

WHEN LAPTOPS COME TO SCHOOL:
HOW DIGITAL IMMIGRANT TEACHERS COPE

by

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DEDICATION

To my nieces and nephew – Shelby, Jillian, Morgan and Michael – and to the digital world you are inheriting. You are truly digital natives.

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An undertaking of this magnitude is never accomplished alone. The completion of this dissertation has also required the support, time, and guidance of many others, and I would like to express my deepest appreciation for their contributions.

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ABSTRACT

WHEN LAPTOPS COME TO SCHOOL: HOW DIGITAL IMMIGRANT TEACHERS COPE

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Ten evaluative reports and two case studies have explored how a one-to-one laptop program functions in a school setting. However, little research has focused solely on teachers. Consequently, the purpose of this study is to investigate how six digital immigrant teachers coped with an education laptop innovation. Seven research questions informed this research, focusing on the impact of being a digital immigrant, problems to be solved, what teachers have stopped doing in order to use the laptops, new activities that have emerged, the perceived benefits and obstacles involved, and the laptop attributes and the program's implementation.

In order to ensure the voices of the six participating teachers were heard, a qualitative case study approach using interviews and classroom observations was conducted, involving as well nine administrative interviews to create the case profile.

One of the major assumptions in this research was that teachers, who were at least 40 years old, would have problems using student laptops. However, the label of “digital immigrant” is not a homogenous concept as the study showed the range of responses to using technology varied considerably, from almost total to very little integration.

A number of innovation adoption systems have described a set of integration stages with the underlying assumption that all teachers move through these stages at various speeds and requiring a variety of support. This study has found, however, what is necessary, for a resister teacher to undertake small integration steps, is entirely different from what an innovator teacher would need. A one-size-fits-all approach based on a set of stages cannot effectively meet such teachers’ needs.

The literature on technology has described sets of characteristics for various adoption categories. This study has found three more – specificity of language, reaction to new technology, and filters for successful integration. In addition, the classroom observations have revealed four important characteristics that can play a role in integration – whether an instructional niche is present; who takes responsibility for learning; where the placement of attention occurs in instruction; and teacher beliefs about the relationship between computers and the learning process.

Finally, the study has found that teachers are not actors in their classrooms. There were no inconsistencies between interview data and class observations. Likewise, the context of the high school and its corresponding laptop program were essential to understanding how these digital immigrant teachers coped with student laptops.

1. Introduction

Ubiquitous, defined as “existing or being everywhere at the same time; constantly encountered; widespread,” (*Merriam-Webster's Collegiate Dictionary*, 1996, Page 1280) has become a descriptor of laptop programs in which every teacher and student has his or her own computer. In February 1990, the Australian private girl’s school, Methodist Ladies’ College, introduced the original ubiquitous laptop program in the world to three teachers and 82 fifth grade students. Six years later, Microsoft and Toshiba created the Anytime, Anywhere Learning program that placed laptops into 53 American public and private schools for the first time. By 2003, over 100,000 students had participated in this program nation-wide (Ross, Lowther, Wilson-Relyea, & Wang, 2003).

With the start of the new millennium, the number of public and private schools which had initiated a laptop program in the United States began to expand. Virginia’s Henrico County, the fourth largest county in the country, started a laptop program for all middle and high school students and teachers in 2000. At the conclusion of the program’s four year cycle, despite limited county funding, the program was renewed (*Henrico County renews iBook program*, 2006). The Liverpool School District in New York State introduced laptops to its high school students in 2000. However, as Stevenson (2004) reports, “By the closing of the third year of the program, a significant and growing schism was developing between the high school and the district office regarding the

Laptop Program – a schism that the evaluator considers to be an overriding factor affecting the success (or lack thereof) of the Laptop Program” (p. 160). Liverpool School District announced the end of its laptop program in 2007.

Quaker Valley School District began a laptop program in 2001 and notwithstanding a challenging start, the program remains ongoing (*Another Pennsylvania district approves iBook program*, 2004). Maine became the first state to provide laptops to all 7th and 8th grade students and teachers statewide in 2002, and in 2006, the program was renewed for another four years (Sharp, 2006). Maine’s Piscataquis Community High School’s laptop program began in 2002. Two years later, Warschauer (2006) noted that Maine’s laptop program was extended on a voluntary basis to high schools, and “a total of 31 of the state’s 176 high schools joined during the 2004-05 school year” (p. 28). Michigan created the Freedom to Learn Project that initiated pilot projects across the state in 2003. The projects remain funded and have begun to show positive results (*Mich. laptop program shows early success*, 2005). Because of the accomplishments of Maine’s laptop program, New Hampshire gave seventh grade students laptop computers in nineteen of its most struggling middle schools in 2004. Connecticut and South Dakota both announced plans in 2005 to provide laptops to all their high school students. Indiana intends to phase in 1:1 desk top computers instead of laptops as they are unwilling to wait until the costs of laptops decreased sufficiently to become a viable option.

For most school districts and states, the cost of a laptop program remains a prohibitive barrier to their adoption. But as textbooks grow more expensive and laptop computers continue decreasing in cost, ubiquitous laptop computing for students and

teachers is becoming ever more attractive and within financial reach. In 2005, MIT announced the proposed development of a \$100 laptop for student use in the developing world (see <http://laptop.org>). As this program has unfolded, the One Laptop per Child (OLPC) organization announced a new initiative called “Give 1 Get 1” in which any individual can buy their own laptop for around \$400 but the price also includes a second laptop which would then be given to countries who can not afford even a \$100 laptop computer for their school children. The Birmingham, Alabama, city council announced that they would purchase the OLPC computers for their district’s elementary school children. (*Birmingham approves low-cost laptop project*, 2008)

As the number of laptop programs continues to expand, the time that Gladwell (2000) describes as the ‘Tipping Point,’ a “moment of critical mass, the threshold, the boiling point,” is moving closer (p. 12). Discovery Education and Pearson Education undertook a national survey of the largest 2,500 school districts to determine who has a laptop program and what new adoptions are planned. The preliminary findings indicated that in 2003, 4% of school districts had a laptop program but this had grown to 24% of those in process of adding a laptop program – an increase of 60% in three years (Ascione, 2006), <http://www.ads2006.org/main/index.php> for a list of key findings. There is even an e-manual on how to implement a laptop program available (*1:1 computing: a guidebook to help you make the right decisions*, 2005).

As schools struggle with getting laptops into classrooms, the teens of America are less technology challenged than perhaps many of their teachers. Prensky (2001) notes that “today’s average college graduates have spent less than 5,000 hours of their lives

reading, but over 10,000 hours playing video games (not to mention 20,000 hours watching TV)” (p. 1). Prensky (2005) has called these students digital natives, defined as “native speakers of technology, fluent in the digital language of computers, video games and the Internet” (p. 9). The Pew Internet and American Life Project (Lenhart, Madden, & Hitlin, 2005), in a 2005 survey about teens and technology, found that:

- Teens are technology rich and enveloped by a wired world,
- 45% of teens have cell phones and 33% are texting,
- Email is still a fixture in teens’ lives, but IM is preferred,
- Teens share more than words over IM,
- Half of families with teens have broadband,
- Face-to-face time still beats phone and screen time,
- Most teens share computers at home and growing numbers log on from libraries, school and other locations, [and]
- The size of the wired teen population surges at the seventh grade mark. (p. vi)

The U.S. government and NetDay undertook a national survey of teens in 2004 with the following question (p. 5): “Today, you and your fellow students are important users of technology. In the future, you will be the inventors of new technologies. What would you like to see invented that you think will help kids learn in the future” (*Visions 2020.2: student views on transforming education and training through advanced technologies*, 2004)? The student responses reflect a very different perspective from that of schools and teachers who are focused on the here and now of education and technology:

Every student would use a small, handheld wireless computer that is voice activated. The computer would offer high-speed access to a kid-friendly Internet, populated with websites that are safe, designed specifically for use by students, with no pop-up ads. Using this device, students would complete most of their in-school work and homework, as well as take online classes both at school and at home. Students would use the small computer to play mathematics-learning games and read interactive e-textbooks. In completing their schoolwork, students would work closely and routinely with an intelligent tutor, and tap a knowledge utility to obtain factual answers to questions they pose. In their history studies, students could participate in 3-D virtual reality-based historic reenactments. (p. 6)

If laptop programs are eventually to become ubiquitous in American education, their implementation will rest primarily on the shoulders of teachers. Yet, research has shown that teachers have been historically resistant to using classroom computers. In the late 1990s, Cuban (2001) conducted a series of surveys of K-12 schools in Silicon Valley, California, and found that the presence of computers did not change what happened in classrooms. Only 10% of the teachers used computers more than once a week. He observed that less than 5% of the teachers had integrated the computers into their curriculum. Becker (2000) undertook similar research and noted in data from the 1998 national survey, Teaching, Learning, and Computing (TLC), that the conditions in which most teachers work made it difficult to integrate computers. Becker explained that class

size, the technology comfort zone of the teacher, the length of the class period, and the constant pressure to cover specific content for high-stakes testing limited what could happen technologically within the classroom.

In the new millennium, however, this depiction of teachers being resistant to using technology has begun to change. CDW-G (*Teachers talk tech 2005: Tools for teachers vs. tools for teaching*, 2005) conducted a 2005 K12 teacher survey with the following conclusions from teachers' responses:

- Computer technology has changed teaching "a great deal."
- Teachers increasingly cite computers as effective teaching tools, but just over half integrate computers into daily curriculum.
- Administrative uses for technology continue to increase in number and effectiveness.
- The link between computers and performance on standardized tests remains unproven.
- Professional development centers on administrative functions, and
- Almost two-thirds of the respondents think there are too few computers in their classrooms. (p. 3)

The laptop literature itself has revealed a mixed picture of the progress teachers make in using laptops. Rockman et al. who examined the Microsoft/Toshiba Anytime, Anywhere Learning program from 1997 to 1999, found that "laptop teachers show significant gains in how often they use computers for specific academic purposes" (1999, p. vii). Stevenson in 1998 and 1999 researched the Beaufort County laptop program and

Liverpool, New York's program from 2001 to 2004. In both instances, he observed that the teachers, who had mixed laptop/nonlaptop classrooms, had decreased using the laptops by the end of the third year.

Urban-Lurain and Zhao in 2004, researched the first five months of Michigan's fledgling state-wide technology program in 2003, and observed that "over 60% of the teachers reported using computers more than 10 hours a week" (2004, p. 1). The only three-year United States private school report comes from the Mitchell Institute by Hill, Reeves, Grant and Wang from 2000 to 2004 when they studied the Laptop Initiative at Athens Academy in Georgia. Although the teachers and students used the laptops for their own separate purposes, the laptops were not used in the classroom for instruction at all over the three year period. In a small study of the New Hampshire laptop program, Bebell (2005) found in a pre/post survey that within the first six months of implementation teachers had already moved from almost never to several times a month in delivering instruction to students and helping students better understand concepts.

Maine's 15-month-old laptop program was investigated by Silvernail and Lane (2004). Ross, Lowther, et al. (2003) evaluated the Anytime, Anywhere laptop program in the Walled Lake Schools, Michigan, in 2001 and 2003. The Mitchell Institute (Great Maine Schools Project, 2004) conducted a two-year review of Maine's Piscataquis Community High School. Kerr, Pane and Barney (2003) studied the two year Pennsylvania Quaker Valley school district laptop program. Zucker and McGhee (2005) through SRI conducted a two year research study of Henrico County's laptop program. None of these studies specifically examined how teachers had progressed in utilizing the

laptops, although the researchers discussed the range of activities teachers used with the computers.

Overall, the latest laptop research conclusions from the study conducted by SRI of Henrico County (Zucker & McGhee, 2005) are representative of the results from the other nine reports:

- Greater access to resources and information for more students and families.
- Increased student motivation, engagement, interest, and self-directed learning.
- More student interaction with teachers.
- Better-organized students.
- Easier access by teachers and students to up-to-date instructional content.
- More flexibility for teachers during instruction.
- Increased professional productivity and greater collaboration among teachers.
- Improved home-school communication.
- An increased need for planning time to make good use of the laptops.
- Added challenges for teachers to manage classrooms and discipline. (p. iv)

All these studies surveyed principals, teachers, students, technical staff, and parents in some combination when conducting the studies. A number undertook observations and individual as well as focus group interviews. Some of the research, in particular Bebell (2005) and Stevenson (1999b), used pre and post testing but the majority concentrated on survey self-reporting and qualitative data. In several instances, case studies were developed of individual schools within a district, and some researchers focused on specific content, such as mathematics and science. Several explored the

differences between laptop and non-laptop students, especially Rockman (1997) and Stevenson (1998) while Ross et al. (2001) explored the differences between classrooms with laptop computer carts and classrooms where all students had their own laptops. All of the laptop research focused on grades six through twelve from the perspective of one to three years of a program's implementation.

In addition, two case study research teams studied middle school laptop teachers in the first year of implementation of their laptop programs. Windschitl and Sahl (2002) used an "ethnographic perspective in examining how three middle school teachers learned to use technology in the context of a laptop computer program" (p. 1). Three years later, Garthwait and Weller (2005) studied two teachers to determine how "teachers use laptop computers in constructing curriculum and delivering instruction" (p. 361). The researchers were particularly interested in what helped and hindered the teachers in their integration attempts with the laptops.

Statement of the Problem

Ten evaluative and two case studies, as well as a number of smaller reports, have evaluated the value and impact of a laptop program on schools, teachers, students and parents. With the exception of the two case studies, teachers have not been the primary research focus. Although there are considerable historical data on teachers and technology, none have explored what happens within the framework of a laptop program. In addition, teachers continue to grow in their technological skills so that their starting point with a new laptop program may be quite different than in the past. Laptop computer programs, although still in their infancy, are becoming increasingly affordable for school

systems looking at new ways to engage students and increase learning. However, Penuel (2006) undertook a meta-analysis of the laptop data currently available. He found that “the educational technology research community’s collective knowledge about one-to-one initiatives has not to date kept up with the rapid expansion of these initiatives or with their breadth” (p. 329). Consequently, broadening and deepening the research on laptop programs remains a priority.

There are numerous stakeholders involved in implementing a laptop program, including community members, parents, school board members, central office staff, state agencies, and school administrators, teachers and students. However, if the laptops are to be integrated into classroom practice, the teacher is the portal through which this must take place. Glennan and Melmed (1996) believe that it is the instruction, content, and strategies of the teacher that make technology effective. Waddoups (2004) undertook a meta-analysis of available literature on technology integration and found among four principles that “Teachers, not technology, are the key to unlocking student potential and fostering achievement. A teacher’s training in, knowledge of, and attitude toward technology and related skills are central to effective technology integration (p. 4).

Among the tens of thousands of teachers who work in public schools, many of them were born before computers or even before televisions were invented. These teachers are what Prensky (2005) calls digital immigrants, “those of us who were not born into the digital world” (p. 9). Such immigrants print documents in order to edit them, call to check if someone got an email, and can be mystified over blogs, instant messaging, wikis, camera phones, and 3D worlds. The U.S. Department of Education

(1999) found in the total American teacher population that “the highest concentration of teachers were [those] in their mid-40s to early 50s” (Figure 12).

Lortie (1975) determined that the model teachers use to teach is the one they were taught with as students. Therefore, when faced with integrating the laptops into their classroom, these digital immigrant teachers have no computer related mental model, relevant prior knowledge, or frame of reference to help them with this ongoing task and challenge. Yet, many such teachers succeed; often well beyond their school district’s expectations. Consequently, understanding how high school digital immigrant teachers in their third year of implementation have coped with integrating the laptop computer as an education innovation will help expand upon the literature on laptop programs.

Research Questions

Five years ago, I embarked on a journey to attain my doctorate degree; at the same time I switched careers to become a high school teacher in English as a Second Language (ESL). Reading (McCain & Jukes, 2001), *Windows on the Future: Education in the Age of Technology*, I realized how profoundly the world around me was changing, especially the potentially enormous possibilities for computers in education. I wanted to understand both personally and professionally how such technology might impact what I and other teachers taught. At the time I took on this interest, I had a very traditional classroom with a desktop computer for my own use and the occasional trip to the school library’s computer lab for the students.

Then, in the 2004-2005 school year, two pivotal events occurred. I conducted an Independent Reader (my literature review) for technology and education, eventually

narrowing the review to laptop computers and their impact on teaching and learning.

Shortly thereafter, my high school became a laptop school, and I found myself actually living this research. As I struggled to integrate the laptops, I observed that other teachers also had similar kinds of issues. Some resolved them far more successfully than I did, and some could not get beyond the basic reality of the laptops in the hands of their students.

Faced with this puzzlement, I explored various approaches to determine how and why teachers integrate – and do not integrate – technology. But as I had found with the ten evaluative studies, these approaches (see Appendix B) are primarily descriptive and judgmental in nature. For example, teacher X is in this integration stage because she or he exhibits a particular set of behaviors. But how did the teacher get there? What did the teacher actually do? How did they cope? Windschitl and Sahl (2002) observed that for researchers, “the idea of stages as a linear, universal path that all (or most) teachers follow is problematic...” (p. 2). My own laptop experience was not a step-ladder progression that neatly put me in upwardly successive boxes.

I have also come to realize that my research focus has been driven by my status as a digital immigrant, born even before the birth of television. There were no computers present throughout my middle-class public education, in my four year college, or in my master’s degree in teaching program. It was not until well beyond college that I finally came in contact with a computer. The technical expertise I gleaned over the following twenty-five years was only transferable as a teacher, however, for grading, attendance and other administrative activities. I began to wonder if others like me – digital immigrants – are equally challenged, and how they have coped.

Consequently, I want to understand the interaction of a phenomenon – a laptop computer program – with digital immigrant high school teachers. My foundation question is: “How do digital immigrant teachers cope with laptop computers as an education innovation?” Seven subquestions are used to investigate the foundation question:

- 1) How has being a digital immigrant affected teachers’ integration efforts?
- 2) What problems do the teachers believe the laptops are supposed to solve?
- 3) What have teachers ceased doing in order to utilize the laptops?
- 4) What new laptop activities, approaches and strategies have teachers begun to use?
- 5) How have teachers’ use of and attitudes towards the laptops evolved over the three years?
- 6) What roles have teacher perceived laptop benefits, obstacles, and laptop resources played in integration?
- 7) How have laptop characteristics and the program’s implementation helped or hindered teacher integration efforts?

The Conceptual Framework

Miles and Huberman (1994) define the purpose of a conceptual framework as a vehicle to “explain, either graphically or in narrative form, the main things to be studied – the key factors, constructs or variables – and the presumed relationships among them” (p. 18). They suggest the use of bins as a means of identifying the various aspects that are important. Each of the research subquestions are related to one of these bins. Question 1 refers to digital immigrants, question 2 to problems laptops are supposed to solve, question 3 to what’s lost, question 4 to what’s gained, question 5 to attitudes, question 6 to benefits, obstacles, and resources, and question 7 to attributes. Each of these bins and

related research subquestions are explored further through the literature review in Chapter 2. The bins are placed over the symbols of high school that already exist prior to the implementation of a laptop program.

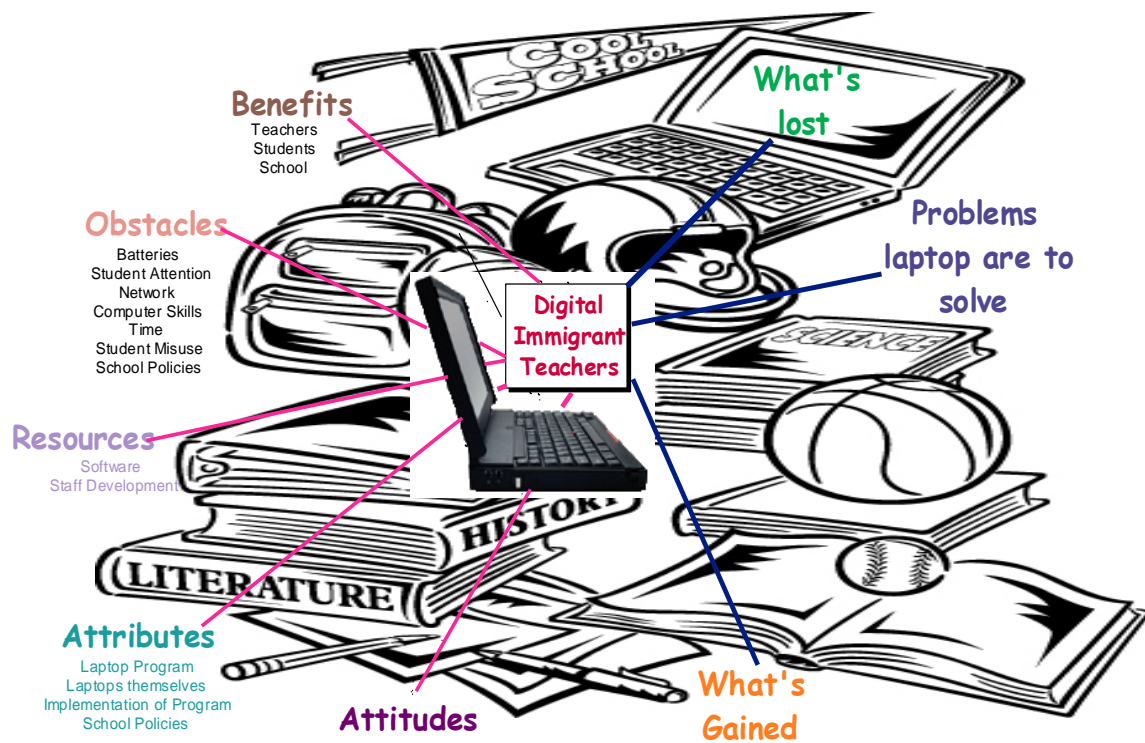


Figure 1. The conceptual framework

Significance of the Study

The purpose of this study is to learn how digital immigrant teachers cope with laptops as an education innovation. The research builds upon the laptop studies already conducted over the past ten years. I focus on the case of one school and carry out research on six digital immigrant high school teachers. Through this group of teachers, I intend the study's findings to ultimately aid the efforts of laptop teachers in integrating the laptops into their classrooms. As laptop teachers grow more comfortable with the benefits of

using the laptops and increase their use of this innovation, the laptop program can become more productive and effective in helping students learn.

Assumptions, Limitations and Delimitations

There are two assumptions in this study. The first is that digital immigrant teachers are different from all other teachers in terms of lack of prior education experience with computers and, as such, this can have a bearing on how they cope with laptop computers. The second is similar to Windschitl and Sahl (2002)'s observation that "...in contrast to the more conventional presence of desktop technology in schools, laptop programs create novel circumstances and introduce special features..." (p. 3). I have used school computer labs, laptop carts, and now ubiquitous laptops and I have found that laptop programs are not merely a matter of multiplying access to more computers.

For example, in a study comparing students having their own laptops with students using laptop carts, researchers (Ross et al., 2001) found that "laptop teachers experience greater benefits from student use of laptops than teachers who use the mobile cart" (p. 59). They attribute this finding to some of the unique aspects of a laptop program – "...knowing that students always have computers, the teachers do not have to create a special 'computer lesson plan' because integration is a natural part of everyday teaching and learning" (p. 59).

This study is limited to one high school in its third year of implementation. While some effort is made to determine the representativeness of the case in terms of the ten evaluative laptop studies, the school in this study remains unique. The participants

likewise represent no persons but themselves. However, Maxwell (2005) noted that qualitative studies can be generalizable either within or beyond the specific context and participants involved in the research. Weiss (1994) wrote that case studies “make the reader aware of the respondents’ experience within the context of their lives: this is what it means to be this person in this situation” (p. 168). Through investigating how digital immigrant teachers cope with laptops, I intend the readers to gain an understanding of how such teachers contend with the complexity of a laptop program. Weiss further wrote that case study readers “...believe themselves to be learning not just about particular people but about people who are like them, not just about particular situations but about a class of situations” (p. 168).

The delimitations of the study focus on the third year of the school’s laptop program in the 2006-2007 school year. I further limit this study to how digital immigrant teachers describe their coping with the laptop program. This coping involves understanding what problems the laptop computers are intended to solve, what is gained and lost in integrating the laptops into the classroom, and how the benefits and obstacles, various attributes of the laptop and its program, teacher attitudes, and the other new resources help or hinder their coping. However, I also allow for the possibility that there may be other, unforeseen, consequences that neither the laptop literature nor I have yet observed. Lastly, a laptop program by its very nature is complex, and although I have isolated a number of factors from the literature that can influence how teachers cope with laptops, again, I provide space for other influences to emerge.

Definitions of Terms

Digital Immigrant teacher – a teacher who is born, attends school, becomes a teacher, and teaches prior to the advent of computers in education, in essence a ‘baby boomer.’

Laptop Program –a complex program designed to introduce laptop computers for every student and includes the laptops themselves, batteries, projectors, the network, digital resources, technical support, staff development, school technology policies, and the implementation process.

Curriculum – the subject a teacher is required to convey to his or her students, including the content to be taught, the standards teachers are expected to meet, pacing guides, handouts, textbooks, and other content material.

Instructional Practices – all of the behaviors, strategies, lesson plans, goals, and activities that a teacher carries out in order to help students learn the curriculum being taught.

Teaching Behaviors –classroom behaviors not directly related to instructing students that include the taking of attendance, maintaining a grade book, managing classroom discipline, building relationships with students, establishing expectations, defining the roles of teacher and student, and communicating with students.

Laptop Integration – Teachers focus on the content – not the computers. The laptops become fundamentally invisible. Weiser (1991) notes that “the most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it” (p. 1). Kerr et al. (2003) further define laptop

integration to situations where teachers “plan lessons around content material while finding or recognizing appropriate technology applications for that content” (p. 35).

Coping – the ability “to deal with and attempt to overcome problems and difficulties” (*Merriam-Webster's Collegiate Dictionary*, 1996, Page 256).

Education Innovation – Any new program, equipment, or priority introduced into a classroom for the purpose of helping students learn. Such innovations have historically included televisions, overhead projectors, reading programs, new math, and now one-to-one laptop computer programs.

Organization of the Study

Because laptop programs are only ten years old in American education, the focus of the research has been on exploring the nature of laptop programs, how they are implemented, and what outcomes have been observed from the combined perspectives of school administrators, teachers, students, and parents. Researchers have also conducted two laptop teacher case studies but there remain many gaps, including how digital immigrant high school teachers in their third year of implementation have coped with their students' laptops. The following chapter focuses first on an overview of the multi-year evaluative and case laptop studies and their settings. Then from a literature perspective, I examine each of the study's subquestions – the problems the laptops have historically solved (question 2); what has been lost through using the computers (question 3); what has been gained (question 4); the attitudes of teachers participating in a laptop program (question 5); the benefits, obstacles, and resources that have emerged (question 6); and how the attributes of the laptop, its program characteristics and implementation

(question 7) have assisted teachers in using the laptops through the learning process with their students.

2. Literature Review

The purpose of this study was to investigate how digital immigrant high school teachers coped with a laptop education innovation. In this chapter, the relevant literature on one-to-one laptop programs is evaluated. Krathwohl and Smith (2005) suggested a set of four essential tasks for a dissertation literature review:

- survey a select group of studies that provide a foundation for the proposed project;
- discuss these studies in detail sufficient to provide an understanding of their relevance;
- describe how they contribute to the study;
- indicate how the study moves beyond them. (p. 50, quoted in Maxwell, 2006, p. 29)

The first task is to identify the key laptop literature that can provide a foundation for the study. This literature has produced a rich set of data that come primarily from ten evaluative reports and two case studies. The reports and studies are first described below, along with a brief account of the settings of these programs.

The second task is to discuss this literature to provide an understanding of the data's relevance. The data from the laptop literature review are divided into the study's six research subquestions, although there is no research available for question 1 – How

has being a digital immigrant affected teachers' integration efforts. Maxwell (2006) particularly noted, "Relevance, rather than thoroughness or comprehensiveness, is the essential characteristic of literature reviews in most scholarly work..." (p. 29).

Consequently, the relevance of the literature's data is to establish a framework against which the study's context, data, and findings can be weighed.

In addition to the review of the laptop literature, three theories provide direction for the study, including Bridge's (1991) coping with change theory, Rogers' (2003) innovation adoption theory, and Roschelle et al.'s (2001) laptops and learning theory. While these theories are not manifest directly within the literature, they do have relevance in understanding the study's data, especially as discussed in Chapter 4.

The other two tasks noted by Krathwohl and Smith (2005) are discussed at the end of the chapter. First the literature is analyzed in how it has contributed to the study and then how the study has moved beyond the data of the ten evaluative laptop reports and the two case studies.

The Laptop Evaluative Reports

Rockman et al. (1997) researched Microsoft and Toshiba's Anywhere, Anytime Learning Program for its first three years of implementation. The report first evaluated the general impact of laptops on a variety of schools from the perspective of their teachers. In the second year, Rockman (1998) limited the number of schools but expanded the scope to incorporate both students and teachers and included a simulated writing project. The final year's study (Rockman et al., 1999) further narrowed the

number of schools and attempted to examine the impact of laptops on standardized test scores.

Beaufort County in South Carolina introduced a three-year laptop program to its middle schools in 1996. As only 300 sixth grade students actually received laptops, all the classrooms had a mixture of laptop and nonlaptop students. Stevenson's (1999b) first year report was a pre/post test focusing on perceptions of the program. The second year's report (Stevenson, 1998) concentrated on the academic achievement scores of the MAT7 (a nationally standardized achievement test). By the third year, there were laptop students mixed into all three middle school grades where classrooms showed a marked decrease in usage (Stevenson, 1999a).

Liverpool, New York's school district, also studied by Stevenson (2001), had a laptop program in which parents paid for their own laptops. The program was introduced by grade level, one per year, starting with 10th grade. By the third year, all three grades had mixed laptop/nonlaptop classes. However, Stevenson surmised a political conflict over control between the district and the high schools had negatively impacted the effectiveness of the program by the end of the third year, and the program was eventually cancelled.

Walled Lake Schools, Michigan, was evaluated by Lowther, Ross and Morrison (2001) as one of the Anytime, Anywhere Microsoft/Toshiba program schools. The researchers studied the impact the laptop program had on teaching, student behavior, and student achievement. The researchers used a comparison of classrooms with all students

having their own laptops, and classrooms where teachers only had access to a laptop computer cart.

Maine's One-to-One Laptop Program study (Silvernail & Lane, 2004) covered the initial 15-month period of implementation from 2002 to 2003. For teachers in particular, the researchers wanted to explore the laptop's influence on classroom behaviors, instructional practices, curriculum changes and staff development. They also examined the laptop's effect on students, on the school, and on families and communities.

Piscataquis Community High School, in Maine, was studied by the Mitchell Institute (Great Maine Schools Project, 2004). Through a two year grant, this high school was an experiment to determine what might happen when laptops were given to Maine high school teachers and students. At the time of the grant, Maine's statewide laptop program was limited to middle school teachers and students.

Michigan's Freedom to Learn Program (Urban-Lurain & Zhao, 2004) was evaluated at the end of the first four months of implementation. The timing of the report (end of the school year), lack of sufficient responses from both schools and participants (especially students and parents), and the initial short duration of the program had a major impact on what the researchers could report.

Quaker Valley School District's research study (Kerr et al., 2003) encompassed both years of the program. While the other multi-year evaluative studies had been largely positive, the Quaker Valley report consistently emphasized the more negative qualities of the program – even when discussing positive elements such as program benefits. The

researchers attributed this primarily to an inadequately planned staff development program.

Henrico County, Virginia, was studied by Zucker and McGhee (2005) with the primary focus on science and math laptop classes. The researchers explored what teaching and learning practices were being used with laptops in these two subjects.

Athens Academy in Georgia, (Hill, Reeves, Grant, & Wang, 2000) had the only three year study of a private American school where laptops were introduced first to the middle school and then to the high school teachers and students. The researchers' goals were "to optimize and document the impact of portable technologies on teaching, learning, and other aspects of life within the Athens Academy community" (p. 2).

Windschitl and Sahl (2002) undertook a case study in Woodvale Middle school. They studied three middle school laptop teachers' belief systems about learning, definitions about what was considered "good teaching" within the school's culture, and about the role of the laptops in students' lives.

Garthwait and Weller (2005) investigated, through a case study approach, two Maine teachers at Hillside Middle School. The research focused on the goal of "examining how one-to-one computing interacted with teaching styles as well as determining the barriers for teachers who were integrating the laptops into teaching and learning" (p. 362).

This study's high school laptop program was evaluated at the conclusion of its first year of implementation by Dawson et al. (2006) to understand what progress had

been made in implementing the laptop program for 9th through 12th grade teachers and students and to determine how well the goals of the program were being met.

Settings

In order to better understand the context of the laptop findings, a brief overview of the settings provided by the researchers is described. In a number of studies, Liverpool, New York; Beaufort County, South Carolina; Walled Lake Schools, Michigan; and the states of Maine and Michigan, no data was available on the characteristics of the school systems or of any particular school.

Rockman et al.'s study (1997) initially had 10 private schools and 16 public school districts. Nineteen were middle/high schools, and seven were elementary schools. Student populations ranged from 19 to 510, and the public school districts encompassed one-school districts to those serving thousands of students. The settings varied from rural to urban, affluent to poor, and small to large school districts. In the study's subsequent years, the number of participating schools decreased but remained a mixture of public and private schools.

Piscataquis Community High School, (Great Maine Schools Project, 2004), is located in rural Piscataquis County, Maine, with 285 grade 9-12 students at the time of the study. Students were expected to take a college-preparatory curriculum, and there were 26 teachers in the school.

Michigan's Laptop program study (Urban-Lurain & Zhao, 2004) had demonstration (6), showcase (1), and application (8) sites, totaling 7,051 middle school students and 512 teachers. The demonstration sites received funding to set up a laptop

program while the application sites were provided with funding to expand their existing programs. The sole showcase site was not discussed. In the initiative, the state supplied different technology devices including handheld computers, personal data assistants (PDAs), mobile carts, computer labs, and laptops. At the start of the program, two thirds of the principals were male and three quarters of the teachers were female. The technology staff was evenly divided male/female. The participants in the study were overwhelmingly white. Seventy-four percent of the schools were rural, 20% urban, and 6% suburban. Almost half the schools had between 26-50% free or reduced lunch students. Less than 10% of the students qualified for special education or gifted and talented programs respectively. More than a quarter of the participating schools had over half of their students with their own home computer.

Quaker Valley School District is located near Pittsburgh, Pennsylvania, and at the time of the study had about 2,000 students in four schools. Eleven percent of the students were African-American (8%), Asian (2%), and Hispanic (1%) with the remainder as White (89%). The portion of free or reduced lunch students was 12%.

Henrico County is located near Richmond, Virginia with 64 schools, including ten high schools and eleven middle schools. In 2004, there were over 45,000 students and 3,000 teachers. The percentage of free or reduced lunch students in the district was at 27%

Athens Academy is an independent co-education day school in northeast Georgia. The school had both middle and high school students, predominately white (80+ %),

followed by Asian (5-10%) and African-American/Hispanic (1%) during the study's the time period.

Woodvale Middle School is a co-education Catholic independent school located in an urban-suburban section of a major Northwest city. When the study was conducted, there were about 150 average or above-average students from predominantly affluent families. The school had required families to buy the student laptop computers while the infrastructure and teacher laptops were provided by the school.

Hillside Middle School is in rural Maine. In 2004, there were 380 students who reflected the ethnic composition of the town: 95.6% White, 1.7% African-American, 1.2% Asian, 0.7 Native American and 0.8% Hispanic.

This study's case, Jesse Jackson High School (pseudonym), is located in the inner suburb of a major metropolitan East coast city. The school district is small with thirteen elementary schools, two middle schools, one high school, and a separate ninth grade school, Susan B. Anthony (pseudonym). In 2004, the high school had approximately 2,000 students. One of the reasons in choosing Jesse Jackson for this research is that the school had a diverse student population comprised of African American 43%, Hispanic 25%, White 24%, Asian Pacific 7%, and Native American 1%. More than 88 countries of birth were represented in the district as well as 69 native languages. Jesse Jackson's free or reduced price meals ratio was 41%. This diversity is in considerable contrast to the majority of the schools in previously noted studies where the student body was mostly white, and the free and reduced ratio was on average about ten percent.

Coping with Change

Bridges (1991) points out three stages through which people move when coping with change. The first stage acknowledges the end of something that has gone on before. There is a sense of loss and of having to let go. There must also be an acknowledgement that something is sufficiently wrong to need fixing. The feelings may involve anger, bargaining, anxiety, sadness, disorientation, and depression. Bridges points out that often people must first be sold on the problem rather than on the solution.

The second stage, transition, is the in-between time which Bridges defines as “the psychological process people go through to come to terms with the new situation” (p. 3). He believed that it is the transition stage that is the most troublesome. “It is a time when the old way is gone, and the new doesn’t feel comfortable yet” (p. 5). Bridges wrote that when people (and organizations) are in transition, there is increased anxiety, feelings of failure and inadequacy, mixed signals, ambiguity, uncertainty, and vulnerability. At the same time, the transition can be a fertile and creative period when people become freer to challenge the status quo and deal with previously unresolved problems.

When moving on to the third phase, the beginning – after the ending and transition stages – people may still feel ambivalent because the shift to the beginning truly marks the end of the past. The new way of doing something also represents a gamble. In addition, it may bring back past change attempts that met with failure. Bridges believed that people must work their way through all three phases, endings, transitions, and beginnings, in order to successfully cope with change.

For teachers who must manage the complex challenges that a laptop program can introduce, they must be convinced that there are problems that the laptop program is intended to fix (both systemically and in their own classrooms). Teachers need to understand what they have to give up, work their way through the transition, and begin with the new change. This process can be repeated again and again as the teachers explore different ways to integrate the laptops into learning.

Innovation Adoption

Rogers (2003) defined the diffusion or adoption of an innovation as “an uncertainty reduction process” (p. 232). People considering, for example, a laptop program want to know if they will be better off by integrating the computers. The best predictor of an innovation being accepted is its relative advantage, “...a ratio of the expected benefits and the costs of adoption of an innovation” (p. 233). For teachers to begin using laptop computers in their instruction, they need to understand what the benefits are and what costs will be involved. This complements Bridges’ theory of coping with change where teachers need to understand what benefits they will receive from making the change and what they have to let go – the cost.

Innovation adoption theory also focuses on compatibility, “the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of [the] potential adopter” (p. 240). If using laptops is compatible with a teacher’s values and past experience, the teacher is much more likely to begin using the laptops. In addition, adopters are helped if the innovation is sufficiently similar to previous changes. “Old ideas are the main mental tools that individuals use to assess new ideas and give

them meaning” (Rogers, p. 246). Another element in compatibility is whether the innovation meets a perceived need. However, teachers may not realize that “they have a need for an innovation until they become aware of the new idea or its consequences” (Rogers, 2003, p. 246).

Moreover, complexity can have a major negative influence on the adoption of an innovation. Rogers (2003) defines complexity as “the degree to which an innovation is perceived as relatively difficult to understand and use” (p. 257). A laptop program is both complex and simple. It is simple in that the students arrive holding the computers but it is complex in what teachers must decide about the ways in which laptops can be used to support teaching and learning. Consequently, trialability and observability become important. Trialability is “the degree to which an innovation may be experimented with on a limited basis” (Rogers, 2003, p. 258). Observability is how much the results of those experiments are visible. In the case of laptops, the teacher can experiment to their personal degree of comfort, and the results are generally visible – desirable or undesirable as well as anticipated and unanticipated.

Laptops and Learning

Roschelle et al. (2001) have analyzed “the various ways computer technology can be used to improve how and what children learn in the classroom” (p. 2). The researchers note that in the past century considerable progress has been made in discovering how children learn best:

Learning is most effective when four fundamental characteristics are present: (1) active engagement, (2) participation in groups, (3) frequent interaction and feedback, and (4) connections to real-world contexts. (p. 5)

As the researchers point out, although generally computers are effective in increasing all of these characteristics, student laptops can be especially valuable. With regards to the first characteristic, the evaluative studies' findings have consistently revealed that students are more actively engaged when they study with laptops.

While students can participate in small groups with or without computers, the kinds of laptop projects with which teachers can challenge their students often go far beyond traditional small group activities. As Roschelle et al. (2001) observe, "Performing a task with others not only provides an opportunity to imitate what others are doing, but also to discuss the task and make thinking visible" (p. 8). Laptop students who must learn to work together to produce multi-media reports or electronic presentations can gain valuable small group experience working with technology.

In terms of feedback and interaction, computers have a distinct advantage over other media as computers actively encourage interactivity and, depending on the software, can provide immediate and continual feedback to the student. Laptops also facilitate students working for longer blocks of time without interruption. Researchers (2001) further note that "in some cases, computer tools can be used to analyze each child's performance and provide more timely and targeted feedback than the student typically receives" (p. 11).

The fourth characteristic, real-world contexts, again is clearly enhanced with laptops that provide a window to the world for each student. While many traditional problem-solving activities can end up completely divorced from the world outside of school, Roschelle et al. (2001) believe that computers have the potential to dramatically transform this situation:

Through the communication features of computer-based technology, students have access to the latest scientific data and expeditions, whether from a NASA mission to Mars, an on-going archeological dig in Mexico, or a remotely-controlled telescope in Hawaii. Further, technology can bring unprecedented opportunities for students to actively participate in the kind of experimentation, design, and reflection that professionals routinely do, with access to the same tools professionals use. (p. 12)

When the four characteristics are present and fully applied in classrooms through the use of laptops, learning can be profound, meaningful, and continual (Roschelle et al., 2001).

In the following sections, program expectations –what the laptops are expected to fix – are examined. Next, what is gained and/or lost in integrating the laptops is discussed, followed by the perceived benefits of and obstacles to using laptops. The attitudes of teachers towards laptop programs, the attributes of the laptop, and new resources available are discussed in terms of their impact on how teachers cope with student laptops.

The Problems a Laptop Program is to Solve

Only some of the evaluative studies emphasized the importance of having a vision – or goals – for their respective laptop programs. These visions and goals are to solve perceived problems, with a number of studies commenting extensively on the “digital divide” or lack of technology equity a laptop program could resolve. Rockman et al. (2003), in particular, believed that a program’s success largely depended “on which rationale was the driving force behind it” (p. 25). Consequently, first the program goals for some of the studies are discussed, followed by equity (the digital divide).

Program Goals

Six of the studies described the objectives for their schools’ laptop programs. The common goals were 1) to improve student learning and/or achievement; 2) to help students prepare for the 21st century; 3) to support teachers in adopting the laptops into classroom instruction; and 4) to reduce the digital divide between students having access to computers and those that do not.

Liverpool (Stevenson, 2001) had the following program goals:

- expand and enhance learning opportunities
- improve student achievement, creativity and motivation
- seamlessly integrate advanced computer technology into classroom practice and learning at home
- better prepare students for a lifetime of success in a technology-rich world. (p. 1)

The Freedom to Learn Program (Urban-Lurain & Zhao, 2004) aimed at systemic changes that would help the learning environment. The program had these goals:

1. Improve student learning
2. Empower parents with the tools to become more involved
3. Empower teachers to teach and share ideas beyond the walls of their classrooms
4. Create equity for educational opportunities through universal access to technology
5. Help foster effective and efficient learning environments
6. Provide Michigan students with the skills to lead in the 21st century workforce. (p. 6)

Quaker Valley (Kerr et al., 2003) had seven state-wide goals involved in creating “Digital School Districts” in 2002:

- developing a new educational paradigm enabled by technology and systematic reform;
- increasing student achievement related to the PA Academic Standards;
- increasing the appropriate and effective use of technology in teaching, learning and managing schools;
- developing strategies to overcome challenges when maximizing the benefits of educational technology;
- bridging the “digital divide” within communities;

- developing partnerships with world-class companies and education institutions; and
- serving as a model of the innovative use of technology to other schools. (p. 1)

Henrico County (Zucker & McGhee, 2005) had as its central goal to help provide its students with 21st century work skills and to reduce the digital divide. Additionally, the district wished to reduce its reliance on print text and move more towards digital formats with the cost savings placed back into the laptop program.

Athens Academy (Hill, Reeves, Wang, Han, & Mobley, 2002) started introducing technology in 1990. The final phase beginning in 1999 (the time of the study) had the following goals:

1. expanding the innovative practices with the integration of personal technologies (laptop computers),
2. enhancing and developing models for faculty development, and
3. developing and implementing an evaluation to document the impact and the effectiveness of the personal technologies on teaching and learning. (p. 3).

Dawson et al. (2006) reporting on Jesse Jackson High School's laptop program wrote that in 2004 the district school board created the strategic goal that "technology would be integrated into all aspects of school operations including curriculum, academic standards, and instructional delivery" (p. 1). In addition, the school board had the following objectives:

- prepare students to compete technically in school and work;
- address the opportunity gaps inherent in [the district's] digital divide;
- facilitate the integration of technology into teaching, thereby expanding students' research, analysis and presentation opportunities;
- address individualized instructional needs, including advanced research as well as targeted skill and content intervention; and
- address both family literacy and family communication with staff. (p. 1)

Equity

Not all students have equal access to technology, either at home or at school. This is particularly exemplified by a U.S. Department of Commerce report (2002) which found that “minority students and low-income students are much more likely to rely on their schools to provide their only access to computers and the Internet,” and noted the “substantial equalizing effect of schools on both computer and Internet use as compared to use at home” (p. 88).

Most of the evaluative studies' laptop programs sought to address the equity issue. Rockman (1997) found in his study's pilot year that many of the participating schools had had little to no access to technology. He noted that “some administrators saw the program as an opportunity to address inequities they saw in their student population – with the laptop program, all students could have a home computer” (p. 18). Henrico County's laptop program also wanted to minimize the growing gap between students who had access to laptops and those who did not (Cook, 2002). For Piscataquis teachers (Great Maine Schools Project, 2004), “one-to-one laptops have helped to ‘level the

playing field' at school or have minimized differences between 'haves and have-nots'" (p. 3). Both Henrico County and Quaker Valley County attempted to provide Internet access in student homes to further decrease their districts' digital divides.

In this study's case, a 2004 survey (Dawson et al., 2006) given to new 9th grade students graphically illustrated the digital divide the school board was concerned about.. Eight percent of the students had no computer at home, and 23% had a computer with no Internet access. Seventy-three percent of students reported having at home an adult who had gone beyond a high school education. Of these students, only 5% had no computer access, and 34% used a computer less than 4 hours a week. However, for 27% of the students who had no adult at home with education beyond high school, the number without a computer rose to 15%, and the less than 4 hours a week usage increased to 66%.

Dawson et al.'s report (2006) further noted that "students on free/reduced meals agreed more frequently than regular-priced meal students that the laptop made it easier to do research for school projects, and they were also less likely to have a computer, printer, and Internet access at home" (p. 44). The same was said by English as Second Language students as well as by non-white minority students.

What has been Lost or Gained?

While the research questions focus separately first on what has been lost and then on what has been gained in using the laptops, the literature data combine these two questions into one topic. Consequently, the research questions: Question 2, what has been lost, and Question 3, what has been gained, are combined in this section.

According to Bridges' theory (1991), teachers must understand what is gained or lost in deciding to use the laptops in their classrooms. The laptop literature has noted that teachers frequently change their teaching style, increasingly use the laptop for administrative purposes, work through what can and can not be accomplished using the computers, figure out how to physically adapt their classroom, consider changes in teacher/student roles, work through shifts in classroom interactions, and open up new ways to communicate.

Teaching Styles

Gillespie (2001), in her dissertation on the impact of laptops on teaching styles, used Mosston's (1972) three types of teachers – command, reciprocal, and inclusion. There was an assumption in both her dissertation and the evaluative studies that moving from command to constructivism was a positive change. A command teacher is someone who is entirely in charge with students following the teacher's lead and has a traditional or teacher-centered classroom. In the reciprocal style, the interaction between the teacher and students is more give and take. The last style, inclusion, which Gillespie redefined as constructivism, is student-centered with the students taking on primary responsibility for their learning (Mosston, 1972).

Only three of the evaluative studies reviewed in this chapter focused directly on modifications in teaching styles. Rockman (1997) found significant changes over the three year period from a command to a constructivist perspective. Rockman determined that even in the first year teachers were already shifting their teaching styles. These changes particularly involved project based instruction and a reduction in the overall

traditional teaching style. By the third year, Rockman ((1999) observed that laptop teachers “showed statistically significant change toward more constructivist teaching practices” (p. vii). Laptop teachers’ constructivist style changes included:

- teacher as facilitator rather than expert;
- emphasis on thinking skills over content;
- interest-driven curriculum over specific content;
- multiple activities and movement around the classroom;
- use of student-driven curriculum;
- use of student projects;
- not using homework to answer textbook questions;
- choosing complex ideas over those easily graspable;
- assessing student products rather than tests;
- collaborative work;
- teacher as learner and student as teacher; and
- student-led inquiry. (p. 32)

The research on Piscataquis High School (Great Maine Schools Project, 2004) indicated that the only significant changes in teaching styles were in students exploring their own topics and students teaching teachers. Other practices remained the same despite the influence of the laptops – students doing multiple activities, evaluating their work, conducting research, following their own interests, receiving direct instruction, writing at least a page, and taking quizzes and tests. However, using textbooks as the

primary source and answering textbook questions were activities that decreased in occurrence. The report also indicated that many of these practices had been in place prior to the implementation of the laptop program.

Researchers of Athens Academy's study (Hill & Reeves, 2004) focused considerable attention on how teachers had not shifted their teaching styles from the command mode despite the infusion of laptops.

During the four years that we collected evaluation data at the Athens Academy, we saw little shift in the underlying infrastructure in the classroom. The strategies being used to assist with learning remain predominately the same – teachers lead and learners follow. (p. 8)

The researchers went to considerable lengths to explain that changes in how teachers teach take time (and obviously beyond three years). The teachers did state that they wanted to change their teaching styles but, despite considerable training and encouragement, they remained within the command style.

In a small study, Kemker and Barron (2004) wrote about how two different teachers, one traditional and one constructivist, conducted their classes using technology. The traditional teacher taught her students all the 'techie' terms while the constructivist teacher emphasized the lesson, not the technology. When using technology, the traditional teacher "spent most of her time going from computer to computer touching the trackpad to solve problems for the students" (p. 8). At year's end, her students were dependent on the teacher to find solutions to problems. In the constructivist classroom, the teacher only observed her students and did not step in to help unless requested.

Students often solved their own problems or asked each other rather than the teacher.

When the researcher questioned the constructivist classroom students about their laptop computers, students discussed the projects they had done and never talked about the computers. In the traditional classroom, however, students expressed their frustrations with computers and the various software programs they had had to use.

Administrative Use

Quaker Valley researchers (Kerr et al., 2003) observed that teachers believed their administrative and instructional workload had increased because of the laptops. While some felt computers had assisted in making their work more efficient, others reported no savings of time. Additionally, teachers felt they spend a lot of time helping “students with technical problems related to their laptop computers, which sometimes interfered with lessons or other instructional time” (p. 38). A few teachers reported that the laptop was “supposed to help kids learn, to be a tool to drive education. Instead it’s driving us” (p. 47).

Zucker and McGhee (2005) found that teachers felt computers “allowed them to more efficiently design and create materials, prepare lesson plans, diagnose student weaknesses, and communicate with colleagues, parents, and students” (p. 19).

Photocopying decreased because teachers could digitally provide documents to their students.

Appropriate Activities

Rockman observed that the teachers’ particular teaching style influenced how they decided to use laptops in their classroom. Constructivist teachers focused on

practical applications and left students on their own to pick up the basic computer knowledge. Teachers also felt laptops were not a universal tool for every application possible but rather that students should learn when laptops were appropriate and when they were not. Likewise, teachers believed that what could be done with pencil and paper should be, and laptops ought to be saved for activities that best used their special capabilities. For example, writing should be conducted directly on the computer because of the laptop's unique ability to facilitate editing. Traditional teachers concentrated on teaching students how to use the laptops, believing that the computers must be used for everything possible in order to make the most of the investment and to help the students become more comfortable in using the laptops. From these teachers' perspective, writing ought to first focus on keyboarding skills. Likewise, the teachers would choose computer worksheets to help students learn more computing skills.

Changes in Roles

Rockman (2000) explained there is often an unspoken fear that teachers will be replaced by machines, especially the computer. In a laptop program, teachers can cease being the only expert in the classroom because students now have access to enormous amounts of information through the Internet, much of which the teacher may not even know. With laptops, teachers stop being the center of everything, particularly as students begin to take charge of their own learning. It takes some time for teachers to realize that they are as vital as ever, if not quite in the same way.

Ultimately, Rockman (2003) noted, "teachers become students and students become teachers, all with the goal of developing new skills and acquiring knowledge" (p.

8). In addition, when teachers have to learn how to use technology, they become more aware of how their students struggle to learn. They, thus, gain a new understanding of the learning environment in their classrooms (Rockman, 2003).

Classroom Interaction

Windschitl and Sahl (2002) observed that when one of their teachers began to use the laptops, the classroom became more active. The teacher found that her “tolerance of them [students] not being completely quiet ha[d] changed as well” (p. 8). She also realized that her students were not focused on her all the time. Another teacher began to use projects, but when he attempted to objectively assess the students’ work, he found, “It’s just more difficult. It’s more subjective, and it [assessment] becomes very ongoing” (p. 10).

Gillespie (2001) stated that laptop teachers must build a sense of flexibility, balanced by a sense of structure far more so than in a traditional classroom. Kinnaman (1993) noted that “good teachers understand the delicate balance between stimulating and agitating, between probing and providing, between observing and directing” (p. 94). Laptop teachers particularly need these same skills as Rockman observed that the role of teacher is changing from a giver of knowledge to a facilitator or guide to students in their own quest for knowledge.

Maine school teachers (Silvernail & Lane, 2004) outlined a number of teacher perceptions concerning how laptops had affected their classroom culture and learning environment but none of these were viewed as a major disadvantage:

- Often too many students need my help at the same time.

- Computers are too unpredictable – they “crash,” or the software doesn’t work right.
- Students can cheat easier – copying work and turning it in as their own.
- Many students use computers in order to avoid doing more important classwork.
- Many students are not careful enough with this expensive equipment.
- It is difficult to integrate computer activities into most of my regular lesson plans.
- A teacher has to give up too much instructional responsibility to the computer software – I feel like I’m not really “teaching.”
- Computers are hard to figure out how to use.
- Students often get so wound up; I can’t get them to settle down afterwards. (p. 78-80)

Similarly, at Piscataquis High School (Great Maine Schools Project, 2004), one teacher believed her students’ skills in reading and writing had decreased because of the laptops while another felt that students’ problem-solving skills were negatively impacted by the computers.

On the other hand, a teacher at Hillside Middle School (Garthwait & Weller, 2005) used student laptops to “...redress issues with their science textbook...” (p. 366). She also found an increase in motivation when she compared students’ use of worksheets

versus online activities. Students did not seem to need her as much electronically, and “they complained less and appeared to think and work more independently” (p. 366).

For Henrico teachers and students, using laptops provided more venues for discussion and expanded interactions because students were more willing to ask questions. At the same time, other interactions decreased between teachers and students because of the quantity of independent work students could now do without working directly with their teachers (Zucker & McGhee, 2005).

Communications

How teachers communicate with their students can also change when laptops are introduced into the teaching and learning context. Traditionally, teachers have used paper to provide notes, grades, assignments, and tasks. Now, teachers can use their own websites to accomplish most, if not all, of this contact. A web chat room can be used for the kinds of communication that used to be done face to face. These same websites may likewise be employed to keep in touch with parents who can see what their children are required to do and even see copies of their work online. Besides websites, the web based program Blackboard (and other similar programs) allows for constant as well as different kinds of communication between teachers and students, between students and students, and between teachers and parents.

At Towns County Middle School, Maguire (2001) found that using email helped communications throughout the school. Teachers were more able to track homework assignments and set up parent-teacher conferences using email. The school itself made

use of email to replace the traditional morning announcements broadcast throughout the school.

Teacher Attitudes

For the most part, teachers in all the studies were enthusiastic about their laptop programs. Rockman (1999) observed that teachers were keen about using laptops even before the Anytime, Anywhere program was implemented, and this enthusiasm subsequently increased over time. In the fifteen month period of the Maine study (Silvernail & Lane, 2004), teachers reflected considerable fervor for the impact laptops were having in their classrooms.

The researchers noted a strong belief by teachers that laptops helped them to be more up-to-date and access more diverse materials as well as explore topics in more depth. But as a direct consequence, teachers also felt they covered less material in their classroom and so were less able to meet their curriculum goals. Piercy (2001) found that “teachers who use laptops feel more empowered in their classroom” (p. 2). He noted an increased sense of control and confidence by teachers in using the laptops.

The teachers at Piscataquis High School (Great Maine Schools Project, 2004) expressed considerable enthusiasm for the impact laptops had in their classrooms. However, there was less agreement on the positive benefits laptops were having on the curriculum. Teachers agreed their computer skills, school climate, and roles in the classroom had positively changed. But there was less agreement on improvement in student achievement, changes in goals for students, and on beliefs regarding how people learn. The least agreement was on teacher beliefs related to the effectiveness of school

laptop policies and procedures, and whether or not teachers had received adequate training.

Teachers at Quaker Valley (Kerr et al., 2003) stated that the incorporation of laptops was “challenging, time-consuming, and requiring a new set of skills, knowledge, and experience base” (p. 35). However, this report expressed a negative quality throughout the study, and teachers may have been reflecting a deeper dissatisfaction with the overall program and how it was implemented than an actual dislike for having to use laptops.

Stevenson (1999a) similarly found that teachers were excited about using laptops, but unlike Rockman, by the third year, “this positive attitude has tended to dissipate over time” (p. 28). But as these teachers had also been teaching mixed laptop/nonlaptop classrooms for three years, this factor might have had an impact on their enthusiasm. Researchers (Hill & Reeves, 2004) at Athens Academy likewise observed high levels of enthusiasm at the beginning of the laptop program but teachers, by the third year, had become “somewhat skeptical about just what the technology can and cannot do” (p. 30). However, this finding might also be reflected in the lack of change in teaching style noted previously. Despite the tendency for enthusiasm to decline over time, none of the Athens Academy teachers (and students) would entertain the idea of giving up their laptops.

Benefits

This study has combined benefits, obstacles, and laptop resources into question 6. However, these three areas – benefits, obstacles, and laptop resources – will be discussed separately due to the quantity of data available from the literature review.

The literature has described a number of benefits for teachers, students, and schools in a one-to-one laptop program. There are specific benefits that teachers reap including the development of their own computer skills; a number of benefits for their students, especially for those on the margins; and some benefits for the school including online testing and improvements in attendance and tardiness.

Teacher Benefits

Belanger (2002) noted that laptops allowed teachers to move beyond their role as the single expert in the classroom to Internet experts in their field. In a combined program for science (Laptop Learning Challenge) integrating laptops had the following teacher benefits:

- In the classroom, teachers can connect laptops to monitors or overhead projectors to give multimedia presentations, clarify assignments, and review procedures.
- Teachers can use laptops to record and organize notes on individual student progress.
- Teachers can use the computers in conjunction with digital cameras to record events for later student assessment.
- Laptops facilitate communication between students and teachers: using a laptop at home or in the field, students can submit assignments or questions via email or wireless connectivity. (p. 1)

Bushman (2003) focused on the laptop program at Clovis High School and found biology teachers to be extremely enthusiastic about what they could do with laptops. “I

love the fact that we can pull up the Internet and get up-to-date information... We get to learn awesome stuff about life and biology” (p. 2). Kline (2003) observed that teachers were able to create materials more easily because of laptops. One teacher mentioned getting lesson plans from the *New York Times* any time of day. A driver’s education teacher used the Internet to go to the department of motor vehicles and have his students take online practice tests.

The Sioux Falls School District survey (Vann, 1997) studying their laptop program identified a series of benefits for teachers: constant accessibility (42%), increase in efficiency and organization (20%), ability to design assignments to meet student needs (14%), provide higher quality student materials (10%), and improve teacher – parent communication (8%). Eib et al. (2003) noted that because of laptops, teachers have access to “an electronic grade book; electronic progress reports; electronic tests, quizzes, and papers; email; and electronic attendance-taking” (p. 2).

Teacher Computer Skills

Rockman (1999) found that teachers rarely need help in using word processing, email, general computer usage, and the Internet. For work with presentation software, spreadsheets, databases, and web pages, however, teachers felt they always or at least sometimes needed more assistance.

Athens Academy researchers (Hill et al., 2002) reported an increase in the computer skill level of teachers despite the laptop’s lack of integration into classroom practice. Teachers reported increased confidence with computers and had no wish to

cease using the laptops, but they also felt they needed to learn many new skills prior to integrating the laptops with their teaching practice.

Researchers at Quaker Valley (Kerr et al., 2003) observed that “teachers and students reported competency in several basic software applications after the first year of the grant and additional competencies after the second year” (p. xi). The only other evaluative study (Great Maine Schools Project, 2004) that focused on teacher computer skills was at Piscataquis High School. Nearly 95% of Piscataquis High School teachers believed their computer skills had improved from the start of the program.

Student Benefits

Stevenson (1999c) found a number of benefits accrued to students when they had laptops. These included shifting usage from games to schoolwork and enhancing interactions among students. There were academic benefits as well including an increase in spelling and writing skills and an improvement in math and reading scores. Additionally, Stevenson highlighted the benefits when students actually own their own laptops.

In many schools, computers do not belong to the students; they belong to the classroom, the computer lab or the media center. Teachers, media specialists, computer technicians, and others determine when and how such computers will be used...This is not the case with the laptops. They are available to students whenever they see a potential use, and students determine how the computer can best meet their unique needs. The laptop is the student's tool. (p. 6)

Urban-Lurain and Zhao (2004) described strong advantages for students having their laptops. They outlined the following benefits.

- Students create better-looking products than they could do with just writing and other traditional media.
- Computers provide a welcome break for students from more routine learning activities.
- Students' writing quality is better when they use word processing.
- Students are more willing to do second drafts.
- Students help one another more while doing computer work.
- Students work harder at their assignments when they use computers.
- Students take more initiative outside of class time – doing extra research or polishing their work.
- 'Average' students are communicating and producing in ways only 'gifted' ones did before. (Table 52, p. 75, 76)

The Quaker Valley researchers (Kerr et al., 2003) observed that students benefited from increased technology competencies that included a boost in motivation and engagement, and a rise in confidence in their ability to work with others, in communication, and in taking more responsibility for learning. However, some students appeared to be less enthusiastic about their laptops by the end of the second year.

Lowther et al.'s (2003) experimental study with a control group of students having access to 5-6 classroom computers and a laptop group of students concluded that control students used the Internet less often, did not complete computer work with

another student or worked as a team, and generally did not use the computers as often as laptop students did. The control group also did not use the Internet as frequently for homework but used the Internet more often for other purposes, and they did not rate their computer skills as high as laptop students did. “The survey showed that the control students were acquiring regular computer experiences but in ways less diversified in scope and less connected to everyday classroom instruction than did laptop students” (p. 8). In a comparison between teachers with laptop students and teachers with a laptop cart, Ross et al. (2003) noted “laptop students emerge with more confidence in the educational benefits of using computers and with better writing and problem-solving skills” (p. 60).

Gutterman (2001) studied the New York Community District Six Middle School where all students received a laptop computer in 1996. She found that students created their own help desk to assist each other and eventually extended that help to both faculty and staff. In a study of Catholic high schools, Assaf (2001) observed that students who were receiving formal training in computers also assisted technology staff in maintaining the technology infrastructure of the school. “Instead of trying to shield them from the network...we allow students access and give them training to handle problems responsibly and to solve faculty and administrative problems” (p. 2).

When studying this study’s case, Dawson et al. (2006) noted that Jesse Jackson (and Susan B. Anthony) students believed the greatest benefits from the laptops were in being able to type essays and class notes, and being able to conduct Internet research. Some students thought the laptops lightened their backpacks when their textbooks were available electronically. “Most respondents felt their teachers did at least a decent job of

explaining to them how to use the laptops, and most gave the help desk high marks for fixing problems” (p. 36). The students also mentioned that being able to take the state’s standardized tests online was a “big plus” (p. 36).

Internal Equity

The evaluative studies focused on equity in the more general sense of every student having the same access to technology. Some studies focused on equity from the perspective of at-risk, minority, low-achieving, and non-traditional students and the impact laptops had on them. Several studies examined the influence of laptops on students with different learning styles and attention span issues.

In Rockman’s research (1999), teachers reported that laptops helped all kinds of students, but especially advanced students because teachers could individualize instruction more with the computers. He reported that teachers felt that students who were stronger visual learners than the more traditional auditory way of learning were particularly helped with the laptops. In addition, Rockman found that students’ short attention spans improved because of the laptops. “[The laptop] seems to expand their attention span, because they receive instant feedback on what’s right and wrong, and instant results for their efforts” (p. 32).

Stevenson (1999a) similarly reported that students who historically did not do well in school did better when they had laptops when compared to similar students without laptops. He noted, “Free/reduced lunch students using laptops scored approximately the same on standardized achievement tests as students not on free/reduced lunch who were not laptop participants” (p. 2).

Maine's researchers (Silvernail & Lane, 2004) observed that laptops engaged all kinds of students, but especially "at-risk and special needs children" (p. iii). The researchers noted that at-risk and special education groups scored as well if not better than traditional students in a number of categories. High achieving students (unlike Rockman's findings) tended to show lower levels of impact but it may be these students were already high to begin with and so would not have indicated as much improvement.

Michigan's teachers (Urban-Lurain & Zhao, 2004) were very enthusiastic about the impacts laptops had with their at-risk students and how fast this effect became evident. Piscataquis teachers (Great Maine Schools Project, 2004) believed that for special needs students "laptops have improved student engagement, class participation, motivation, ability to work in groups, and ability to work independently for this group" (p. 3). Teachers found that with traditional students, laptops helped in every area except for retaining material, and for behavior and attendance which there was no change. However, at-risk students showed more improvement than traditional or high achieving students in the areas of interactions with teachers and other students, engagement, motivation, ability to work both in groups and independently, quality of work, preparation and participation in class, remembering content, behavior, and attendance. The high achieving students were less influenced by the laptops in most areas, but they still demonstrated major improvement in interactions with teachers and other students.

School Benefits

Belanger (2002) found in her review of school laptop programs that computers allowed the school day to extend beyond the normal hours for students who could take

their laptops home or anywhere else they desired to go. Rockman (2000) felt that students learned outside of school all the time, but with laptops available to them 24/7, these students could transform the kinds of learning they engaged in. In essence, having a laptop computer formed a bridge between school learning and the learning accomplished outside of school.

Carter (2001) believed that laptops improved communication between home and school, especially for parents. Bhavé (2002) noted that when students were sick or otherwise unable to come to school, the laptops opened the school doors for them at home, “not merely by teleconferencing or videoconferencing, which is stilted and can be disruptive, but by merely linking into the projector and camera of the classroom” (p. 3). Gutterman (2001) wrote that students who were in hospitals could take advantage of classroom access via the laptops. “With a digital camera connected to their laptop, students [could] participate in real time” (p. 1).

Nor are students limited to traditional textbooks and other instructional materials. Cook (2002) believed that students can now access iBooks and iMovies anywhere or time they wish. Digital textbooks can reduce the physical load students must carry, and it is impossible for them to forget their class textbooks as the digital textbook is always in their computer. Digital textbooks can also be considerably easier to keep up-to-date as they do not require the lengthy production time that updating paper textbooks need.

Barton (2003/2004) formed a partnership between his school and a medical center to investigate heart monitoring as well as other fitness factors for the students. Using data from the program, he helped students work on their individual fitness profiles. While

such programs have been fairly rare, further partnership opportunities may eventually materialize, thereby making the school's boundaries more porous and allowing students to be involved in real time, relevant, and important activities beyond school. There are also opportunities for electronic pen pals including those who speak another language or live in another country. Laptops can even transform the nature of field trips. Carter (2001) noted for schools which cannot afford to send their students on field trips, especially those at a considerable and expensive distance away, these students can now take virtual field trips or follow along with experts doing research in the field.

Online Testing

For this study's case, Dawson et al. (2006) reported that one of the state's technology goals was to have all state standardized testing conducted online. In June 2005, more than 5,600 online standardized tests were given by SB Anthony and Jesse Jackson students who then received their results within days rather than months. This enabled students who had previously failed the opportunity to retake the tests shortly after the first attempt. For seniors in particular, online testing proved very beneficial in helping them graduate on time. Ninety percent of the students reported taking the online state standardized tests, and 89% felt this was an easy way to take the test. Both the state and the school district believed the online testing series was a major accomplishment for the laptop program.

Attendance and Tardiness

Carter (2001) found that after the laptop program began at the Hartford public schools in Connecticut the dropout rate shifted from over 50% dropping out to 92%

remaining in school. Carter also reported that the school attendance “rates increased to 97 percent” (p. 40) at the Rio Bravo Middle School in Texas. Piscataquis researchers (Great Maine Schools Project, 2004) revealed that “in the first year of the laptop program, the daily student attendance rate increased by more than seven percentage points to over 98% from 91% the year before. The daily attendance rate has been sustained through 2003-2004, remaining at 98%” (p. 9). Stevenson (1998) similarly noted that Beaufort County students with laptops had better attendance and tardiness rates than nonlaptop students. Laptop users missed 6.9 days as compared to 10.3 for non-laptop students. Laptop students also had 3.8 tardy days versus 5.5 for non-laptop students.

In a study of the ACOT project (Apple Classrooms of Tomorrow), researchers (Sandholtz, Ringstaff, & Dwyer, 1997) found that when students with computers were compared with nonlaptop students over the five-year study, laptop student absenteeism from school was half that of students without computers. There were no dropouts for computer students while the non-computer students had a rate of 30%. Before the study began, less than half the student body had any interest in higher education and only 15% actually went to college. By the end of the study, 100% of the students with computers had graduated from high school, and over 90% went on to college.

Obstacles

For teachers to embrace using laptops in their classrooms, they have to cope with a number of obstacles that can impede their progress. These include shifts in classroom interactions, the physical classroom layout, getting distracted by all the wonderful possibilities that laptops can provide, dealing with students’ lack of keyboarding skills,

finding time to work out how to use the laptops, and managing student computer misuse. On occasion, school laptop policies can also make it difficult for teachers to use the laptops in their classrooms.

Classroom Interactions

Bhave (2002) asked, how teachers can maintain their traditional control over the classroom “when students multitask with ease” (p. 1). Additional issues include those such as how teachers manage eye contact with students using laptops – normally a very important connection between teacher and student; whether or not laptops should be used for quizzes and tests and if so how; how other forms of laptop supported assessment such as electronic portfolios should be valued and measured; and how class participation grades should be determined, especially when they may include electronic communication between student-teacher or student-student? Bhave inquired further, “Does a question asked electronically have lower priority than a student’s raised hand” (p. 2)? How does the teacher manage the flow of information when it is presented both on the board and on student laptops?

Physical Classroom Layout

Based on personal observation and experience, I have found the traditional classroom to be poorly equipped to facilitate students and their laptops. Teachers who do not have student monitoring software may have to shift to the back of the room where they can simultaneously see all the student screens. This requires an adjustment for the teacher who has traditionally worked from the front of the room. For teachers who had previously tried to move students out of rows facing the blackboard into groupings that

facilitate cooperative learning, they may be faced with going back to rows in order to make sure students stay on task while using the computers.

Mowen (2003) points out as well that the traditional student desks provide little room for a laptop, especially when other materials such as books and notebooks must share the space. Even more problematic is that student desks are often slanted, putting the laptop in increased danger of ending up on the floor. One of the teachers associated with this case study (Windschitl & Sahl, 2002) found moving “between backpacks and laptop cases strewn around students’ desks quite difficult” (p. 8).

Teachers must adjust to what they actually see when the students have their laptops open. Rockman (2003) noted that “an open laptop on each desk is a dramatic shift from what a teacher normally sees. And for most, the first time is a little frightening” (p. 26). He further explained that teachers are used to viewing a sea of faces looking up at them but now many if not all of those faces may be hidden behind raised computer screens. Open books lie flat, but open, upright laptop screens can form a kind of visual barrier.

Getting Lost in the Glitz

Ringstaff and Kelley (2002) found that many teachers get caught up “in the ‘glitz’ of technologically sophisticated student work and lose sight of the ‘guts’ or content” (p. 16). Teachers often focus on fonts or graphics or the number of slides in a presentation rather than on the actual content. This is particularly prone to happen when the assignments include multimedia projects.

Quaker Valley (Kerr et al., 2003) teachers similarly believed that there were social problems among students when they became so focused on their laptops that they ignored more normal interactions with their peers. Researchers noted that one student complained that he could not be as creative with his laptop because of an over-reliance on software like PowerPoint. “While he previously gave considerable thought to how to use poster board, bright colors, or other artistic or creative methods to present his work, he now simply had to type a PowerPoint presentation and add a few pictures from the Internet or interesting graphics to satisfy the requirements for the assignment” (p. 46).

Student Keyboarding Skills

Rockman (1997) reported that a number of teachers were concerned about the level of keyboarding skills among students. Because students rarely had strong typing skills, they were slow in doing their work, and they had a lot more frustration in working with the laptops to finish assignments. He found that many schools failed to provide adequate resources to teach keyboarding skills to students. Teachers wondered whether they should be actively teaching keyboarding skills or shifting the emphasis to actual laptop use.

Stevenson (1999a) noted a number of teachers believed “the lack of keyboarding skills was a major or even overwhelming obstacle to effective implementation of the laptop project” (p. 8). However, students disagreed with this assessment, and Stevenson observed that the issue of keyboarding dissipated over time. In the Walled Lake laptop program, Ross et al. (2003) reported “a striking difference in the observed computer literacy and keyboarding skills of students in the laptop vs. cart classes” (p. 35).

Time

Teachers at Quaker Valley felt there had to be a trade off between individualizing instruction and integrating technology. Researchers (Kerr et al., 2003) noted that “In many ways, the teachers we spoke to who made the greatest efforts to integrate technology into their lessons had the least time left for individualized work with students or communication with peers and parents” (p. 39). As a high school teacher remarked, “It doesn’t save me time. This is my hardest year of the nine years I’ve been teaching. The end result is great, but it takes so much time” (p. 39). In effect, increased use of technology in instruction led to decreased time for other instruction related work for many teachers.

Garthwait and Weller (2005) observed that fixing technical issues took away a lot of time from classroom instruction. For example, when one of the teachers started an activity that involved going to the server, she found that half of the class did not know how to proceed. Consequently, she had to spend time bringing those students up to speed.

In Henrico County, for teachers, finding time “to learn and practice new approaches to teaching” was an issue (Zucker & McGhee, 2005, p. v). A lot of time was also required to “simultaneously prepare and deliver electronic and paper-based lessons” (p. v) for students without laptops or because parents requested a specific format.

Student Computer Misuse

The evaluative studies noted that the problem of student misuse of computers was often either temporary or was only practiced by small numbers of students. For the programs that had few misuse problems, the studies found this was primarily due to the

initial planning that reduced the options students had in using the Internet. Another strategy eliminated external drives which kept CDs from being used on the computers, and still others disabled the USB ports to prevent devices from being plugged in and viruses gaining entry.

However, even with the best of planning, students could still surprise teachers and administrators with their ability to get around the barriers and rules. Cook (2002) found that in the first year of implementation in Henrico County over 50 students downloaded pornography at home and had to be disciplined accordingly. Two more students were suspended for trying to hack into the laptops of teachers and other students.

When these types of behavior have happened, it is important for the school to have policies in place to deal with laptop abuse. Such policies, as indicated in the evaluative studies, have included taking the laptop away from the student for a specified period of time, depending on the nature of the offense. However, Mowen (2003) pointed out that taking away the computer would then leave the student without a laptop in a classroom full of laptops. While this might punish the student, it also had a deleterious impact on the teacher who was “planning for instruction using the computer as a required vehicle of the learning process” (p. 3). Mowen noted that a teacher had found an ingenious solution with a software program that would freeze out Internet access, forcing the student to complete the work in the library.

At Piscataquis High School (Great Maine Schools Project, 2004), students had their laptops taken away when they broke the rules – a punishment which teachers felt was a sufficient deterrent as there were few such incidents. However, Quaker Valley

(Kerr et al., 2003) teachers believed they had to create two sets of lesson plans “one with activities using the laptop computers and another with non-technology-based activities – to be prepared for students with missing or broken laptops” (p. 39). Middle schools in Quaker Valley found this a particular problem where over 50% of the students would not have their laptops available “due to laptops being broken, sent away for repair, or left at home by students” (p. 39). Consequently, teachers used the laptops as additional tools but not as a basic component of their instruction.

Quaker Valley teachers also reported problems with students using technology “in inappropriate ways, including tampering with the district’s network security measures and Internet content filtering software, plagiarizing text, playing games and using email at inappropriate times, and harassing students and teachers with email” (p. 45). Teachers and administrators likewise felt students were learning the wrong lessons about caring for the laptops “since students were able to mistreat and then turn in broken computers to be fixed without facing negative consequences or receiving additional instruction about proper care” (p. 46).

The evaluative studies revealed that many of the laptop programs had students and parents using email to communicate with each other and with the teacher. In some cases, the students would be inappropriate in what they wrote in their emails, and the school had to have some kind of mechanism in place to both document the problem and assign punishment. A related problem in accessibility was described by Barrett (2002).

We knew when we got laptops that ‘accessibility’ would change. We anticipated that students with email accounts would be able to send

messages at any hour. It was another thing to begin to receive them...at any hour. Then we began receiving messages from parents, also composed and sent at any hour. This raised the issue of response time and accountability, on the part of both the students and the teachers. (p. 3)

Barrett (2002) also described an additional problem that involved the use of anonymous email accounts in which the sender was unknown. The problem of viruses sending anonymous emails complicated the matter. However, the solution was fairly simple in that students were eventually required to include their name in any email sent to a teacher.

A different challenge but related to the Internet was the ease of obtaining information not written by students themselves. Barrett (2002) noted that while plagiarism has always been a problem, there are now websites developed specifically to help students write or copy information that is not their own. In response, there are websites like Turnitin.com where teachers can test whether a student has copied text from the Internet without citing the source.

Barrett (2002) further believed that unintentional plagiarism is the more common problem with the example of a student downloading a digital image without quoting the source. He explained, "It's so simple to do – right-click to copy and then paste into the text" (p. 3). But when the image is copyrighted and students do not properly quote the source, they have in essence violated the law. Barrett deemed this was not a habit teachers should encourage their students to develop. In addition, he noted, "Lifting a

short piece of text, a sentence or two, might not seem to be a big deal” (p. 3), but allowing even the smallest cut-and-paste starts to teach the students the wrong lesson.

School Policies

Garthwait and Weller (2005) reported that a school’s laptop policies affected what teachers did or did not do with laptops. For example, in the study’s school, each student violation of appropriate laptop use was kept on record, and when enough violations had taken place, the student could no longer access the school server. The school also required that any work not finished in class had to be finished at home. However, the school’s laptop policy did not allow students to take their computers home.

Maine (Silvernail & Lane, 2004) teachers and students likewise had similar problems because many school districts (40%) did not permit the laptops to be taken outside of school. As a result, teachers reported “having difficulties in assigning and completing homework when the laptops are not allowed to go home” (p. 31).

Resources

In addition to the laptops themselves, teachers must deal with access issues to other resources which can help or hinder their coping with the computers. All of the research laptop programs have had the standard Microsoft suite of programs – Word, Excel, PowerPoint, and Access – but in many instances, additional software was also made available. Teachers could receive other resources as well through their staff development program.

Software

While all laptops provide some form of word processing, spreadsheet, and database programs, there has been little development until recently of programs specifically designed for instruction in classrooms across all academic areas. For some teachers (Stevenson, 1999a), not having access to worthwhile education software made it difficult to really use the laptops in their classrooms. Kline (2003) observed that even when software became available it often could not be used on older machines.

Roblyer (2003) described five kinds of software – drill and practice, tutorials, simulations, instructional games, and problem-solving programs. Moreover, as such programs have become more sophisticated; the software often includes several options within one specific program. The author also made a distinction between this type of software and the kind that is automatically included with laptops, such as the Microsoft Suite.

Ringstaff and Kelley (2002) differentiated between learning “from” as opposed to learning “with” computers. They considered drill and tutorial software to be used in learning “from” technology, and usually present in the traditional classroom with the intent of ‘increasing students’ test scores on standardized achievement tests” (p. 5). On the other hand, software that involved simulations, instructional games, and problem-solving programs were used in learning “with” computer classrooms. However, researchers (North Central Regional Educational Laboratory Web site, 1999) noted the problems this has created with assessment.

Technology used in these ways leads to outcomes that tend to be difficult to measure. The difficulty results not only from rapid changes in technology, but also because many existing assessments do not adequately capture the skills that this technology enhances, such as critical thinking, other higher order thinking skills, writing, and problem solving.

Fouts (2000), after reviewing the research, noted that “59% of the teachers say it is somewhat or very difficult to find appropriate software. As the grade level increases, the difficulty of finding software increases. Only 12% of the teachers say they have lists of titles that match curriculum standards” (p. 32). Fouts believed that technology’s potential will remain limited until adequate and varied software options that are standards based are developed and provided to teachers and students.

Staff Development

Vann (1997) examined a number of issues surrounding staff development for teachers related to supporting integration of the laptops into their classrooms:

- Difficulty in finding practice time (26%)
- Lack of confidence and/or computer knowledge (13%)
- Lack of printer availability (11%)
- Need for additional training (11%)
- Lack of software manuals (10%)
- Insufficient time with mentor or peer tutor (10%). (p. 2)

Quaker Valley teachers (Kerr et al., 2003) also indicated the need for more training and technical support to help teachers be effective using laptops in their classrooms. While

the teachers did receive staff development, they reported “that the majority of the time thus far had focused on procedural issues, for example, training teachers on basic skills related to using software or district administrative tools” (p. 36). Some teachers believed they had to take on the sole responsibility to learn how to use the technology appropriately in their teaching.

Roblyer (2003) reported that the more teachers received training, the more likely they were to use technology in their classrooms. In a meta-analysis (Sivin-Kachala & Bialo, 2000), researchers found that staff development for teachers was the most effective factor in influencing teachers’ use of technology to help students learn.

Fouts (2000) raised a number of questions that teachers and administrators should consider when developing technology usage goals for teachers:

- What kinds of training are most effective for helping teachers use high-quality instructional programs?
- Are there general integration skills that can be taught to all teachers or are the integration skills dependent on subject matter?
- What do teachers need to know about the learning processes to be able to use technology to its full potential?
- What do teachers need to know about the technology itself?
- How much time is needed for teachers to learn, to reflect, to absorb discoveries, and adapt practices?
- How much time is needed for teachers to design integrated, engaging and personalized learning experiences?

- What is the best way to use technology to facilitate teacher learning?

(p. 35)

Attributes

There are inherent attributes of the laptop computer, the laptop program, and its implementation that can help or hinder teachers' coping with student laptops. To some degree, teachers must manage problems arising from the physical characteristics of the laptop – LCD screens, hinges, batteries, configurations, weight, repair, and loss. Features of the laptop program also have attributes that aid or obstruct teachers from moving forward. These include the reliability of the network and Internet access, technical support for teachers and students, staff development, and time. Lastly, the attributes of a laptop program's implementation can provide additional support or block a teacher's efforts to integrate the laptops into instruction.

Laptop Computer Attributes

Attributes related to laptops computers include hardware, especially LCD screens, hinges, batteries, durability, batteries, the laptop's internal configuration, and weight. Each of these attributes can cause problems if they do not work correctly.

Hardware. Virtually all the studies mentioned laptop hardware issues as a barrier over which their programs had to prevail at least in the initial year. Partly the concerns focused on the reliability of the laptops themselves; partly they focused on the vulnerability to breakage from teenagers; and partly on the consequences of having broken machines in the classroom. Stevenson (1999a) found that, in general, the longer

teachers and students used the laptops the less likely they were to focus on such challenges.

Rockman (1997) revealed that the 1996 Toshiba laptops often had problems with “frozen screens, broken latches, and easily-damaged screens” (p. 42). Some computers seemed to be “lemons” because of their constant need for repair. Other laptops did not appear to be configured correctly.

Batteries. Internal batteries were a particularly vexing and ongoing problem for teachers and students. Smith (2002) noted that laptop batteries needed to be completely drained before recharging but it was often difficult to tell if the batteries had actually been exhausted. Additionally, teachers had problems planning usage to avoid losing the batteries during class time. At Athens Academy, Hill et al. (2000) similarly reported battery problems although they mentioned data loss as an additional issue. While the teachers and students felt their laptops were strong enough, the batteries would still eventually die. Even with structures in place to save data when this happened, the operating systems often froze with the failure of battery power, and the data would still vanish.

Laptop Internal Configuration. Mowen (2003) studied a middle school laptop program which considered configuring their computers with external drives for floppy disks. However, this greatly increased the vulnerability to computer viruses, so they opted for no external drives and instead included a second battery. An additional benefit from the extra battery was that the laptops lasted longer in school which meant less confusion in “having 25 students plugging into electrical sockets during the day” (p. 2).

Another problem came from the network cards protruding a few inches outside of the machines. These cards were frequently struck by accident as students moved through school, or from storage, or from handling. The network cards were not cheap (\$70) but they were at least easy to replace. Bartels (2000) similarly observed that the weight and vulnerability including protruding wireless cards were liabilities. In addition, he found that the laptops were not “modularized in a way that facilitates repair” (p. 6).

Weight. Athens Academy (Hill et al., 2000) teachers and students were concerned about how much the laptops weighed especially when combined with “the other materials that must be carried – books, notebooks, power cords, etc” (p. 17). Mowen (2003) also found that laptops were much more subject to damage when carried with such materials. A participant in a study by Windschitl and Sahl (2002) spoke of the difficulties the laptops presented to herself and her students. “I see that they’re often times distracted by their [the computer] use because they’re shuffling things around. It’s another something to deal with. To open; to close. To worry about; to keep track of cords” (p. 12).

Durability. Rockman (1997) discovered that many of the handling problems went away over time as students became more adept in using the machines. However, when machines were broken for whatever reason, this created problems for the teachers especially when the number of unusable laptops was large. Teachers could not consequently assign homework that involved the computers, and in some ways the classroom had to revert back to having some computers shared by many students.

Maine researchers (Silvernail & Lane, 2004) reported that damage to laptops was low (1-2%). Curtis (2004) noted at one Maine school the principal stated, “the students

are doing a lot better than adults in caring for the \$1,200 machines. At this school, no laptops have been lost. At O'Hare Airport in Chicago, he notes, 'they find a couple of dozen a day'" (p 3). Piscataquis High School researchers (Great Maine Schools Project, 2004) listed a number of statistics concerning the durability of Piscataquis' laptops.

- 35% of students responding to the survey report that their laptop has broken down or been damaged at some point since the program began;
- 11% report that they got a loaner machine right away and were never without a laptop;
- 11% say they were without a laptop for less than one week;
- 39% were without a laptop for one to two weeks;
- 39% were without a laptop for more than two weeks. (The longest period reported was two months). (p. 11-12)

In addition, the Quaker Valley researchers (Kerr et al., 2003) observed that the unreliability of the laptops overwhelmed the technology staff who had to give up helping teachers integrate the laptops into their curriculum in order to cope with the damaged machines.

Laptop Program Attributes

Laptop programs have a number of attributes that impact how teachers use computers. These include the network, Internet access, and technical support for both teachers and students.

The Network and Internet Access. In a number of schools, the network was an issue. At Clovis High School (Bushman, 2003), teachers were often faced with computers

that did not work; technicians who were not accessible; and a network that suddenly would not be available. Athens Academy, whose network is probably one of the best in the country, had a loss of 0.6 % in their network connectivity over a 4-year period. But even this low amount of downtime was problematic for Athens teachers who had grown accustomed to the network always being available. “Teachers indicate that the inability to trust the system 100% undermines their confidence in relying on the technology in the classroom context” (p. 20).

Piscataquis High School (Great Maine Schools Project, 2004) had problems with the network and in maintaining Internet access. There were times when the Internet and email were not available, and teachers believed “[this] has interrupted lesson plans, caused frustration, and also highlights how much the school has come to rely on laptops” (p. 25). A related problem with the network was the ability of teachers (and sometimes students) to print anywhere within a school because of iPrinting. Unlike the more traditional single computer linked to one printer in a classroom, networked laptops could print virtually anywhere within the system. As Kline (2003) learned in her research, teachers often forgot where they had printed and then printed again, leaving stockpiles of unclaimed documents throughout the school. This considerably increased both the cost of paper and printer cartridges, neither of which is cheap. The situation also amplified frustrations both from the teacher who could not find the printed document and the teacher who had a built up reservoir of unclaimed documents.

Technical Support. Many studies reported a lack of sufficient technical support for teachers and often for students. Bushman (2003) noted not having network

technicians when needed was a problem. Kline (2003) found that teachers in Catholic schools had the same complaints, coupled with teachers unprepared to deal with technical difficulties. Researchers for the Quaker Valley schools ((Kerr et al., 2003) concurred, finding that technical staff were “overwhelmed with support and repair issues, thus shifting the support burden onto teachers and the technology experts who were supposed to be assisting teachers with curriculum and instruction (p. xii).

Maine researchers (Silvernail & Lane, 2004) mentioned that insufficient technical support, training, and time impacted teachers’ abilities to integrate the laptops. Over two-thirds of the teachers wanted more technical support than what was available. However, Maine instituted iTeams of students who helped their teachers and fellow students with technology. The iTeam students received regular training in application software as well as in solving common technical problems. This was a no-lose situation as teachers gained additional technical support, and students improved “their own technological and interpersonal skills” (p. 31). Bauer (1998), researching a private Catholic girl’s school in Texas, found that 25 students had created a service club “to troubleshoot laptop problems, develop an online help desk, make presentations, and assist the technology team in providing service to laptop students before and after school and during study times” (p. 2). The club eventually became the student help desk.

Ringstaff and Kelley (2002) observed that “even teachers who enjoy using computers will stop using technology if the equipment is unreliable” (p. 21). They further pointed out that the support teachers need evolves over time.

In the early stages of the ACOT project, for example, teachers needed basic technical support as they learned to use new hardware and software. Later, when teachers began experimenting with team teaching and interdisciplinary, project-based instruction, teachers needed professional development related to alternative student assessment strategies, such as performance-based assessments. Clearly, as teachers begin using technology for more sophisticated purposes, instructional support is as essential as technical support. (p. 21)

Implementation Attributes

One of the implementation challenges schools must resolve is the timing of when teachers and students each receive laptops. Inevitably, over the implementation of a multi-year program, some teachers will get their laptops for the first time while their students may have had theirs for multiple years. The converse of this situation is also possible in which teachers have had their laptops for a number of years but their students are in their first laptop year. Obviously, the second scenario is preferable to the first which can place enormous pressures on teachers to catch up with their students in a very steep learning curve.

Some schools have decided to have every grade level student and teacher receive their laptops simultaneously so that everyone starts at the same point. I have defined this as the Full Scale Implementation Model. This would, however, pertain only to the program's first year. In the second year, a new group of students entering the program

would start from scratch, while all the teachers and the rest of the students would be in their second year of laptop use.

Table 1

Full Scale Implementation Model

	7 th grade teachers	Seventh grade (new) students	8 th grade teachers	Eighth grade students	9 th grade teachers	Ninth grade students
First Year	1	1	1	1	1	1
Second Year	2	1	2	2	2	2
Third Year	3	1	3	2	3	3

1=one year of experience 2=two years of experience 3=three years of experience

Other schools, often because of cost, may decide to start with one grade or class and then incrementally add more teachers and students as time progresses. I have defined this as the Incremental Implementation Model. For example, all seventh grade teachers and students would get the laptops the first year. The second year, eighth grade teachers would be added, and the third year, the ninth grade teachers. Unlike the full-scale model, however, as each additional grade level receives laptops, the added teachers start from scratch but the students increasingly have more experience.

Table 2

Incremental Implement Model

	7 th grade teachers	Seventh grade students	8 th grade teachers	Eighth grade students	9 th grade teachers	Ninth grade students
First Year	1	1				
Second Year	2	1	1	2		
Third Year	3	1	2	2	1	3

1=one year of experience 2=two years of experience 3=three years of experience

The Liverpool New York School District (Stevenson, 2001) began with grade 10 for teachers and students. In year 2, the 10th grade laptop students moved up into classrooms where teachers were in their first year of implementation. This trend was further reinforced when the now 11th grade students moved to twelfth grade. At that point, they had had the laptops for three years, but the 12th grade teachers were new to students having laptops. For the group of students who had been in the program for three years, every year they had to work with teachers in their own first year of implementation. Stevenson (2002) further noted in year two that “there is a very strong relationship between teacher experiences with the program and the amount of time teachers reported using the laptops in instruction” (p. 95). In addition, “the more experience a teacher had with laptops, the more positive were the findings related to student use” (p. 95).

Each of the ten major laptop studies had different implementation models. Some of the studies noted how this affected the classroom and others did not include this aspect in their research. Stevenson (1999a) particularly found that the incremental program at Beaufort created increasing problems for teachers as time went by; Athens Academy researchers (Hill & Reeves, 2004) found no impact with the school’s incremental approach but then little actually changed in the classroom. Rockman (1997) described the various implementation models in the first year of the study but then focused on the full-scale model for the remainder of the other two years. Maine’s (Silvernail & Lane, 2004) and Michigan’s (Urban-Lurain & Zhao, 2004) programs were four months and fifteen

months respectively, so the impact of the implementation stages would not have yet become obvious. Piscataquis High School (Great Maine Schools Project, 2004) and Quaker Valley (Kerr et al., 2003) reported using the full-scale model but did not discuss

Table 3

Research Studies Implementation Schedules

Schools	Year 1	Year 2	Year 3
Anytime, Anywhere	Full Scale/incremental	Full Scale for study	
Beaufort County	6 th	6 th , 7 th	6 th , 7 th , 8 th
Liverpool District	10 th	10 th , 11 th	10 th , 11 th , 12 th
Walled Schools	5 th , 6 th	5 th , 6 th , 7 th	5 th , 6 th , 7 th , 8 th
Athens Academy	7 th , 8 th	7 th , 8 th , 9 th , 10 th , 11 th , 12 th	
Maine	7 th	7 th , 8 th	
Piscataquis HS	Full Scale		
Michigan	Full Scale for study, incremental at other sites		
Quaker Valley	Full Scale		
Henrico County	10 th , 11 th , 12 th	7 th , 8 th , 9 th , 10 th , 11 th , 12 th	
This study's case	9 th	9 th , 10 th , 11 th , 12 th	

how the stages of implementation over the two years of the programs impacted teachers and students. Table Three describes all of the laptop schools and the implementation models each program used.

Another implementation factor relates to the actual timing for giving students laptops as opposed to teachers receiving their own computers. Most of the studies noted that providing teachers with at least a month's head start was the minimum, but several laptop programs gave the laptops to their teachers along with training a full year in advance of student distribution. Some schools tried to get the laptops into students' hands as quickly as possible. But as Cook (2002) noted, such schools found that "we didn't take

enough time to prepare the students for the responsibility of having a computer. We should have taken six to eight weeks to talk to the kids and their parents about what we're doing" (p. 15). Even after the students had their laptops, Minkel (2003) observed, students had to be given enough time to let the novelty wear off. A teacher in Henrico County's laptop program said, "It takes at least six to 12 months for many students to use their new laptops to begin to engage in real learning. The novelty needs to wear off first, after they've played all the games" (p. 1).

Summary

Krathwohl and Smith (2005) discussed four tasks for a literature review, the latter two of which are explored here. These include how the literature has contributed to the study, and how the research has moved beyond what is already revealed about education laptop programs.

In order to comprehend how this study's teachers have coped with their school's laptop program, it is important to provide a context that would improve understanding of their responses. This context is the school and the corresponding laptop program which are described in Chapter 4. Equally important is to grasp how the school and its laptop program fit into the schools and districts that have already been researched. Is this study's school representative of a "typical" laptop school (at least as discussed over the past ten years)? How is it different or the same? Answers to these questions can shed light on the study's data. Likewise, are the problems, benefits, obstacles, and attributes of the study's program similar to or different from those experienced in the ten evaluative reports and two case studies?

Schools, teachers, and technology are not static; they evolve over time, particularly in relationship to each other. Consequently, in a sense, the literature review data present a “case” which informs this study’s research. As this study took place in 2007 and the literature reflected research from 1996 to 2004, there may have been significant shifts or differences between this study and the literature review. Analysis in Chapter 4 returns to the literature and discusses those data in conjunction with this study’s school profile, and the responses of the six digital immigrant teachers.

Having established the relationship of the literature to this study, Chapters 5, 6, and 7 explore the data from the six teacher participants. The teachers are the primary focus of this study and are an area that has not been sufficiently researched in the laptop review. If a laptop program is to be successful in helping students learn, however, understanding how teachers cope with the laptops is equally central in that effort. It is in Chapter 8 that the findings of the study are analyzed and where the three theories utilized by this study are brought to bear in order to provide further insight.

3. Methodology

Upon the introduction of laptop programs into United States education institutions by Microsoft and Toshiba's Anytime, Anywhere Program, researchers conducted ten major multi-year evaluative laptop studies from 1996 to 2004. These studies demonstrated certain impacts, benefits, and issues related to implementing a laptop program. The purpose of this research was evaluative which Fitzpatrick et al. (2004) defined as "determining the worth or merit of an evaluation object" (p. 5). The studies were formative in function and focused on the merits of the laptop program as identified by those who had made the decision to implement the program (see Appendix A).

However, evaluation studies can be limited, and as McEwan and McEwan (2003) pointed out, "knowing *that* something works is not the same as understanding *how* it works" (p. 75). Consequently, moving beyond the evaluative approach in the laptop literature, the purpose of this study is to understand how a particular group of digital immigrant high school teachers have coped with the phenomenon of a laptop computer program innovation in their school using a case study approach.

Maxwell (2005) compared instrumentalism versus realism approaches in which instrumentalist questions focus on observable data while realist questions include such unobservable data as "feelings, beliefs, intentions, prior behavior, effects, and so on" (p. 73). This study's research questions have been answered primarily through realist based

interviews from the multiple perspectives of selected participants, while the instrumentalist based classroom observations provided a visible representation of those perspectives as well as a validity check. Both what the teachers think and believe – as well as do – are important in this study.

The framing question for my case study of Jesse Jackson High School (pseudonym), in the third year of implementation, is “How do digital immigrant teachers cope with laptop computers as an education innovation?” The following subquestions have informed the research:

- 1) How has being a digital immigrant affected teachers’ integration efforts?
- 2) What problems do the teachers believe the laptops are supposed to solve?
- 3) What have teachers ceased doing in order to utilize the laptops?
- 4) What new laptop activities, approaches and strategies have teachers begun to use?
- 5) How have teachers’ use of and attitudes towards the laptops evolved over the three years?
- 6) What roles have teacher perceived laptop benefits, obstacles, and resources played in integration?
- 7) How have laptop characteristics and the program’s implementation helped or hindered teacher integration efforts?

In the remainder of this chapter, I first indicate how I planned to answer such questions through a qualitative, case study approach as well as how the process actually proceeded. Second, I address why this case was chosen. Third, I discuss my role as researcher. Fourth, I examine participant identification and gaining access as well as the end results of that process. Fifth, I outline the research phases of data collection and

analysis and then describe the procedures that actually took place. Lastly, I focus on the measures I have undertaken to build the validity and guard the ethics of the study.

Qualitative Research and the Case Study

Glesne (1999) defined quantitative researchers as “positivists [who] seek explanations and predictions that will generalize to other persons and places” (p. 5). The questions that I explored were not easily answered through a quantitative lens. The purpose of my research was not to find patterns that make predictability and generalizability possible but to understand how digital immigrant laptop teachers coped with their laptop computer program phenomenon. Denzin and Lincoln (2000) noted that “qualitative research is a situated activity that locates the observer in the world...attempting to make sense of, or to interpret phenomena in terms of the meanings people bring to them” (p. 3). My research was, therefore, rooted in how teachers themselves have constructed their classrooms, applied their beliefs about education, and grappled with the laptop phenomenon.

LeCompte and Schensul (1999) explained how qualitative researchers “can isolate target populations, show the immediate effects of certain programs on such groups, and isolate the constraints that operate against policy changes in such settings...The evaluator becomes the conduit through which such voices can be heard” (p. 23). Unlike the ten evaluative studies described in Chapter 2 that assessed entire programs with teachers as only one element in that effort, the voices of digital immigrant teachers were prominently heard in this study on how they coped with the laptop program’s benefits, constraints, and challenges.

A case study approach is defined as an “empirical inquiry that investigates a contemporary phenomenon; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used” (Yin, 1989, p. 23). Yin further noted that “establishing the how and why of a complex human situation is a classic example...” for a case study (p. 24). Laptops are a current phenomenon and likely to grow more so over time particularly in education. Unlike a quantitative research experiment that would divorce the laptop from its school context or an attempt to transfer understanding from the business world where laptops are more prevalent, teachers using laptops need to be studied within their classroom and school context through interviews and observations embedded in a qualitative approach to more fully understand the impact of this phenomenon.

Three kinds of case studies were defined by Stake (2005) – *intrinsic* (the value of the case itself regardless of any potential to generalize or establish theory or patterns), *instrumental* (to learn through the case study about something else) and *multiple cases* (to investigate a phenomena). It is my intention to use a single case instrumental approach to study the interaction of the phenomenon, a laptop program, in one case – a grade ten through twelve high school – with the unit of analysis being that of the teacher. Stake (2005) noted that “the case is of secondary interest, it plays a supportive role, and it facilitates our understanding of something else” (p. 445). While this case – the high school – needs to be understood in terms of its relationship to the ten evaluative laptop studies, its role has been supportive with the focus primarily on the teachers within that case.

I have chosen this approach with the objective that exploring this case “will lead to better understanding, and perhaps better theorizing, about a still larger collection of cases” (Stake, 2005). Although case studies are inherently ungeneralizable in a quantitative sense, my hope is that a deeper comprehension of how and why digital immigrant teachers integrate student laptops into their teaching practice has emerged from the study. Wolcott (1992) believed that “...the work of an increasing number of researchers reflects an underlying (but presumably conscious assumption) that things are not right as they are or, most certainly, are not as good as they might be” (p. 15). I, too, believe that the support, guidance, and assistance that digital immigrant teachers receive can become more finely tuned to their needs for integrating laptop computers into their classroom practice through the findings of this study.

Choosing the Case

Marshall and Rossman (1999) provided a set of criteria for selecting a site: “(a) entry is possible; (b) there is a high probability that a rich mix of the processes, people, programs, interactions, and structures of interest are present; (c) the researcher is likely to be able to build trusting relations with the participants in the study; and (d) data quality and credibility of the study are reasonably assured” (p. 69). I chose the high school, Jesse Jackson, for the following six reasons:

1. Proximity. I was a teacher at Jesse Jackson and, therefore, had easy access to possible participants.

2. Jesse Jackson reflected considerable diversity in terms of age, gender, and subject content in its teacher population, and a large portion of the 166 teachers were digital immigrants.
3. Jesse Jackson was in the third year of its laptop implementation which provided a rich context from which to draw data.
4. There existed a fair amount of information already gathered about the laptop program at Jesse Jackson from an internal first year study. Consequently, much of the background needed to understand the case context for the participants was readily available.
5. Available information on Jesse Jackson was consistent with the findings on schools in the ten evaluation studies, thereby indicating that this school fell within the current representation of a laptop school.
6. Access was easier to negotiate because of my own reputation, resources, and networking within Jesse Jackson.

Researcher Role

I decided to focus on high school digital immigrant teachers because I am one myself. I too have had first hand experience in trying to integrate laptops into my classroom activities. But although I am part of this diverse group of teachers, I am not truly one of them. As a career switcher, I came very late to high school teaching. Almost all of my computer experience was derived from activities not involved in teaching. While I have found such experience difficult to transfer into my instructional practice, I also do not have years and years of experience teaching without computers to overcome.

I share a similar perspective to that of my participants, having had the same staff development opportunities. Within the structure of Jesse Jackson's laptop program, I have had access to the same resources – student help desk, training, and policies, for example. As a result, I can more easily understand both the context of the case and the data that have come from my digital immigrant teachers. On the other hand, I also know most of the potential participants, especially within my own English as a Second Language department. Consequently, I decided that I would not choose any teachers with which I had a close relationship, particularly those within my own department.

While I have found myself resistant every time I am faced with a new technological wrinkle, I have never doubted the power and importance a laptop program can have for teachers and students. Having had extensive computer experience in the world of work, I know that computer skills are vital to almost every kind of career and job. I have also experienced the enabling ability of computers to undertake all kinds of activities. I see my students moving quickly through this new technological world, and I want to join them as much as I can.

I have a strong bias in favor of technology and, in particular, for computers. I believe that a teacher runs the risk of eventually becoming irrelevant to his or her students if some effort to integrate technology into the classroom is not undertaken. I call this the “digital disconnect” where the teachers and their students occupy different technology comfort zones. I have experienced to some degree the majority of benefits, challenges, and issues my participants have faced but, while I have used my own experience as a starting point for my research, I have constantly kept in mind that my

familiarity with a laptop program cannot become a filter through which I analyze my participants' responses.

So given this bias, I have attempted to listen fully to all participants, but particularly to those teachers who have not coped well with the laptops. I have identified with their struggles but have not judged their integration decisions. My research goal has been to understand how digital immigrant teachers cope with laptops and not to fix those who have not. However, I wear two hats – that of researcher and also that of laptop teacher colleague. Particularly as a colleague, I have a built-in reciprocity factor (sharing stories, exchanging tips and ideas) with my participants as that is one way teachers learn from each other. Given this role and my propensity to find solutions, I have stayed fully in the researcher mode for the interviews and observations. However, on occasion one of my participants has shared a problem he/she is having with the laptops, and, if I happen to know of a solution or where to find that solution, I have only conveyed that information after the formal interview or observation was over. Conversely, the wearing of two hats can also create a relationship where LeCompte and Preissle (1993) believed the researcher can "...address ethical issues more directly...negotiate data collecting and recording and seek feedback on what is seen and how it is interpreted" (p. 94). Working in the same school as my participants with the same laptop program has helped me build an effective relationship with them. I have also queried some of participants at the conclusion of their interviews whether I have been perceived by them as being judgmental in any fashion regarding their responses. None of the participants felt this had

been the case and, in several instances, took this opportunity to talk about what they understood about my computer expertise in comparison to their own skills.

Stake (1995) described the researcher as a teacher, advocate, evaluator, biographer, and interpreter. One goal of my research has been to help readers understand the experiences of digital immigrant teachers with a laptop program. I have also wanted to serve as an advocate for digital immigrant teachers as I am one myself. I have been most careful in the evaluative researcher functions not to judge or fix. To some degree, I am a biographer as I have chronicled how participants have coped with laptops in their classrooms. As an interpreter, I have sought to explain participants' experiences and perspectives as fairly and clearly as possible.

There is a particular philosophical view that underlies my research. I believe in a reality separate from the ability of humans to perceive it, but I also believe that humans



continually construct and interpret their view of that reality. This picture of the computer shows both an internal and external reality. It is my intention to see the internal construction

from teachers as a representation of the external reality of a laptop program.



At the same time, I know it is impossible to fully understand what teachers' perceptions of a laptop program are, and this is represented by Rene Magritte's picture, *The Field Glass*. There is always much more to know.

Participant Criteria for Selection

Merriam (2002) noted that "...since qualitative inquiry seeks to understand the meaning of a phenomenon from the perspectives of the participants, it is important to

select a sample from which the most can be learned” (p. 12). In order to create such a sample, criteria are essential to determine which teachers would be most advantageous. I did not look for how representative an individual was of the entire American teacher population – race, socio-economic status, years of teaching or age so these characteristics did not govern the selection criteria (except as noted below). However, I decided prior to selecting participants to represent the entire core curriculum to the extent possible and to have both a male and a female participant in each adoption category. Further, I decided to limit teacher participants to six as this would provide a sufficient range of responses but would not make the data collection an overwhelming process.

LeCompte and Preissle (1993) believed criterion-based selection requires that “the researcher establish in advance a set of criteria or a list of attributes that the units for study must possess” (p. 69). The first criterion for selection as a participant was that related to being a digital immigrant. Prensky (2005) has defined digital immigrants as individuals who were not raised in the computer age. Consequently, I determined that the participating teacher should be over 40 years of age at the time of the study.

For this study’s purposes, I have called such teachers “digital immigrants.” However, in making this artificial distinction between teachers who are younger than 40 and digital immigrants, the reader can not presume that prior knowledge and exposure to technology can predict integration. The reader should understand as well that labeling someone a digital immigrant is not to presume such a person is incapable of using laptops in their classrooms.

The second criterion was related to involvement with the Jesse Jackson laptop program. To qualify as a participant, a teacher must have taught at the high school for all three years of the laptop implementation. They may have taught prior to the initiation of the laptop program either at Jesse Jackson or at another school (but not one with a laptop program). For this study, I am not looking at career switchers similar to myself who have had lots of computer skills and experience outside of teaching

The third criterion focused on laptop usage. The intent of the study was to examine two adoption extremes – those teachers who had integrated laptops into most if not all of their teaching, and those teachers who rarely if ever used the laptops. A third group was added at the approximate mid-point. In order to find these participants, I began with an initial set of characteristics using Rogers (2003) and Geoghegan's (1994) descriptions of adopter attributes (Table 4). I also looked at the stages of adoption (see Appendix B) approximating where each group would be at the time of the study. The innovator group would be in the last phases of technology integration, and the resister group would be in the initial phases of integrating the laptops. The adopter group would be placed arbitrarily somewhere in the middle. I combined the adopter category characteristics and the adopter process to develop the criterion for the study's three groups of participants.

Table 4

Description of Adopter Categories

Source	Innovator
Geoghegan (1994)	Newest technology focus Proponent of fast revolutionary change Visionary user Technology oriented Willing to take extreme risks Willing to experiment constantly Individually self-sufficient Tend to communicate externally (focused outside disciplines)
Rogers (2003)	Ability to understand complex technical knowledge Cope with a high degree of uncertainty A desire for the rash, the daring, and the risky Launches new ideas Creates a bridge external to social system Gatekeeper of the flow of ideas
Source	Early Adopter
Geoghegan (1994)	Technology focused Proponent of revolutionary change Visionary user Project oriented Willing to take risks Willing to experiment Individually self-sufficient Tend to communicate horizontally (focused across disciplines)
Rogers (2003)	More integrated into social system High degree of opinion leadership The individual “to check with” Puts stamp of approval on innovation Local missionary to spread ideas Decreases uncertainty about innovation
Source	Early Majority
Geoghegan (1994)	Not technology focused Proponent of evolutionary change Pragmatic user Process oriented Adverse to taking risks Look for proven applications May require support Tend to communicate vertically (focused within a discipline)
Rogers (2003)	Seldom hold positions of opinion leadership Take longer to decide to use innovation Follow with deliberate willingness

	Provide interconnectedness to late majority
Source	Late Majority
Geoghegan (1994)	Not technology focused Proponent of slow evolutionary change Pragmatic user Process oriented Adverse to taking most risks Look for well proven applications Will require support Tend to communicate locally focused within small group)
Rogers (2003)	Follow because of peer pressure Are skeptical and cautious Weight of system norms must favor innovation Most of the uncertainty is removed
Source	Laggards
Geoghegan (1994)	Technology phobic Proponent of no change in education Traditional user, Past oriented Adverse to taking any risks at all Look for proven applications from the past Will require considerable support to change Tend to communicate internally (focused within self)
Rogers (2003)	Very locally oriented in social system Point of reference is the past Decisions based on what has been done before Interact primarily with those of similar values Are suspicious of change and change agents Decision to adopt is a long one

Group #1 – Innovators

Innovators are teachers who have easily integrated the laptops into their classrooms and gone far beyond the expectations of the school and/or district. Their characteristics include:

Visionary user, technology oriented, willing to take extreme risks,
experiment constantly, self sufficient, understand complex knowledge,
cope with high degree of uncertainty, launch new ideas, experiment with

new ways of relating and teaching students, individualize instruction, are student centered, do not have major laptop management issues, computers used constantly in innovative ways, computers are virtually invisible.

Group #2 – Adopters

Adopters have adopted the laptops but such integration has been difficult, time consuming, and not without struggle. Their characteristics include:

Somewhat technology focused, proponent of evolutionary change, pragmatic user, willing to take some risks, somewhat self-sufficient but may need support, follow with deliberate willingness, somewhat willing to experiment, fairly skilled with computers, will initially use computers for traditional activities, begin shift from teacher centered to student centered, do some projects, have a fair amount of management issues but tolerance for problems increased, lots of time issues, increased productivity, begin to seek out new ideas, computers routinely used, computers are somewhat visible.

Group #3 – Resisters

Resisters have either resisted outright or have integrated the computers extremely slowly. Their characteristics include:

Not technology focused or may be phobic, want little or no change, traditional user, past oriented, adverse to taking risks, look for well proven applications (mostly from past), will require considerable support and can be suspicious of change agents, are skeptical and cautious, will wait until

most uncertainty is removed. Critical of computers, discourage use, avoid involvement, may alter some activities to use laptops in traditional activities, have few computer skills and have problems using computers for classroom management tasks, computers are highly visible.

Finding the Study's Participants

Initially, I decided to create two groups of participants. The first group of participants would involve staff and administrators, and their interviews would be used to construct the case's profile. This would constitute Phase One of the study. The second group of participants would be digital immigrant teachers, and would serve as participants in Phase Two of the study. For the first group, I began with six individuals: Jesse Jackson's two technology staff, the technology trainer, the assistant principal who oversaw Jesse Jackson's laptop program, the current high school principal, and the previous principal who had moved to a central office position. The second group of participants would be the six digital immigrant teachers. I also intended that the first group of participants would make recommendations on individuals that would meet the criterion established for the second group – digital immigrant teachers.

Phase One – The Case Profile

After I began interviewing the Phase One participants, I decided to expand the number of participants to nine in total. Since one of the state's technology goals was to push online standardized testing, the school's testing coordinator was included to supply insight in how this process had manifested itself. Two central office staff – the Technology Training Coordinator and the Director of Information Technology Systems –

were also included to provide a broader and more external perspective of Jesse Jackson's laptop program. This brought the total number of Phase One Participants to nine. The data from the nine interviews in this phase formed the case profile for the study.

Phase One – Finding the Teacher Participants

In addition to providing data for Jesse Jackson's case profile, the Phase One participants were asked to recommend possible Phase Two teacher participants. These participants had to meet the study criterion: be 40 years or older, taught in all three years of Jesse Jackson's laptop program, and, as much as possible, exhibit the characteristics of an innovator, an adopter, or a resister. Four of the nine Phase One participants did not supply names. The online testing coordinator retired a week after the interview. The new principal was in his first year and had not had sufficient time to get to know all his teaching staff. The two central office participants were too removed from the daily lives of Jesse Jackson's teachers to make recommendations. The remaining five participants (the technology staff, technology trainer, assistant principal, and former principal) were asked to recommend possible teachers. However, I discovered that none of these five participants could realistically provide useful names. Only one recommended teacher met the study's criteria and was asked to join the study.

Phase Two – Finding the Digital Immigrant Participants

As the Phase One participants could only provide a few names, I subsequently approached Jesse Jackson's curriculum department chairs and asked for their recommendations. This time I only asked that the recommended teacher be over 40 years old and had taught at Jesse Jackson for the past three years. I did not use the literature's

characteristics at this point, but simply said I was looking for innovators who used the computers a lot, adopters who used the computers fairly often, and resisters who used the laptops rarely to never. Two more Phase Two participants were added to the study but, for the most part, the department chairs' recommendations did not meet the criteria for the Phase Two participants.

Finally, I literally walked the hallways of Jesse Jackson and asked teachers how old they were, how long they had taught at the school, and what they thought their level of technology integration was (a lot, some, or a little). Two more Phase Two participants were added in this fashion. The final participant proved to be the hardest to find because the criteria at this point (content area and gender) were extremely specific after identification of the first five. Finally, a colleague made several recommendations, and I was able to select the final participant. At no time did I disclose the names of any selected teachers to those who had suggested them.

An additional problem emerged when two teachers were each recommended for two different categories. In order to provide clarity, I decided to only select participants who had been recommended for just one category.

Permissions for Research

As part of the preparation process to conduct the study's research, I sought permission from the school district as well as the University's Human Subjects Review Board (HSRB). Difficulties appeared with the school district that required me to shift from Susan B. Anthony to Jesse Jackson as the case study. In hindsight, the larger school proved to be much more advantageous because a larger pool of teachers was available

from which to select my participants. With Jesse Jackson's principal providing support, my request to conduct my study at that school was approved by the school district. HSRB subsequently approved my application and provided the informed consent form in Appendix E, which all the study's participants signed prior to the interview process.

Research Phases and Procedures

The purpose of this case study was first to describe the case – Jesse Jackson high school – in terms of the phenomenon of a laptop program and then examine, through the eyes of six digital immigrant teachers, how they had coped with the educational innovation. Both the Phase One and Phase Two participants' data were gathered through interviews and, for Phase Two participants, I also conducted a classroom observation for each teacher sequenced between their two interviews.

Semi-structured Interviews and Observations

Highly structured interviews are defined as those having all the questions and their order established before the interview (Merriam, 2002). Unstructured interviews have little prior planning with the questions and order developing within the interview itself. Semi-structured interviews are “a mix of more or less structured questions” (p. 13). The semi-structured interview allows for continuity among the participants but also permits questions to emerge within the interviews themselves. The Phase One interview questions are listed in Appendix C, and the Phase Two interview questions are in the Interview Guide, Appendix D. Interviews for Phase One participants were highly structured, and the interviews for Phase Two participants used a semi-structured interview.

Merriam further noted that “observational data represent a firsthand encounter with the phenomenon of interest rather than a secondhand account obtained in an interview” (p. 13). Schaumberg (2001) videotaped what transpired in classrooms and found that “the actual instructional changes observable in classrooms may be less profound than is commonly reported by students and teachers on the surveys and questionnaires used for most previous laptop studies.” Consequently, the observations in this study served two purposes – one was to place the teacher within a specific physical context – his or her classroom. The second was to provide a validity check concerning what teachers said in the interview process.

All interviews were audiotaped, and the observations involved field notes only (no videotaping) as the intent was to use the observations more as a context and validity check. The observations took place over the course of a class block the teacher recommended. At the conclusion of every interview and observation, I filled out the Contact Summary Forms (Appendix F and G) as a first step in analyzing what I had heard and observed. After transcription, I re-checked the form and revised as needed.

Phase One Interviews

The nine participants each had a one hour interview that was taped and transcribed for the purpose of creating the case profile. The interview questions were highly structured and are listed in Appendix C. The interviews occurred between January and February, 2007. They were transcribed and the case profile written during the summer between the third and fourth school years of the laptop program. Each Phase One participant was provided an opportunity to read Jesse Jackson’s complete profile and to

provide comments from their perspectives on any inaccuracies, additional materials that should be included, and the degree of vulnerability the profile would reveal about their participation. The final case profile of Jesse Jackson reflects all of the comments from the member checks.

When I analyzed the case profile, I decided to place this lengthy document in the appendices (Appendix H) and, in the interests of clarify, created a summary of the profile for analysis in Chapter 4. In addition to the case summary, I analyzed the profile in terms of the ten evaluative studies' finding as outlined in Chapter 2. I also summarized the relevant comments from the six Phase Two teacher participants in terms of the case profile's summary.

Phase Two Interviews and Observations

Initially, I intended to use a baseline interview, followed by the classroom observation and then more interviews until I had fully explored all the questions in Appendix D. In reality, each teacher was interviewed for one hour, and then I observed a class block in order to place that interview in perspective. I followed the classroom observation with a second interview approximately one hour in length. No further interviews were necessary as, at the conclusion of the second interview, it had become apparent that all the relevant study questions had been covered.

The first interview started with the questions, "How have you coped with the laptop program over the past three years? What is your story?" Background information on the teacher was also solicited during this interview. The purpose of this unstructured questioning approach was to give each participant space to talk about how they had coped

with the laptop program without having their responses keyed to specific questions. However, in the case of one participant, we both had difficulty staying on topic and, consequently, it was necessary for her interviews to be subsequently highly structured.

For the other five participants, the second interview used the highly structured approach and worked through the list of questions (see Appendix D) to ensure that I had covered the same ground with each participant. Because of the truncated school year's schedule and the impending move to the new school, it was not possible to transcribe the interviews prior to interviewing the next participant or to observing a class. The twelve interviews and six classroom observations were all completed from March to early May, 2007. The transcriptions were completed over the summer hiatus and in the fall of the 2007-2008 school year. In addition, because the evaluative studies in the literature review found that math teachers rarely integrated laptops and because one of my resister phase two participants was a math teacher, I decided to interview Jesse Jackson's math department chair in order to understand why math has historically made so little use of student laptops. Consequently, I conducted a one hour interview with the department chair but treated her data as background only. She was not included as one of the phase two participants but a summary of her comments are included in Chapter 7 with the math resister participant profile.

Once each Phase Two participant's profile was written, the teachers were given the opportunity to provide feedback on any inaccuracies, additional information they desired included, and any information they wished to have removed because of potential vulnerability once the study became public. The participants also understood that while

the world at large would never be able to either identify Jesse Jackson high school or themselves, the school district might be able to surmise who the participants were. Consequently, each participant was asked to take this into account when they provided the member check. The participants only saw their own profile and none of the other teacher profiles. I had also intended that Phase Two participants would complete a member check of the case profile but I found, towards the conclusion of the data analysis process, that this was unnecessary.

Chapters 5, 6 and 7 focus on the teacher profiles of the innovators, adopters and resisters respectively. Each profile contains information on how the participant became a teacher and then examines the data from each teacher's viewpoint. At the end of the profile, I describe the classroom observation and then relate that description to the profile. I then analyze each participant's responses in terms of the study's seven research subquestions. After this analysis I return to the characteristics described in the literature and examine the relationship of the participants' comments in regard to those characteristics.

Collection of Artifacts

At the conclusion of Phase One interviews and Phase Two interviews and observations, useful artifacts were collected and analyzed. Merriam (2002) observes that "the strength of documents as a data source lies with the fact that they already exist in the situation; they do not intrude upon or alter the setting in ways that the presence of the investigator might" (p. 13). Each artifact had an Artifact Summary sheet, and the participant who provided the artifact was asked follow-up questions as needed. Artifacts

included technology policies, implementation plans, lesson plans, and communication among teachers about laptops.

Data Analysis

Data analysis began with the first phase of interviews and continued throughout the second phase. While initially I had intended that no new interviews would occur until the previous interview had been summarized, transcribed, coded and analyzed, this became impossible to carry out because of the extremely limited timeframe in which the interviews and observations had to occur. The school year ended in late May instead of late June because of the move to the new building. Consequently, while all the interviews occurred between January and early May, for the most part they were not transcribed until the summer hiatus.

The computer program for the analysis was Qualrus. Miles and Huberman (1994) noted that most of the previously manual work done on segmenting, coding and analyzing can now be facilitated by computer programs – “In our view all of these functions can be accomplished more easily and simply with computer software” (p. 45). Summary sheets built upon Miles and Huberman’s models for interviews, observations, and artifacts were written during each phase and set of interviews and observations (see Appendix F and G). In addition to the coding of data, I embedded reflective notes in the transcripts as they would occur to me, but I made sure that these reflections were carefully labeled so they would not be confused with the interview data. I also created memos of my analysis which Maxwell (2005) described as a means of “getting ideas down on paper (or in a computer) and of using this writing as a way to facilitate

reflection” (p. 12). Miles and Huberman (1994) made a similar point, “Memoing helps the analyst move easily from empirical data to a conceptual level...building toward a more integrated understanding of events, processes, and interactions in the case” (p. 74).

After transcription, I conducted the initial coding with a combination of tables in Microsoft Word and the qualitative software program, Qualrus. I found issues with both approaches. The Word tables made for easy visualization of the responses in terms of the research questions, but they were difficult to use when the response fit more than one question. With Qualrus, it was difficult to figure out how to make the most of its properties; however, it was easy to code data segments into multiple codes and to provide links between the codes. It was in linking codes that I was able to delete some of my questions as being redundant. Linking codes also enabled me to see the relationships between my codes and my research questions from a more iterative perspective.

I faced an additional challenge related to how people create. Schneiderman (2003) discusses three kinds of creativity – inspirationalist, structuralist, and situationalists. Inspirationalists “emphasize the remarkable ‘Aha!’ moments in which dramatic breakthroughs magically appear” (p. 209). However, such individuals also recognize that “preparation and incubation lead to moments of illumination” (p. 209). As I have worked my way through this research process, I have come to understand that I create as an inspirationalist. Consequently, while I have relied on coding and immersing myself in the data, I have also left room for the inspirational moments to emerge.

Conversely, Schneiderman (2003) defines structuralists as individuals who “emphasize the more orderly approaches...the importance of studying previous work and

using methodical techniques to explore the possible solutions exhaustively” (p. 210). Quantitative and qualitative research methodologies are based on the structuralist approach which Kuhn (1996) defined as normal science with the “research firmly based upon one or more past scientific achievements...” (p. 10). Structuralists seek to build upon their existing knowledge base while inspirationalists search for ideas that can shift or move out of the paradigm (Schneiderman, 2003). As a doctoral student, it has been imperative that I follow the structuralist approach but, as an inspirationalist researcher, I have had to find ways of marrying these two approaches.

Schneiderman (2003) described the third category, situationalists, as those who place an emphasis on “intellectual, social and emotional contexts as key parts of the creative process” (p. 211). Situationalists become involved in a community of researchers and engage in “a social process for discussion and approval” (p. 211). To the degree that I interact with my dissertation committee, I am also involved in a social process for the purposes of defending first my proposal and then my dissertation. However, my preferred approach has remained that of inspirationalist.

Chapter 8 provides a number of themes that have arisen out of my analysis. They are based on memos that I created in order to perceive the larger picture of laptop integration, the concept of a digital immigrant teacher, and the characteristics of innovators, adopters and resisters. These characteristics were initially based on literature but a number of additional characteristics emerged from the Phase Two interviews. One question in particular – Are you teacher or student centered – helped to clarify what was observed in each participant’s classroom activities.

Participant Feedback on this Study

As part of the modifications from my dissertation defense, I asked each of my teacher participants for feedback on what they thought about a) the topic of my research; b) the process of my research; and c) me as a researcher. Because I defended in June and had to ask these questions late in the school year, only four teachers (an innovator, an adopter and two resisters) had time to respond.

Research Topic

One of the two innovator teachers, Richard, felt that my topic “was well grounded and necessary for the proper analysis and implementation of technology into the classroom.” He believed that without sufficient information, school districts ran the danger of not successfully implementing such technology. He further noted, “You have chosen a topic that hits at the heart of every implementation that is currently being adopted...”

Ruth, an adopter participant, thought the topic “was timely and unique.” She felt “there is a tendency to expect everyone to embrace new technology without regard for the psychological or cultural contexts of those who are learning to use it.” Consequently, she viewed the research topic to be valuable in that context.

Leigh, as one of the resister participants, believed the research topic was “very relevant, given that we at [Jesse Jackson] are in the process of transitioning to everyone using laptops...” She also thought that the topic was relevant for other school districts starting up their own laptop programs. Chris, the other resister participant, found the research topic “a very interesting one, perhaps even more so from the standpoint of a

teacher like me who did not grow up with computers or computer instruction.” He felt that computers generally have integrated into everyday life, including in education.

Research Process

Leigh believed the process was very thorough and she was pleased with how the research was carried out. “You requested that I participate; you made a classroom observation; and we had two interviews – the second to clarify some of the discussion in the first.” She then noted how she had the opportunity to review her own profile and okay its accuracy. Chris likewise found the process to be “thorough and enjoyable to be a part of.” He felt that you “went to great efforts to get to know him as a teacher, both by what you observed, as well as from my responses to your questions.”

Although Richard did not feel he was an expert on research (except as it pertained to his field of physics), he “was impressed by the amount of time and energy you put into the research and the thorough nature of how you validated your observations with both the interview and the classroom visit.” Ruth judged the process to be “thorough and well organized.” She found the interviews “covered a lot of pertinent ground, with a good balance between specifics and general areas of information.”

Researcher

Richard felt “quite comfortable talking with you and sharing my ideas and classroom with you. I like your informal yet investigative style of letting me talk and then asking questions that clarify what I have tried to say.” He felt honored to be selected for the research and hoped that his contribution would “have a positive affect on those who take your work seriously.”

Leigh believed as the researcher, you were “thorough, accurate, and respectful.” She found my questions to be “concise and clear.” Most importantly, she noted that “she didn’t feel judged, although I’m sure you had reactions to my comments that you (wisely) kept to yourself!).”

Chris thought “you did an excellent, thorough job in your research.” He found the questions “thought provoking and allowed for plenty of room to express [his] thoughts and ideas in a complete fashion.” Again, he stressed that he had found the experience enjoyable as well as “providing the opportunity for depth of thought on this important, timely topic in education.”

Ruth felt that you had been very respectful, and she felt that you “really wanted to hear [my] thoughts and about [her] expectations.” She also believed that the process “was highly productive because [you] addressed each topic in depth, rather than simply ‘ticking off boxes.’”

Validity

Maxwell (2005) advised that the quest for validity should start with the researcher thinking “about what particular sources of error or bias might exist and look for specific ways to deal with this...” (p. 112). For me, the most obvious threats to my research have come from my own involvement with Jesse Jackson’s laptop program and from my belief that technology is vital to the education of every student. I have guarded against these biases by reminding myself constantly that my experience and perspective form a foundation but NOT a template for my research. I found interviewing teachers who do not use the laptops the hardest in terms of the second bias. To help keep perspective, I

listened in order to understand rather than fix those teachers. Lastly, while I heard much that echoed my own practices, beliefs, perceived benefits, and obstacles, I placed particular attention on data that were different from my experience.

In order to develop a large quantity of useful data, particularly those that provide a different perspective from my own, I needed an intensive, long-term involvement with my participants and the case. Subsequently, I conducted the study's data gathering over a five month timeframe but this also extended another six months for analysis and member checks. Maxwell (2005) pointed out that "repeated observations and interviews, as well as the sustained presence of the researcher in the setting studied, can help rule out spurious associations and premature theories" (p. 110). To help ensure I had rich and varied data, I observed the classrooms of my participants while they were teaching, and I conducted interviews on either side of the observation. The correspondingly large volume of data helped eliminate bias and assisted with the development of more meaningful conclusions.

Last, the validity of data was increased through triangulation. I used the observations, interviews, and artifacts to approach my research from three separate but related directions. I also used the case profile as a further check on what teacher participants conveyed about the laptop program. The use of the case profile served as a method of mitigating the possible effects of self-reporting bias. In addition, I used the ten evaluative research studies as a further check on the representativeness of my case.

Ethical Considerations

Merriam (2002) noted that “a ‘good’ qualitative study is one that has been conducted in an ethical manner” (p. 29), which, he believed, rests on the ethics of the researcher. As the researcher of this study, I have communicated with my participants so that they never felt blindsided or uninformed and have created boundaries that made it comfortable for my participants to avoid talking about things they did not wish to discuss. I generated a structure of transparency so that the participating teachers would understand how they were being portrayed, especially in the teacher profiles. I also worked to create a sense of clarity in communicating with participants to ensure I had not misled them on any topic or process related to this study. In addition, Miles and Huberman (1994) suggested ten further ethical issues that I have addressed in this study.

In terms of competence boundaries, as a doctoral student, I have inherent limitations to my skills and experience as a researcher, the expansion of which is, of course, the purpose of doing a dissertation. My dissertation committee has aided in my learning process, but I have also had to remain mindful of what I did not know how to do and to be honest when I forged into new territory.

All participants signed the Informed Consent (Appendix 5) before becoming involved. As the study progressed, I kept the participants abreast of any changes in what I planned to do. As a further check on ensuring participants were fully informed, I gave each teacher their individual profile for comment. Any participant could withdraw from my study at any time with no consequences from me and for no stated reason. However, none chose to leave the study.

For the element of reciprocity, with the successful completion of my dissertation, I will gain my PhD. This will hopefully open doors to new professional opportunities. Although it is unequal in benefits, participants also “get to be listened to; they may gain insight or learning; they may improve their personal practice...” ((Miles & Huberman, 1994, p. 291) Both participants and I made time commitments to each other but no other cost to participants was involved in this study.

I made every effort to ensure that no harm or risk came to any participant in my study. All participants had an opportunity to give feedback on their individual profiles. I did not share any observations, notes, or comments with any other individual either in the study or externally within the school. I checked periodically with participants to make sure they did not feel overly vulnerable or at risk through my study’s process.

All communications and interactions between me and participants were viewed as private and confidential (although participants were free to discuss anything they wished with anyone they wanted). Nor did I tell a participant the names of any of the other participants. To the degree possible, I have maintained participants’ anonymity through the use of pseudonyms and the exclusion of any data that would significantly identify them to others. However, the school system knows I am working with teachers in their employ and, as Miles and Huberman (1994) noted, “local people nearly always can tell (or will assume) who is being depicted.” The member check of each teacher profile has helped to mitigate this as much as possible.

In terms of intervention and advocacy, I did not find any activity objectionable in any teacher’s activities during their classroom observation, and consequently, I did not

intervene in any manner. I did find much that was different from what I do in my own classroom, but again, I recognized this and did not let it impact my observations. I have not acted as an advocate for any position participants have taken nor have I worked with them on their own agendas

With regard to ownership of data and conclusions, I am the custodian of my data and conclusions and take full responsibility for their protection as well as denying access for others to view. While participants have been able to check their individual profiles, the conclusions from my data are my responsibility alone. However, as my study is of my district's laptop program, my results may be used by the central office and/or the staff of Jesse Jackson High School for their own means. To the best of my ability, I will work with district and school staff to ensure that my results are not misunderstood or misused for other purposes.

I have encountered dilemmas which Miles and Huberman (1994) noted include that of validity versus doing harm, anonymity versus visibility, and scientific understanding versus individual rights. In one occurrence that involved all three of these issues, a Phase Two participant wished to have any identifiable data removed from her profile as well as wishing to add clarifying comments. These changes did not significantly change her data or impact my subsequent findings. However, she also wished to have her gender and the subject she taught changed. In this instance, the validity of my findings would have been compromised had I made the changes she had requested. We discussed the situation and came to a middle ground. She remained female but I somewhat disguised the true subject she taught. I had to balance her need for

anonymity with the degree she would be visible and identifiable in the study as well as balancing my own scientific understanding with her right to privacy.

Summary

The purpose of this research case study has been to investigate how digital immigrant teachers cope with an education laptop innovation. This chapter has outlined how I intended to answer my research questions through a case study approach as well as the actual process that took place. I have described my biases and role as a researcher and have created a set of criteria with which to find my participants. In Phase One, through the development of the case profile of Jesse Jackson high school, it became possible to determine the representativeness of the case in relation to the ten evaluative laptop studies. The case profile has also assisted in placing the six participating teachers within the context of their laptop program and school.

Using a combination of interview, observation, and artifact analysis, I have developed a profile of each teacher with the goal that through analyzing those profiles I have answered my research questions and have presented a clear and in depth set of findings and conclusions that help broaden and deepen the current literature on the education laptop innovation. The following five chapters present a synopsis of the data and analysis. Chapter 4 focuses on a summary of Jesse Jackson's case profile. Chapters 5, 6 and 7 highlight the data from the innovators, adopters and resister participants respectively. Chapter 8 presents a set of findings that have risen out of the data and analysis, including the overall summary analysis of my seven research questions; the concept of a digital immigrant,; and finally an analysis of the characteristics of

innovators, adopters and resisters leading to a new set of characteristics for each adoption category.

4. The Case Profile

In order to place the study's teacher participants in the context of Jesse Jackson's laptop program, nine administrators were interviewed to create the case profile which is summarized below. Following the case profile summary, an analysis of similarities and differences among the laptop literature, the case profile, and the six teacher participants is presented. The literature in Chapter 2 is then compared to this study's teacher participants. Last, elements that only the case profile and the teacher participants have in common are analyzed.

The Case Profile Summary

Two principals and one assistant principal, two technology staff, a technology trainer, the online testing coordinator, and the central office Instructional Technology Coordinator and the Director of Information Technology Systems were interviewed over the course of a month. Their responses form the case profile of Jesse Jackson's laptop program. The complete profile is presented in Appendix H. A summary of the salient points are described below.

At the Beginning

At the time that Jesse Jackson high school decided to invest in a one to one laptop program, it had a variety of technology resources already available – a 24 desktop computer lab and several laptop carts as well as a number of LCD projectors and desktop

PC computers for all teachers. The school system had invested in a laptop program with its ninth grade feeder school but expanding the program to the other three grades was a quantum leap in required resources and financial commitment. In addition to the school district's decision to rebuild the forty year old high school, they had to plan for the new building's technology that would start its first three years in the old school building. The board was concerned about the digital divide as Jesse Jackson's students represent a broad range of income brackets and home access to technology. Consequently, the school board approved the laptop proposal in early spring and accepted Hewlett Packert's bid. That spring Classroom Connect introduced Jesse Jackson teachers to the laptop initiative through a short presentation, followed by an additional day of staff development in the week leading up to the 2004-2005 school year and the laptop program's implementation.

Preparation

A wireless system was established throughout the old building, and a network created. The teacher and student servers were purchased and set up as well as the student/teacher file structure. Teachers were provided with a docking station that used a LAN connection to all the teacher productivity tools (as well as wireless access when not using the docking station) while the students would have wireless access only. The docking station also had a full size flat screen monitor, keyboard, and mouse. Student and teacher laptops were imaged (the program structure access and visual representation on the desktop were created on a single laptop, compressed, and then "exploded" into all the student laptops as an image) and, in addition to the Microsoft suite, several specialty programs were loaded. It was not possible to add programs during the year once the

image was established. This situation would begin changing in the third year when the image became more flexible in adding programs when needed throughout the school year.

Student Technology Support

A student help desk was set up, and a system worked out for repairing the laptops. Hours were established (before and after school and during lunch) for student access to the help desk. Especially during the first year, the length of time for repair could last from a matter of days to weeks in duration. The repair time would eventually shrink from a couple of days to just hours by year three. One particular problem emerged when students discovered they could say their laptop was at the help desk when it was in fact at home or in a locker as a means to get out of classwork, and the teachers had no way to confirm this. In the second year, students began receiving a written receipt when they turned in their laptop for repair, and by year three an ongoing list in Blackboard also provided this information for teachers.

Printing

Although each teacher had their own classroom printer, the concept of iPrinting (any printer in the building available for a teacher to print to) was introduced in year one. However, the only printing option for students was to send their documents to teachers to be printed. This situation was particularly unacceptable to parents as well as burdensome for teachers. In year two, students were allowed to print to the help desk where they could pick up documents during the regular times the help desk was open to students. Documents not picked up were discarded prior to the start of the next day.

Laptop Distribution and Collection

For year one, laptops were distributed to students during a three week period starting in the eighth week of the first quarter. In addition to handing out laptops, students were required to attend a brief lecture on general maintenance, care, and appropriate usage. At the conclusion of this process, all involved agreed that the laptops could be distributed much more quickly, and the lecture would not be necessary in subsequent years. In year two, the laptops were distributed to students on a single day in the fifth week of the first quarter. Student computer training became the ongoing responsibility of teachers on an as-needed basis. By year three, the distribution was moved to the fourth week of the first quarter.

Collection of the laptops at the end of each school year also shrank in time in a similar fashion. Initially, they were collected over five days in the last three weeks of school. However, several teachers were given temporary class sets of twenty-five computers that they kept in their rooms for review and final exams. In year two, laptop collection was again in the last few weeks of school but took place over a single day. This time twenty teachers requested class sets in order to continue to the end of the school year. Seeing the writing on the wall, in year three, the laptops were collected on the last day of exams so that all teachers could use the computers for review and final exams.

Electrical Issues

Although student laptops had only one internal battery, this was not a significant problem in the first year as not very many teachers used the laptops extensively. Eventually, teachers were offered battery towers with thirty additional external (valence)

batteries in order to extend the available time for students to use the laptops in class. However, the batteries and the towers presented their own set of problems – the ease with which batteries broke (or imploded), difficulties in charging the batteries, managing batteries in and out of the tower, and security (many batteries and power cords just disappeared). In year two, the problem of having enough electricity for the laptops grew as more teachers used the laptops for extended periods. Eventually, every teacher either had their own tower or was willing to share with other teachers, but due to loss and wear and tear, by the end of the school year, there were not enough batteries available for teachers to use. This problem continued to grow during the third year. Solving the electricity problem remains a major factor in choosing new laptops at the completion of year four.

Teacher Training/Staff Development

The general philosophy at Jesse Jackson the first year was – here are the machines; we are going to get them out; some of you are going to run with them; others of you are going to become a little more comfortable with the laptops and see how they can be used. To that end, periodically throughout the school year, short staff development workshops were given on the mechanics of the whole system – the network, laptops, student network drive, and printing, for example. While this light touch kept initial resistance to the laptop program low, the lack of a clear mandated vision on computer integration meant teachers both formulated their own ideas and were self directed in their experimentation or else they were free to ignore the whole situation.

In year two, teachers were required to write a lesson plan involving technology integration for each school year quarter. Also in the second year, Blackboard was chosen as the portal for school-wide communication. Teacher training was conducted in three waves – wave one appealed to innovators, wave two to adopters, and wave three to resisters as well as to those who had procrastinated to the very end. In addition to the initial training, teachers had the opportunity to either attend general staff development sessions or participate in a lunchtime session on Blackboard every month. There were about one hundred teachers who participated in the first two waves, but only about thirty actually started using Blackboard with any consistency.

By year three, the new principal established two levels of usage for Blackboard and made level one mandatory by mid year. Level one required teachers to make all their classes available to their students on Blackboard, and to supply a class syllabus, glossary, and teacher related information. The second usage level became mandatory by the end of that school year. At this level teachers had to provide regular announcements, a list of appropriate web site links, and some electronic assignments. Expanded staff development opportunities were additionally provided to teachers in the form of half day training sessions which included time to work on their Blackboard sites. However, despite all these training opportunities and the requirement to be at level two, progress remained slow in implementing the program across all classrooms.

Other School Priorities

In addition to coping with the student laptops, teachers had to handle a number of other priorities. In the first year, there was a major push to get Jesse Jackson fully

accredited. The state's standardized testing became mandatory, and online testing was introduced. Teachers were required to participate in focus groups to help with planning for the new building which focused on a push towards a small-schools-within-schools vision as well as providing input on the ongoing accreditation process mandated by the regional association of high schools. A new teacher evaluation program was also piloted that first year.

During year two, the level of change continued to ramp upwards. Construction on the new building was moving forward, and temporary housing required a number of teachers to shift to new classrooms. The new evaluation program was now mandatory across the entire teacher population. While accreditation by the state and the regional association had been granted, No Child Left Behind (NCLB) along with Annual Yearly Progress (AYP) now began to exert pressure on teachers to have all their students pass mandatory state standardized tests. The principal who had been at Jesse Jackson for over twenty years was about to leave, and a new principal had been hired. In addition, there was an ongoing drive to have every student take at least one Advanced Placement (AP) course during high school.

The summer hiatus was three weeks shorter than normal, and the third year of the laptop program was truncated in order to allow for a full twelve weeks in the following summer for the move to the new building. Not only did teachers have to cope with an intense school year that ended in late May, the new principal arrived with his own set of priorities and ways of accomplishing things. In his previous school, the principal had developed an effective literacy program but lacked technology resources to help find new

solutions. At Jesse Jackson, he now had the opportunity to marry literacy with student laptops and, in addition to the literacy initiative (which would become a priority throughout the school district), he introduced the concept of the paperless classroom, Achieve 3000 (a web based literacy program), and virtual high school online courses. Amongst all this, teachers had to manage the dismantling and packing up of their classrooms in anticipation of the move to the new building.

Online Testing

In order to have students take the state's standardized tests online, an entire system had to be developed to implement this initiative. Eventually, the staff created stations around the school that could supply backup laptops and batteries if problems developed in a testing classroom. The teachers were required to participate in considerable staff development, and patches were designed to take care of other technology issues. After the first day of testing, teachers had no desire to ever go back to a paper and pencil testing format. Not only was security easier, results could be received in a matter of hours, allowing for immediate retesting especially important for seniors. With the exception of the English writing test, all standardized tests have been online ever since. AP testing, however, remains primarily a paper and pencil examination.

The Network, Servers, and Security

During the first year of the laptop program, the server was not adequate to cope with all the demands placed upon it. The server failed frequently and locked students out. When the online testing team conducted a practice run, they found that when everyone in the school logged on at simultaneously, the system failed. There were also gaps in how

teachers and students understood the network system. For example, they did not understand that if a student left a classroom with the laptop on (and connected to that classroom's wireless hub), when the student got to the next classroom the laptop would no longer work with the new wireless hub. Consequently, teachers often thought the laptop was broken when it simply needed to be turned off and restarted to connect to the new hub. A number of network drives were established for teachers and students to save and organize files. Students could save to their laptop and the student network drive, and teachers could save to their own laptops as well as to the teacher network drive, the student drive (where they could make documents available to students), and the shared network drive for files and documents to be available to the entire school community. Everyone had to adjust to this system in the first year.

In the second and third years when Blackboard was adopted, teachers could make material available either on the student network drive or in Blackboard. Some teachers preferred one system, and some liked the other approach. Although the number of servers had grown to support the network and laptops, the network's speed had increasingly slowed. One reason was the need for multiple firewalls to block students from inappropriate websites. By year three, proxies had turned into a substantial problem in which students went to an appropriate website and used that to gain access to other sites that would normally be blocked by the school server. The network manager tried to block 5-10 such host sites a day but then another fifty pop up. A technology resource trainer (TRT) described the situation as like having fingers in a dike. The upside for all the firewalls has been that viruses decreased as a problem. In the first year, the system was

shut down for a week because a teacher brought his own laptop and plugged it into the network. However, in years 2 and 3, there was no system downtime because of viruses. Yet, it has proven harder and harder to keep them out. A person at central office oversees the 3000 student email accounts. Other staff members monitor the 3000 student folders on the student network drive weekly. While in year 1 there was not much in student folders, by year two, the amount had grown exponentially and not all of it was appropriate.

Administrators had to handle students who had lost their laptops, often through no fault of their own. There is a tracking device implanted in the computer. When the laptop is reported lost, police are alerted, and the device activated. A number of laptops have been recovered using this device, and the rate of loss has proven quite low. In some cases, students were given a new laptop as covered under the HP contract. In other cases, especially in instances where students had misused their laptops on numerous occasions, students were permanently deprived of the machine. Although MP3 downloads have been consistently blocked (which has also been a problem in supplying some software programs that require MP3 access), students have still managed to download music and other materials not appropriate to class work.

Teacher and Student Email Systems

In the first year, students did not have access to email. However, because of pressure from parents, a separate, student email system was developed in year two. Students can take their home telephone connection, plug it into their laptop, and access the Internet or use email through the school's server. Students often find the system slow

(dial up), cumbersome to use, and sometimes difficult to gain access because of the volume of calls. While supposedly restricted to two 30 minute sessions a day, in reality students can stay plugged in as long as they wish. Because teachers and students continue to have their own email systems, there is no extensive communication across the two systems. Many students either do not use the school's student email system or may not even know it exists. Both teachers and students have recommended that the two systems be merged into one email system for the school, but at the conclusion of year three, this has not occurred.

Teacher/Student Feedback

In the second year, a teacher feedback group and a separate student feedback group were formed to provide an avenue for comments on what had and had not worked, as well as recommendations for improving the program. (See Appendix J for teacher feedback group reports in year two and year three). Central office staff listened to teachers and students and addressed, as much as possible, their concerns. For the first time, several teachers were invited to the student laptop re-imaging meeting (the program structure access and visual representation on the desktop were to be recreated on a single laptop, compressed, and then “exploded” into all the student laptops as the new image) in the summer to provide further feedback on what programs teachers wanted in their classrooms. The meeting addressed the software site licenses, whether a program was actually being used (some programs had not been used at all), where a program should be located on the desktop, and what additional requirements were involved in using the program. An ongoing problem in year two was that teacher laptops had grown out of sync

with the student laptops as the teachers' laptops were not re-imaged yearly. This problem became seriously magnified in year three. The challenge for re-imaging teachers' computers centers on how to update teacher laptops without taking them away for an extended period of time. In addition, many teachers only save their work to their laptops and not to the teacher drives on the server. Consequently, re-imaging a teacher's laptop could mean the loss of years of work (which can also happen if a teacher's laptop breaks down). This will become a critical issue when teacher laptops are turned back in at the conclusion of the lease in year 4.

Year Four's New Resources

The thrust for year four will be for Blackboard to become a totally integrated communications structure for the school, teachers, students, administrators, and parents. While the district had at first considered adding Smart Boards into the new high school, they have now shifted instead towards a School Pad which provides the same functions as a Smart Board but allows the teacher and the screen to be mobile. The company also markets class sets of clickers so that students can individually respond to a PowerPoint set of questions; the system records all the answers and displays them on a table in the slide show. The clickers give the teacher instant feedback about student understanding.

In the original plan for the new Jesse Jackson building, every classroom would have a television electronically connected to the library. However, the new principal has fought for every class to have a LCD projector instead. Consequently, a new projector will be added that will allow teachers to have either television access including a digital video library or a display of their own computer screen. The science department, a leader

in integrating the laptops, is now planning to do the Earth Science quarterly assessments through Blackboard's testing function. The data will not only tell teachers how students answered each question but also where the problems lie. In addition to expanding the paperless classroom concept (including adding scanners so teachers can have digital copies of classroom materials) as well as the virtual high school online course offerings, new photocopiers will allow teachers to electronically email documents to be printed without having to physically go to the machine.

Analysis

The data that come from Jesse Jackson's case profile and the six teacher participants are analyzed in the context of the study's literature review. A summary of the major similarities and differences are outlined below, first where data are analyzed overall from the literature review, the case profile and the teacher participants; then with the literature review and the study's participants; thirdly, the case profile and the teacher participants; and lastly the case profile. For more details, go to Chapter 2 (Literature Review), Appendix H (Jesse Jackson's complete case profile), and Chapters 5 (Innovators), 6 (Adopters) and 7 (Resisters).

The Literature Review, the Case Profile, and the Teacher Participants

The laptop research data discussed in Chapter 2 came from a variety of participants, including administrators, teachers, students, and parents. For this study the case profile data were derived from Jesse Jackson's administrator interviews, and the teacher participants provided the user perspective. The nine areas below are divided into three sections with data in common from all three sources (the literature review, the case

profile, and the teacher participants): equity/vision, program implementation, and training; teacher administrative use, email, and laptop resources; and technical support, printing, and network/server/security.

Equity/Vision, Program Implementation and Training. The ten evaluative laptop reports and the two case studies discussed four general visionary goals for a laptop program – to improve student learning/achievement, help students prepare for the 21st century, support teachers’ integration efforts, and reduce the digital divide among students. Jesse Jackson’s school board was likewise concerned about the digital divide, preparing students technically for school and work, and assisting teacher technology integration. In addition, the board prioritized addressing individual instructional needs, improving family literacy, and facilitating communication between families and staff. Jesse Jackson’s teacher participants felt the laptop program was to provide a tool that would help with the digital divide and transform students into life-long learners. One teacher, however, believed that for students who had grown up with computers, the laptops supplied a new avenue for tuning teachers out while another participant felt that enhanced prestige was the driving force for the program.

In the literature review, two implementation approaches were described: the full scale model (all grades receive the laptops simultaneously) and the incremental model (the laptops are introduced one grade per year). Jesse Jackson’s laptop program followed the full scale model. Neither the study’s teachers nor administrators had an issue with implementing the full scale model. Additionally, the literature review highlighted the issue of timing - when teachers and students would each receive their computers. The

study's administrators also struggled with this challenge as they tried to have the laptops available to the students both earlier and later in each subsequent school year. The administrators did not discuss alternative ways of introducing the computers but rather adapted the system based on what worked and did not work with distribution and collection from year to year.

The study's teacher participants had a variety of responses concerning how the program was implemented. Two teachers would have preferred starting with class sets for volunteer teachers who would then model laptop integration to colleagues before students would receive their individual laptops. Two other teachers focused less on how the program began and more on the nature of the program itself. These teachers either preferred class sets (but felt this would not have solved some of the ongoing technical problems) or more extensive technological solutions not currently available. The last two participants felt it was important to get the laptops into student hands as quickly as possible.

All of the literature's teachers expressed support for their laptop programs. This study's teacher participants displayed a similarly positive attitude towards Jesse Jackson's laptop program. They believed students should all have their own laptops although there was some difference of opinion about the training teachers received prior to the program's start. Teacher preparation in the laptop literature spanned from little to extensive before implementation. In the case of Jesse Jackson, the teachers were only informally introduced to the laptop concept, and training the first year focused primarily on the program's nuts and bolts.

In the literature review, studies reported several staff development issues – not having enough practice time, lack of confidence or basic skills in using computers, too much focus on procedural issues, and insufficient training. At Jesse Jackson, the training gradually expanded in both quantity and quality over the three years. Administrators pointed to the challenge of adapting to the ever changing training needs of teachers as well as meeting the integration expectations from the principal and central office staff. Administrators also discussed initial attempts to differentiate staff development in year three.

Among the teacher participants, one teacher felt he had received so much training that it was hard to keep track. He also thought that neither teachers nor students needed training on how to use computers. Two other teachers believed they needed training in basic computer skills as well as sufficient process time to acquire those skills. Consequently, those teachers preferred training that encompassed a half or full day and had very limited goals. Other teachers felt they had received just the right amount of training. Two participants criticized the one-size-fits-all approach, stating that this approach meant that only a small fraction of the participating teachers' needs were being met.

Neither the laptop literature nor the case profile discussed in detail student computer training, which in the case of Jesse Jackson, fell primarily to the teachers after the first year. The administrators, particularly in the third year, recognized that students actually did need more training and stated that it should be external to the classroom. Teacher participants' responses encompassed three positions – students do not require

training as they already know how to use the computers; students know how to use computers to play but not for academic applications; and students need more computer training (but not by teachers).

Administrative Use, Email, Laptop Resources. The literature reported both positive and negative aspects concerning teachers' administrative computer usage. For some teachers, their administrative workload increased while others said the laptop made them more productive. Some teachers believed they had to prepare two sets of lesson plans because they could not rely on the technology to work when needed. Still other teachers felt the computers helped them to communicate more easily, and there was less photocopying required. These responses also resonated with Jesse Jackson's teacher participants. One teacher thought she too had to have two sets of lesson plans which took more planning time because of unreliable technology but, concurrently, she also believed the laptops gave her more flexibility and increased access to student data for decision making. Although all of Jesse Jackson's participant teachers used the electronic grade book and attendance programs, one teacher found the programs hard to use because of her lack of basic computer skills. Administrators did not discuss this issue in detail but sought to provide training whenever a teacher had difficulties in using the electronic administrative programs.

While the laptop literature reported mostly positive responses on school email systems, this was less the case for Jesse Jackson's teachers. Several teachers felt that because students now had the ability to email, they could cheat more easily and be off task. One teacher believed that email was impersonal and much preferred face to face

communication. This sentiment was also echoed by another teacher who thought that people in general already spent too much time looking at a computer screen and not enough time actually interacting with each other. The case profile administrators believed that because there were two email systems (one for the school/teachers and one for the students), there was little cross communication between the two groups. The administrators further reported that various teachers and students had recommended that the two systems be merged into one email system for everyone.

Laptop related hardware resources include peripherals, such as LCD projectors, cameras, Smart Boards and/or School Pads. However, the study's teacher participants noted that having an LCD projector was a necessity for their laptop integration efforts. Jesse Jackson's current principal has emphasized the need for every teacher in the new building to have an LCD projector. Several teachers mentioned the clickers that help teachers assess which students do not understand. One participant had tried the School Pad but did not find it as useful as his remote presenter which he was much more comfortable using. Another participant wished to have more access to digital cameras so that she could incorporate digital story telling into her instruction. The literature review did not discuss specific laptop related hardware resources but this might have either reflected such peripherals not being available due to cost or having not yet been invented.

The literature review revealed that finding suitable software was difficult for many teachers and, in some instances, hampered their ability to integrate the laptops. However, as almost all of the literature review research dated from 1996 to 2004 and software has continued to grow in quantity and quality over this same period, it may

again be a case of timing – how far education software had improved in light of when a specific study was conducted. None of this study’s participating teachers felt they lacked software resources. In some cases, the teachers had access to digital resources either through their textbook or through an online support website maintained by the textbook publishers. One participant extensively used the electronic databases made accessible by the school’s library through Blackboard. With Jesse Jackson’s literacy initiative, several online reading programs have also been provided. The administrators in the case profile further noted that increasingly software is web-based which has reduced their own workload. However, because the district bans MP3, some of this software can not be used on the student laptops. Moreover, for math, while some software is presently available, it tends to be labor intensive and at times awkward to use. Lastly, one participant teacher felt that the school had gone overboard with the quantity of software options for teachers, and she would much prefer fewer but higher quality programs.

Technical Support, Printing, Network/Server/Security. Many studies in the literature noted that a lack of adequate technical support for teachers and students often hampered integration efforts. In a number of instances, the teachers were forced to handle technical problems for which they had not been trained. Several studies also found that the technical staff was frequently overwhelmed coping with technical issues. In response to requests for more technical support, Maine initiated student technology teams to assist teachers and other students in their schools. Jesse Jackson’s administrators discussed how the student technical support system was developed and their efforts to make the structure more responsive to both student and teacher needs. The teacher participants

generally were either satisfied with the level of support the students received or they felt the student help desk was more of a problem than a solution.

Printing emerged as an issue in the literature as teachers had to adjust to being able to print anywhere within the school, not just to their classroom printer. For Jesse Jackson, this was less a challenge than the problem of student printing. Initially, students could not print at all. In the second year, they were allowed to print only to the student help desk, and they had to pick up their documents before the next school day began. For the special education participant teacher, this proved to be very difficult for her students. She found the hours of operation, access through the library, communication between the staff and her students, and the inevitable loss of printed material simply unacceptable. The study's administrators discussed how the printing system had been established for the teachers and how they eventually had to develop another system for the students.

Almost all of the literature studies noted ongoing problems with their program's network and server. This was also the case for Jesse Jackson's teachers except for the participants who did not use the laptops. The teachers were quite sensitive to when the system would go down, and almost all of the participants noted how easily the students could circumnavigate the district's filter system. Administrators were much more focused on network security and access as they had to manage the whole system. They also had to deal with virus and security issues as well as student proxies.

Summary. The literature review, the case profile, and this study's teacher participants were in agreement on a number of topics, including a common vision and enthusiasm for their respective laptop programs, attitudes towards teachers'

administrative use of the computers, network/server issues, and technical support. There were relatively small differences in opinions about program implementation; the training teachers received both before starting the program and ongoing; student and teacher email systems; finding suitable software; and printing. This study's participants were, in addition, somewhat concerned about student computer training and additional laptop resources.

The Literature Review and This Study's Participants

The research in the literature review had findings from teacher participants as did this study with Jesse Jackson's teachers. The following section summarizes information from these two sources but as the case profile was created from administrator data and not from a user perspective, it has no stated commonality with these two groups of participants. First, benefits are summarized; then obstacles including the physical classroom and student misuse; followed by internal equity (special education, and at-risk students), and classroom roles and interactions; and lastly teacher attitudes, school policies, and a laptop computer's attributes from a user perspective.

Benefits – Teachers, Students, and Schools. The literature review describes a number of benefits for teachers – access to online experts, having more information available, higher quality materials development, access to digital forms of assessments, and an increase in teachers' computer skills. Jesse Jackson's teachers agreed that more information was available (as well as more immediate) and that higher quality materials development was possible (as well as faster and more creative approaches). The teachers did not discuss any of the other literature related benefits. However, the study's teacher

participants added that they could cover the curriculum faster; could access all digital content and extend that content via the Internet; could have access to electronic databases; could have more diversity in classroom activities; and could make better presentations to students.

The laptop literature discussed various laptop benefits for students – promote better writing skills, produce finer products, enlist more engagement and initiative, work more with other students, expand effective use of the Internet, help out-of-class students keep up with assignments, and develop skills in independent work. In addition to the above student benefits, several of this study's teachers believed students gained improved organizational skills; an increase in curiosity, asking questions, and achieving more mastery over the course content; more success in school; out-of-school access to course materials; access to applets to provide more interactive video format presentations; expanded in depth online research; and ultimately a view of the future's possibilities.

Two teachers emphasized both positive and negative aspects for students. Like the literature teachers, these teachers too believed the Internet was a useful resource tool but not all websites, especially Wikipedia, provided reliable information. Several of the study's teachers observed that the laptops could compensate for poor handwriting when taking notes or writing an essay but for many students this was unnecessary, and, as the AP exams are handwritten, those students needed to practice writing without a computer. Finally, two other teachers felt students developed computer skills which would be invaluable as computers are already the centerpiece in any profession. However, both teachers agreed that the students must know how to type (an opinion expressed by some

of the literature's teachers) and how to conduct online research beyond accessing Google. Overall, Jesse Jackson's teachers were in disagreement on whether the laptops made the students better students. Three participants believed this was the case while the other three disagreed.

The literature enumerated a number of school benefits from having a laptop program. These included being able to extend the school day, take virtual field trips, assist with home/school communication, develop partnerships with outside entities, and have a positive impact on attendance and tardiness. The study's teachers did not discuss these topics but almost all of the participants concurred that Jesse Jackson's culture was one of risk taking, although one teacher believed that there was risk taking only when the individual already felt fully supported. Another participant noted that the school's laptop program gave Jesse Jackson a position of leadership in the metropolitan area.

Obstacles, Physical Classrooms, and Student Misuse. The literature review discussed a number of obstacles that hampered teachers from integrating student laptops. These included getting lost in the glitz, student social problems including computer addiction, an over reliance on PowerPoint, lack of student keyboarding skills, not having enough time or having no time to learn about the computers, and teachers having to fix classroom technology problems. Time was a major issue for most of this study's teachers as well. They furthermore agreed with the literature's teachers on students' lack of technology skills (including keyboarding) as well as social problems, and teachers being technology fixers.

However, the study's teachers also pointed out a number of other obstacles not discussed in the literature. The standard software normally available on student laptops is not math friendly and the available software also presents a special challenge for drawing in physics. A number of teachers discussed having to balance multiple expectations from colleagues, administrators, students, and parents. An AP teacher, in particular, believed the laptops could not help with developing critical thinking skills and that, as the AP exams are handwritten, the students' skill with writing on computers becomes an obstacle in itself. Several teachers strongly believed that it is the human connection that makes learning effective, and the laptops form a barrier to that kind of interaction. Finally, two teachers felt their own lack of computer skills and knowledge was a major detriment to adopting the laptops into their classrooms.

The literature also identified several obstacles related to the physical layout of a classroom. There were teachers having to shift from the front to the back of the room, having to cope with the poor structure of student desks (which tended to have small and/or slanted work surfaces), and teachers being met with laptop monitors rather than student eyes when they perused the class. The study's participants similarly noted issues with the physical arrangement but focused on their rooms being too cramped which reduced mobility or having to teach in a classroom that was not their own. No one seemed to have problems visually, and several teachers had modified where they stood in class in order to monitor student laptop activities. However, one teacher refused to move to the back of the class because, as he pointed out, no one likes to be talked to behind their backs.

The literature review listed a number of ways students misuse their laptops. These have included going to inappropriate web sites, breaking school laptop policies, being off task, and plagiarism. Several of the study's teachers were concerned about plagiarism but each had worked out their own solution. One teacher believed the laptops made plagiarism much easier for students, and they were usually very skilled at screen shifting to hide being off task. Four of the teachers were concerned about the school's Internet filtering system which they felt the students all too easily could get around using proxies. Teachers also pointed out the system inevitably would block teachers from valuable web sites that they wanted to use in teaching their students.

Internal Equity, Classroom Roles, and Interactions. Participants in the laptop literature found that student computers were helpful for the special education students (a sentiment echoed by this study's special education participant). They also felt the laptops allowed for more differentiated instruction which could help gifted as well as at-risk students. The study's special education teacher had one concern not discussed in the literature review. She found that many of the activities she could use with the laptops inevitably required her students to navigate through a multi-step process that often proved to be challenging. At the same time, she viewed computer expertise as a life skill, and her students over time mastered many of the tasks she gave them.

On the topic of classroom roles, the literature focused on teachers becoming students and students becoming teachers. In some instances, an underlying fear for teachers – being replaced by computers – was discussed. The literature also examined the perspective of teacher centered versus student centered classrooms. Several of this

study's teachers believed they had a balance of teacher and student centered classrooms. Most of the study's teachers stated they were open to learning from students but two especially felt that their job was to be the expert in the classroom so it was more difficult for them to take on the role of learner. While five of the participants had no concern about being replaced by technology, one teacher was no longer sure this was the case three years into the program, as she felt teachers were being slowly being substituted by the laptops.

Several themes emerged from the literature surrounding classroom interactions. These encompassed classroom management issues, teachers as technology fixers, and students taking responsibility for their own learning. Two of the study's participants were not challenged in managing their classroom laptops. Two participants expressed a fair amount of difficulty, and two others had no problems at all because they rarely if ever used the laptops. Two teachers disliked having to be technology fixers but neither felt such a role inhibited them from using the computers in class.

Teacher Attitudes, School Policies, Laptop Attributes. The literature's teachers were, for the most part, enthusiastic about their school's laptop program. In instances where attitudes were more negative, those teachers still did not want their program to be discontinued. All of Jesse Jackson's teacher participants were supportive of the students having their own laptops and expressed no wish to dismantle the program.

All the study's participants believed that "old dogs could learn new tricks" – if teachers were open to new ideas. Teachers were in agreement that diversity of computer use among teachers was acceptable. This was particularly the case for two of the teachers

who stressed that students should be exposed to different styles of teaching, including using or not using the laptops. Three of the participants used the laptops in a supplemental role while the other three wanted the laptops to take on a more central position in instruction. All teachers believed that technology should not be an end in itself – either in the classroom or in staff development. Two teachers were particularly concerned that students could become so dependent on the computer they would not be able to function well without that support. The math participant extended this concern also to the graphing calculator which he believed his students should know how to use although they should first know how to solve math problems without such a crutch.

School laptop policies were discussed briefly in the literature with the primary focus on addressing student abuse and whether students would be allowed to take their laptops home. There was a similar focus with Jesse Jackson's school policies and, in this case, students had permission to take their laptops out of school. Four of the study's teachers felt the policies were fine on paper but that students routinely ignored the rules, and that consequences were not sufficiently detrimental.

Last, the literature reported a number of laptop attributes that were primarily negative in impact – the size of the screens, broken latches and machines, frozen computers, the internal batteries, the weight of the laptop, and the lack of overall durability. These concerns resonated among Jesse Jackson's teachers as well. Four of the study's teachers were concerned about the rate of breakage. The internal batteries were a continuing issue as was the size of the computer screen when used as a portable computer. Two teachers felt overwhelmed with all the options the laptops presented.

Summary. Data from both the literature and this study were consistent in content and tone. Many of the same benefits were discussed and, in particular for teachers, having more information available as well as development of higher quality instructional materials were stressed. The stated obstacles were also similar for each group. Time emerged as one of the biggest issues as did social problems for students because of the laptops and, in some instances, a lack of student technology skills proved challenging. Additionally, the physical layout of the classroom, a shift in where the teacher should stand to monitor student usage, and the school's Internet filtering system were common threads. The study's special education participant agreed with the views expressed in the literature on the value of the laptops for this particular group of students. Most of the study's teachers were not concerned about being replaced by computers and, for the most part, were open to becoming students in their classrooms. As in the literature, classroom management was a problem for some of Jesse Jackson's teachers as well as the problem of having to become a technology fixer. The study's teachers likewise felt that "old dogs could learn new tricks," and it was suitable for some teachers not to use the laptops because diversity and effectiveness were more important than conformity. School laptop policies in the literature and among study participants tended to be consistent as did issues identified concerning the laptop computer's attributes. The lack of durability emerged as the overarching issue in the literature and among study participants.

The Case Profile and Teacher Participants

There were a number of topics discussed both by Jesse Jackson's administrators and teachers but were not brought up in the laptop literature. These included the use of

Blackboard as the school's communication platform, other priorities that had to share the focus with the laptop program, battery issues, teacher feedback, and the perspective ahead for year four. These topics are discussed briefly below.

Blackboard. Jesse Jackson's administrators focused their attention on training and establishment of usage levels for teachers. Although teacher participants mentioned the training and usage levels, they also discussed the pros and cons of using Blackboard. Several teachers felt that Blackboard was tedious to use, with too many additional (and unnecessary) steps. They all liked the accessibility to materials, databases, and websites that Blackboard could provide. A number of teachers found having to comply with the standards set for using Blackboard to be an additional stress for their jobs. Two teachers really enjoyed using the discussion board function of Blackboard while another felt that face to face communication was much more effective. Several teachers preferred the student network file structure to Blackboard for providing information and receiving completed student work. Last, two teachers liked the announcement function of Blackboard but did not want this to be the sole means of communicating with students which, they felt, was ultimately the teacher's responsibility.

Other School Priorities. All study participant as well as the case profile administrators were asked about balancing other school priorities and how this impacted work with the laptop initiative. The administrators focused on efforts to successfully gain full accreditation for Jesse Jackson, the new principal, the move to the new building, the new teacher evaluation program, and the literacy initiative. None of the teacher participants stated any major problems with those priorities, and two felt it was important

for schools to solve problems so teachers must have some skills in balancing all the various priorities. Two teachers felt the school was trying to do too much, and all the priorities were *first* priorities but teaching must come first. Two other teachers expressed the opinion that school change is cyclic and, while there is always something new to focus on, most of the time such an initiative is a repackaged older reform.

Battery Issues. Both administrators and teachers had issues with electricity, i.e. laptop batteries, external batteries, security, loss, breakage, and battery system management. The general consensus among four of the teachers was that the batteries broke too easily; there were never enough batteries; and the system for dealing with the batteries was tedious at best. Two teachers had no opinion, but this reflected the lack of laptop use in their classroom. The administrators acknowledged these user related issues and that the battery problem was high on their list for finding new solutions in year four and beyond.

Feedback and Year Four. In the first year of Jesse Jackson's laptop program, all decisions were in the hands of administrators. In year two, feedback groups, one for teachers, and one for students, were formed to interject the user perspective into management decisions. Additionally, teachers were invited to the yearly summer re-imaging meeting (the program structure access and visual representation on the desktop were created on a single laptop, compressed, and then "exploded" into all the student laptops as an image) to provide views on how the image needed to evolve. Toward the end of year two, teachers were able to make suggestions on what software programs they wanted. None of the study's teacher participants served in the teacher feedback group so,

as a consequence, they had no particular opinion on the effectiveness of this group.

However, several administrators praised both the teacher and student groups and felt they had had a positive and considerable impact on how the laptop program changed. When teacher participants were asked what they felt the school had gained or lost because of the laptop program, several teachers believed students were becoming more comfortable with using computers, and one teacher thought nothing had been lost at all. Another teacher was not sure because he felt the program was too new to make that kind of assessment. Several teachers commented on the huge financial investment, and several others felt there had been some alienation among some teachers over being faced with integrating the laptops. Last, one teacher stated the school had to find a balance between a focus on money and making the laptop program work and a focus on teachers and understanding their needs, priorities, and issues.

Jesse Jackson's laptop administrators commented extensively on how the program was going to change in the fourth year of implementation. They felt that Blackboard would continue to evolve and become fully integrated into every aspect of school. In the new building, all teachers would have their own LCD projector – believed by both administrators and teachers to be crucial for integration success. In addition, a new built-in sound system and other technologies such as School Pads or classroom clickers would begin to migrate into teacher classrooms. The paperless classroom, the literacy initiative, and the virtual online course offerings would continue to spread slowly through out the school as well. Several teachers were unsure how distance learning was going to be effective as a learning avenue for students. Teacher participants also anticipated that four

year old computers were going to become more difficult to maintain, ultimately meaning fewer working laptops in classrooms.

Summary. While the laptop literature review did not discuss certain topics that arose for both the study's administrator and teacher participants, this may have reflected the difference in timing between the previous studies and this research. It may also have been a case of the state of technology and its evolution in terms of what might be available to a laptop program. For example, none of the evaluative literature studies discussed a communication portal like Blackboard or the use of battery towers or valence (external) batteries or how to solicit feedback from teachers and students. However, such options might not have been available in the late 1990s or early 2000s or feedback committees may have developed later in the programs. While there was a difference in perspective (management versus user) between the study's administrator and teacher participants, the opinions were similar in regards to Blackboard, other priorities, battery issues, teacher feedback, and what might happen in the fourth year.

The Case Profile

There were two areas that only the study's administrators brought up in their interviews. One, the student laptop image, was discussed strictly from an administrative point of view, and teacher participants would not be expected to comment on the student image. The second, online testing, was a major focal point for administrators in light of the state's push towards digital standardized testing. However, teachers did not mention testing in relation to the laptop program. It may have been the case that online testing

had simply faded into the normal way of conducting testing by year three and so the topic elicited no comments from the teachers.

Student Laptop Image. In order to be responsive to ongoing and changing teacher and student laptop software needs, the administrators re-imaged student laptops in the summers between each school year. Administrators also wanted to bring in new programs that had been developed over that same time period. However, a once-a-year updating process inevitably proved difficult in helping teachers expand their use of the laptops. Consequently, while it took two years, in the third year the image had become sufficiently flexible that administrators could download a new software program or patch or other technical requirement without having to remove the laptops out of the classroom. None of the teacher participants commented on this new flexibility, possibly because their own needs were now being met more frequently.

Online Testing. Initially, teachers were unsure if online testing would be easier to conduct and, even more importantly, would be helpful to students successfully passing the tests. Once the initial set up challenges had been resolved, everyone – both administrators and teachers – fully embraced this approach to testing. There were no comments from teacher participants most probably because online testing was now a normal way of conducting state standardized tests. For these participants, there were no down sides to online testing, only benefits for everyone involved.

Summary

The literature review, Jesse Jackson's case profile, and the six teacher participants had substantial areas of agreement. The only topics not in alignment were those in which

the study's teachers and/or administrators amplified and expanded beyond what the literature had already presented.

In Chapter 5, 6, and 7, each group of teacher participants are described and analyzed in terms of the study's seven research questions. Chapter 5 focuses on the two innovator teachers; Chapter 6 portrays the two adopter participants; and Chapter 7 centers on the two resister teachers. Chapter 8 discusses the various findings that have emerged from these three chapters and analyzes the topics from the perspectives of the research questions, the participant characteristics, and the teachers' classrooms. A new conceptual framework that visually represents these various themes is presented.

5. Innovator Participants

Six digital immigrant teachers were studied with two in each of three categories – innovators, adopters and resisters. Genders were matched for each group, male and female, and a variety of subject matter was included – English, math, social studies, science and special education. The teachers at the time of the study were all at least forty years of age and had taught at Jesse Jackson for all three years of the laptop program's implementation. In this chapter, the two innovator participants' data are examined first within individual profiles, then in regards to the research questions, and lastly in terms of innovator characteristics.

Each participant's profile has a brief biography on how they became teachers, what the participant feels are their greatest skills and challenges as a teacher, and where the teacher thinks he or she may be in five years. Then the teacher's viewpoint of the laptop program is explored. At the conclusion of the profile, a brief description of the classroom observation conducted between the two interviews is provided to place the teacher's comments within the context of what they actually do in their classroom.

Innovator #1 – Richard Feynman

Born just after World War II, Richard decided to become a teacher while still in high school. As a show off and a trouble maker, he noticed the teachers who caught his attention were also show offs and trouble makers. "I thought if they could get my

attention, then I could get anyone's attention." Richard essentially taught himself how to use computers.

In college ... I was in an engineering school at Kansas State. I was getting a degree in physics and math, and they wanted us to learn a programming language. So I learned FORTRAN. I wrote programs, and it was meaningless because nothing had any application to it. Eighteen years later, I [was] presented with an Apple 2E, and they said it does these wonderful things, so learn how to use it. And they said, here's this program named Basic. So I started working with Basic and the large floppy disks, and as I began to work with it, the first thing I was seeing was this is a really interesting and dynamic education tool. I could immediately see the translation. So I began seeing what I could do with this that would help my teaching skills.

In 1978, while teaching in an inner-city high school, Richard won a grant that provided him with twenty four Apple 2E computers. The school did not have very much laboratory equipment, so he decided that instead of doing hands-on lab experiments, he would write virtual lab programs. Later, while involved in a seventeen year detour from teaching, Richard honed his computer skills, teaching adults how to use computers. He remembers meeting someone

[with a] pocket calculator that had little red lights on top, and would suck a battery dry in two minutes, and had four functions – add, subtract, multiply, and divide. To go from that to where we are now, I've seen the

whole thing happen. I guess it's like people who drove the first cars. My grandfather tells me about how it was to go from a buggy to his first Model T. And it's the same kind of technology change.

In 2000, when Richard returned to teaching at Jesse Jackson, he immediately set up his entire system of teaching using a computer. Each year he would digitalize more as programs and resources like animated gifs opened up. When students were given laptops in 2004, this allowed Richard to take a major step forward in providing students electronic access to his content. For the past three years, Richard has experimented with electronic testing, Blackboard, the paperless classroom, and electronic ways of preventing cheating – and what has worked, he has kept.

Richard believes his greatest skill as a teacher is being a performer. “You use whatever gimmicks you can find, whatever kinds of tools, anything that will connect them and their world to you and your world.” Richard's greatest challenge is unmotivated students who want to give up and quit. When not working to engage his students and persuade them to finish high school, helping students understand how to use computers to get things done is one of the most valuable skills Richard believes he can impart to his students.

My priorities have been to make sure that the kids know how to use the laptops, because, when they walk out my door, they're going to forget physics in the first thirty days. They're not going to remember anything other than some of the silly answers we did. But when they come back next year, or when they go on to college next year, they're going to be

using computers again, and they are going to remember how to do the stuff that we did. One of the recommendation letters I have is from a college biology professor. He had the kids turn in lab reports, and one of his kids was my physics student from last year, and the professor said ‘I was absolutely blown away by this kid’s lab report. Where did you learn to do this?’ ‘Oh, my physics teacher made us do this for each of the activities that we did.’ He wrote me a letter thanking me for that. That blew me away.

Richard’s Views of a One to One Laptop Program

Richard believes that people can learn at any age. He continues to take classes, and when asked why he keeps on learning, Richard says, “I took this class 40 years ago, and I wanted to know what was different. This is modern physics, so tell me what is new.” The American Association of Physics Teachers has seminars called the Partnership for Resource Training where there are other physics teachers, “people that I admire, and I watch what they do, and I say, ‘I’d never thought of putting it that way.’”

When asked whether his Jesse Jackson classroom is teacher or student center, Richard replies, “It has got to be a partnership. There’re times when it has to be teacher centered, and then there’re times when it has to be student centered. It’s just maintaining the equilibrium between the two.”

Richard has some deep concerns about distance learning. While he hopes the online classes are successful at Jesse Jackson, he sees some severe limitations in this approach. “There is a difference between my reading something in words, and hearing

somebody say the same thing. The way that we say something can be interpreted by voice inflection. It can be interpreted by just simple tone. You can't do that on the computer." Richard asks an average of three questions a minute in his classroom. "It's nonstop from the time they walk in the door until they leave." He does not see how an online course could provide such an instructional environment.

Not every teacher uses the laptops at Jesse Jackson in their classroom, so Richard has organized an informal team of teachers to provide training to any teacher who requests help. But despite these resources, "people have said that I'm not going to use this; I don't want to use it. Don't even bring it into my classroom – fine." He does not believe teachers should be forced to use the laptops, particularly when they believe their own way of doing things is effective. But conversely, Richard says, "Any new teachers that we hire should not just understand the technology, they should be computer fluent."

Richard believes that the laptops definitely make students better students, especially in the area of organizational skills, which he feels is a life skill. "This kid's got his backpack that's got 10,000 things in it. But when I say, 'show me your homework,' it's in a folder, and he knows where it is – ding, ding, ding, there it is." Richard also considers the culture of Jesse Jackson to be tolerant of risk taking by teachers. This has provided him a great deal of freedom to experiment, and explore using the laptop computers in his classroom.

Along with organizational skills, Richard believes a skill that students need is how to ask questions. "If you don't ask questions, then you're not making a connection with what's going on, so I'm trying to teach kids to be curious again." He also feels that

students have to learn to master material. It's not just "I know this. I know how to do that." Master it. Make it so that you perfect it." In studying physics, the laptops provide an opportunity for students to move towards mastery.

You can keep going back to the PowerPoint presentation, and show this thing over and over again. It has all these different moving things that they can see happening again and again. I've got interactive applets that they can see again and again. And once they see it enough times, and they begin to make the connection, then we're talking about mastery. I think that goes a really long way in making them understand just exactly where things fit.

Although Richard had been making considerable progress in using technology in his classroom, when he learned that Jesse Jackson would become a laptop school, he was very excited over what this could mean in teaching physics. In terms of the program's vision, he believes the school district wants teachers to see the laptops as a tool. "I see it as a tool and I want to use it as a tool, but not as a replacement for anything." Another goal of the program is

bridging the gap between the people who are the haves and the have-nots.

I believe that is definitely helping. I know that there are kids who would not have a computer in any other way. Is that a significant part of the school population here? Yes, it is. Is that a significant part of the population nationwide? No. But we live in an area where this is very important. We're addressing the problem and that's absolutely a key goal.

When responding to what Jesse Jackson has gained or lost in implementing the laptop program, Richard feels the school district has had to deal with a lot of controversy. “We’ve gained a lot of alienation from teachers that didn’t want it in the first place, and feel it’s been thrown down their throats.” But equally, he has seen it become a great benefit for the students.

Even if we just helped a few students to be successful, that would be good.

But we’re helping a lot of students to be successful, and we’re helping them in a lot of ways. There’s a creativity that I’ve seen in teachers here that has been spawn by the fact that this technology is in every kid’s hands right now.

Asked about computer expectations from parents, Richard states, “I don’t think I’ve ever had a laptop discussion with a parent in the last three years – which is good because that says that, in their way of thinking, it’s not an issue. If it helps their student to do better; if it improves their grades, that’s good.”

Richard has known since day one that what his students learn about physics will not be useful for their career, but what they learn about using the laptops will be helpful. “I’ve told them; particularly when I started teaching them how to do formulas in Excel – you can walk into offices where people are getting paid \$25/hour, and you can sit down and do this for that company. That’s a whole lot better than asking somebody in front of you if you’d like fries with that.” In the fall, Richard used an applet – an animated gif file - to show gravity at work, and the person who created that gif was a fourth grader in Michigan. Richard told his students, “He’s going to be your boss because he knows how

to make the computer do things, and you sit here and play games. You'll never be able to do what he does, and you'll never make as much money as he will unless you learn how to make the computer do things instead of letting it entertain you." This is ultimately the computer lesson Richard wants his students to learn.

Richard has no problems with most of the other priorities teachers have been given over the past three years, in addition to the laptop program. However, he does take issue with using Blackboard, although he accepts that it is the standard for the school, and "we are embracing standards, and that's important." Richard uses Blackboard for multiple choice unit tests, but he much prefers the file set up that he had created on the student network drive prior to the introduction of the laptops and Blackboard.

It was the second year they had the laptops – they started turning things in electronically, and I was grading it, and returning it the same way. I just used the drop and drag thing where I take it out of my folder and put it into their folder. I use the Windows Explorer so I've got two windows open and I just drag the document over, and it goes out of my in folder and into their folders. And they do the same thing coming towards me.

Richard's biggest problem with Blackboard is that it requires double duty. "I do everything on the network drive, and then I have to move it over to the Blackboard setup." He finds Blackboard very tedious to use. "It takes so long to do everything. It just seems like the whole process is very laborious and incredibly work intensive just to do something simple. It's like everything that I've done in Blackboard has at least four or five steps more than to do the same thing on the network drive."

As the school district has the license to use Blackboard, he believes pressure should be placed on the company to make things easier to accomplish. “The fact that we had to go out and get another software package (Respondus) just to do the big tests says that Blackboard hasn’t really met our needs.” Richard states that there is both a corporate and an education version of Blackboard. “I’ve seen the corporate version which is superior to the educational version because people that started using the corporate version said we’re not going to deal with the tedium. You are going to make it work the way we want to do, and they’ve got the dollars, so they paid to get it done.”

However, Richard makes use of Blackboard’s communication functions. He has an ongoing ‘To Do’ list in Blackboard. The students know that they need to check that list on a regular basis. In order to encourage the students to get into this habit, at the start of school, “I would put a little note in the To Do list that said ‘By the way, if you show me your textbook when you come into class, you’ll get bonus points on your next quiz.’ Kids would start bringing their books and showing them to me. And I’d say, ‘Bonus point.’” He still puts in the occasional note to make sure the students continue to check the list regularly.

For Richard, there has been “positive” loss as a result of using the laptops. “It’s allowed me to cover my material sooner...I can get into atomic energy, talk about nuclear reactors, and reactors generating electricity, and all this good stuff that I didn’t have a chance to do before.” Using Excel and its formulas has allowed him to “get away from the math piece, and begin looking at how this data really looks on a graph, and what it

means with respect to how this entity affects that entity.” However, he has found that technology cannot solve every problem in the classroom.

I have to revert back to paper quite often when it comes to drawing things.

Right now, we’re doing circuit problems with my honors class, and they have to draw resistor circuits, and it involves something that there is just no way to do it on a computer. I actually handed out paper yesterday just because we’ve got to do it somehow. To them, it’s like what is this – paper?

Richard also gives a lot of paper quizzes because many answers require drawing. “At the beginning of the last school year, I tried giving a paperless quiz, and they had to draw and do things, and it was such a disadvantage for them to try and do that. I realized immediately that that just wasn’t going to work.” A lot of physics activities involve vectors which just cannot be done practically in a digital format. “It becomes a hindrance to the understanding of physics if you’re trying to figure out, well, ‘how am I going to make this picture look like what I have in my head?’”

Richard gives homework assignments which the students are expected to keep track of. As well as telling them verbally, he posts the assignments in Blackboard. “That way the kids don’t have to be in class to know that they have homework.” He also supplies them with a document “that is on their laptop, that has every chapter in the book, and every homework assignment I give.” Completing homework can involve either paper or the computer. “There is not any real preference for them to go one way or the other. A lot of them do have a notebook, and they keep it in that.”

Although there is no state standardized test for physics, Richard follows the physics content standards. For Richard, however, his curriculum has changed in how he teaches the students. It is “mostly through applets where I’ve made the greatest investment in time, and I have seen an improvement in their understanding of basic principals of science because they can see it in an interactive, video kind of format. So that’s been a real improvement across the board, in every phase of physics that I’ve taught.” The class textbooks typically provide material that is at least one hundred years old.

It is good physics, and it is good mechanics, and light, heat, and sound but it’s not the new physics that started in 1905, first with relativity, and then quantum mechanics, and then the physics of the small. Now we’re looking at stuff like string theory, and it’s in the textbook, and it’s beautifully written and set up in a way so that the kids can move out of the classic textbook content.

Richard also believes his relationship with his students has not fundamentally changed over the three years of the laptop program. “I think, at the beginning, in the first year, they saw me as somehow technologically advanced because I was probably the only teacher they had that used them.” But as more and more teachers have begun integrating the laptops into their classroom instruction, “it doesn’t change their perception of me as much anymore. But the first year I could see it right away. ‘He knows everything about computers!’ ‘My computer’s broke’ And I’d say fine, take it down to the help desk. ‘Well, what do you do?’ ‘They fix computers and I teach physics.’”

Although Richard is an expert in using computers, he is always open to learning something new from his students. “I’ll see something, and I’ll say, ‘How did you do that?’ And they’re impressed that they can teach me something. It makes them feel good too.” As with other teachers, he has problems with students being off task and using their laptops inappropriately. “They know that if I see what they’re doing, they’ll lose the machine and have to do it on paper. That’s the penalty, and that’s a huge penalty because that means they have to start from scratch. Everything that they’ve done up to then is gone, and they’ve now got to go back and start the whole thing again.”

Richard has set up a number of routines to help the flow of teaching and learning. The students constantly have their laptop screens up or down, depending on what happens in the classroom.

Particularly when we started the lab, I wanted them to see the lab report set up first of all – the document. And then I wanted them to see me put the equipment together. That’s where if they start looking at the picture on the machine and then I’m showing them how to connect something and they don’t see how that works, then they’ll say ‘what do I do now?’ I really have to force their attention in different places, and I do that just by ‘screen up and screen down.’

When it comes to the physical arrangement of his classroom, there is very little room to change anything, even with the laptops. Richard is very much looking forward to the new school because “I’m going to have a room that is three times the size of what I have now. So I can have different work spaces, and I can actually have a space where I

do mostly computer work, and I have another one where I can do mostly hands on work, and I want those to be two separate places.”

Prior to the arrival of the student laptops, Richard had created a number of PowerPoint presentations for chapter reviews and summarizations. When he discovered applets, he created a library of them, and began to do his labs on the computer. Richard also created a Word document that contains a list of applets for each chapter in the book. “When they open up the Word document, there are hyperlinks that they can activate. All of my PowerPoint presentations have embedded applets that they can call right in the middle of the PowerPoint presentation.” Richard extends each of his lab reports with questions that do not come from the textbook or from anything already used in class. The students must go to the Internet to find the answers.

For example, we did simple machines for one of their labs and at the end of simple machines, we did lever, pulleys, and inclined planes. At the end of the inclined plan lab, I said that I want you to tell me what the Americans for Disability Act says about handicapped access to buildings. When was it first enacted and what did it say? They’re not going to find that in a book anywhere so they have to go out online and look up the ADA, and find out exactly what year it was enacted and specifically what it said. That’s the kind of thing where I want them to be able to see there is a connection between what we’re doing in physics and what happens in our country.

Although Richard cannot think of any applications in which the Internet would not be appropriate, he is concerned about Google searches for images. “What comes back is sometimes pretty trashy. They need to do some pretty serious screening on that!”

Every teacher has had to cope with students not having their laptop in class. Richard maintains six small desktop computers along the side of the classroom, which he calls the “Wall of Shame” for computer-less students. He regularly asks for the help desk receipt so that students can prove their laptops are in for repairs. Richard also uses the small computers because the USB ports on the student laptops are unavailable for student use. “I have these wonderful probes, digital probes, and everything that would work wonderfully with these laptops, and they can’t use them.” Consequently, he has to use the small desktop computers so that “the students can log on and collect the data and save them on the network drive, and then they put them on their laptops. We’re fighting a losing battle on changing that.”

When it comes to plagiarism and cheating, Richard believes the introduction of email has opened up whole new opportunities for students to work around the system. “I know now that some of my students are not doing their work. Someone will do the lab and then email it to others. They’ll change fonts, and something else, and make it look like they did it.” Using invisible characters in the assignment, Richard can find out who created, and who copied the document. “They’ve listened to my spiel about what I’ve done as a computer consultant, and when I say ‘you’ve copied this from this guy over here’ – ‘how’d you know that?’ ‘I’ll never tell, but I do know!’ You’ve got to put the fear of God into them, and then they’re honest about it.”

Richard's biggest problem with the training given to teachers has been that "they put everyone together and try to teach them all the same thing. This isn't done with students - you don't take everybody and say we're going to teach all of you Algebra 2 right now, and some people don't know Algebra 1, and some people know Algebra 10." Consequently, he feels there was not a lot of buy-in initially for the laptop program, and the training is still one-size-fits-all. "There are people down here who don't get it, and there are people up here who are bored." He believes that staff development needs to be divided into different levels.

If I'm in a low level group I want you to teach me at this level. I'm going to sign up for this day. If I'm at a medium level, I kind of understand this so you can tell me this in 25 words or less. But if I'm at a high level, if you tell me where to go read it, I will do that, and I'll save myself having to waste my time listening to you tell me.

In some recent staff development on Inspiration, Richard tried to differentiate into two levels of instruction by creating a presentation for teachers who were already familiar with the program. It was an automated lesson where he had recorded his voice and screen movements into Inspiration. However, the presenter was not as savvy on the software and could not combine the voice and the picture. "We've still got some technology issues between how you do this, and then how you get it to present."

When it comes to how to implement the laptop program, Richard would have started with classroom sets first for just those teachers who wanted to use them. "Let those teachers show the other teachers how to use them, and show them that it works.

Then get a buy-in, and the next year go to distributing.” This is how the paperless classroom idea has been promoted (See Appendix I). A few teachers started as a pilot initiative, and they have demonstrated and helped other teachers grasp the idea.

Richard believes that the personal computer (PC) is much more difficult to use than the Apple computer. However, the PC machine is “far easier to use than it was ten years ago, and it will be far easier to use ten years from now.” He feels it really does not matter which machine people use – the PC or the Apple. “Whichever one you jump on won’t be a bad decision. It’s going to be going in the right direction. But if you don’t get started, you’re going to get left behind.”

In terms of the relative advantage a computer has over other technology like radio, television, film strips, and films that have been introduced into the classroom, unlike the computer Richard describes all these technologies as static. “Once they are written, they stay that way. Once they are put on the screen, they stay that way. Conversely, the computer is immediate. It is current or five seconds ago.” It is how Richard gets his own information.

The kids knew that at a quarter to ten a week ago Monday that there was somebody dead in Virginia Tech. By 10:30 they knew there were 22 people dead. This was before it was ever even on the radio or on the news – they knew. This is what this particular tool does. It is today. It is now.

However, Richard finds the laptops the school district chose to be very fragile, and wishes they had found something a little more indestructible. At the very least, he would have preferred some kind of protective covering. He bought a little case called a

wetsuit (similar to what scuba divers use) for his own laptop. “It would have cost maybe another \$10 or \$15 per unit to give them something like this. But the students drop [the laptops] on the floor. They are constantly carrying them by the screen. The horrific things they do to these machines! I don’t think they spent enough time looking at how robust those things need to be in order to survive school.”

One area that Richard feels has been very well conceived and implemented is the file structure for the laptop program. “On the network drive that we have, permissions on the directory allow the students to see every teacher’s folder, but they cannot see any of the student folders. This is important because they’re going to copy and cannibalize anything they can.” Richard also believes the technology staff does the best with what they have. “The batteries are dying by the thousands, and they can’t even get them replaced. I’m now down seven batteries in my room. I can’t even have a full class available.” He also perceives that trying to maintain such a fragile machine “with kids who have absolutely no concept of what it means to care for something like this” is a very difficult task for the technology support staff. He was initially pleased to see the school district begin to block inappropriate websites. However, he finds a lot of useful websites are banned because the school district views them as unsuitable. “We were trying to do carbon dating. I was trying to get this site to come up, and they said it had the word ‘date’ in it so it can’t be available.”

When it comes to student computer training, Richard believes every teacher is teaching how to use the computers. However, he feels that, although many students think they know all about computers, they do not really go beyond the entertainment value. For

Richard, “what you begin with, as soon as the laptops are out, is a regiment I do the first week. I have them do this, do this, do this. And then I go back and verify that they do this, and this, and this. The second week, if I find they’re still not doing it right, then I come back to the regiment again. By the third week, they’re doing what I ask in the sequence that I’ve asked.” He has found the students do not even follow the basic rules they sign in the Acceptable Use Policy when they get their laptops.

They walk around school with it running all the time. There is not a single kid who doesn’t have at least one Word document that’s been trashed, and they don’t know how to use the document recovery facility. They just don’t get it. By the end of the third week of school, normally I’ve got those kids fixed so that they understand what they’ve done, and why their document isn’t what they thought they had.

On Richard’s “would like to use list” is to have the laptop serial ports made available, although he has come to accept that this is not going to happen. Richard was provided with a School Pad that the school introduced as an alternative to the SmartBoard. Richard did not find the School Pad to be of much use. “I’ve got my own little portable mouse, what they call the remote presenter, and I’m so used to using that, and I don’t really have a need to use that kind of stuff [School Pad].” But he would like the clickers that allow teachers to find out who understands material, and who does not. Richard has also found some of his own digital resources. He has discovered a software program from the Internet that costs \$10 which “takes the laptop speaker that’s here, and plays any sound into it, and it will literally paint the spectrum of all of the different

frequencies.” He has been promised that the software will become available for all students in the coming year.

Classroom Observation

On the day I observed, Richard’s classroom was overflowing with materials, storage areas, posters, and poster paper that outlined each day’s work for the unit on electricity on which the class was currently focused. The students needed to understand the concept of charge and the units of charge, and the day’s assignment was to move them from the virtual mode the students practiced with on their laptops, to constructing a hands-on model that students could physically manipulate in class. Richard explained that in the virtual mode, “I get a lot of applets off the Internet, and one of the applets has two charges on the screen, and with your mouse; you can move the charges back and forth. You can actually take a test charge, and it will place one on the screen, and you can move it around, and then the arrow changes all around.”

At the beginning of class after checking homework, Richard turned on the LCD projector, and told the students to go to the network drive so that they could see the projected document on their own laptops. The Word document outlined the unit’s objective which was to measure the strength of an electrical field, and contained instructions for building the equipment. Richard then said, “Screens down,” and required that all students be focused on him while he demonstrated exactly how to put the equipment together, and showed the students the end product that they must achieve themselves. Richard was quiet spoken and laid back, and did not overly explain or repeat what he was doing in front of the students.

The students were randomly seated three or four to rectangular shaped tables, and this formed each group for the day. As the students attempted as a team to create the same equipment that Richard had just demonstrated, he circulated around the room, encouraging and guiding the students. There was an obvious rapport he had with his students, and it was equally evident that the students were very familiar with how Richard's class was organized, and what was expected of them.

Once the equipment had been assembled, the students shifted from creating to using the equipment to determine the electrical field. Without prompting, a student on each team opened the Excel program to record the results. Then Richard again stopped the class, and focused them up front while he explained exactly how to get the data and record it in Excel. This activity required fairly detailed and precise work in order to ensure the data were accurate. The students managed to finish recording their data before the end of class bell rang.

Because the class block was only sixty minutes long and met everyday to accommodate lunch blocks, I observed Richard's class again the following day. First the students reassembled the equipment used yesterday. Then Richard started with demonstrating how to use Excel and the student data to create a graph, and manipulate material back and forth between Richard's PowerPoint, a Word document and the Excel spreadsheet. Richard only demonstrated this once, and then the students attempted to duplicate what he had just shown them. Richard kept them engaged with jokes as he circulated around the room, helping and prompting as needed. When he found data that as clearly not correct, he had them reuse the equipment to get more precise information. At

the end of the class, Richard again addressed the students by asking them questions about what they had just learned about charge and the units of charge over the past two days.

Summary

The classroom observation was intended to provide a reality check to the information each participant provided in the interviews. During the observation, Richard demonstrated that his classroom was both teacher and student centered as he shifted the students' attention back and forth from completing the assignment to watching and listening to him demonstrate what was needed. He also had a set of routines to help with that shift in focus and the students clearly understood when they should have their laptops open or closed. Classroom management was clearly not an issue with the laptops.

Asking questions was a fundamental skill that Richard enforced throughout the observation. Richard also believed that the laptops were a tool that the school district wanted teachers to use – and the laptops were in constant use throughout the classroom observation, both as a source of information, and as a tool for recording and analyzing results. Richard had also installed a set of small desktop computers and one student who did not have her laptop utilized one of these as a result. Last, Richard strongly believed that his students need to move beyond the entertainment value of a computer, towards learning how to harness the power of these machines. The activities in which the students used their laptops demonstrated his efforts to achieve that goal.

Innovator #2 - Frederica Gonzales

Frederica's path in becoming a teacher was not straightforward. In college, while studying history, she decided that she wanted to teach students and began to take

education courses. Frederica eventually abandoned history for English, because “if I have to do this the rest of my life, I should really, really like what I’m doing.” What has driven her to teach for the past thirty years is, “I still get really excited if I’m teaching something new, or learning something new, or presenting it in a new way.” She is always exploring fresh literature, developing innovative materials, and conducting research. Her deepest level of gratification is when she positively touches someone’s life. Frederica believes her greatest skill as a teacher is being a listener.

I just feel like I learn from [my students] as much as they learn from me, so I’m open to what they say. I’ll ask them a question, and I really want to hear their answer. I think they forget sometimes that I’m just a teacher, because they know I’m a listener. They get very excited.

What Frederica likes to teach the most is creative thinking. She enjoys the life of the mind, and seems most comfortable in that realm. She believes that “I am what I teach. I’m the same person in the classroom, pretty much, as I am outside the classroom.” As a teacher, her biggest challenge is engaging students in reading great literature, because she believes students do not read as much as her generation.

We’re moving away from literacy as a society, towards just everything is visual, like in the Middle Ages with stained glass windows. Everything is a sound bite. Surfing the web is fifteen seconds of information. Whereas really reading and responding well to literature takes time and effort. You have to be willing to sit there for a long time, and concentrate, and think deeply.

Frederica feels no resistance to using computers. While she was growing up, her father provided a model in using technology. “He just saw it as a way to do his work better.” Although she does not like dealing with the mechanical “wasting time” issues, like handing out or collecting batteries, she thinks her past has helped her use computers. She took FORTRAN in college, and considered going into education technology, although her professor convinced her to get her degree in the social sciences.

During her studies, Frederica had no access to electronic material. Now she has entrée to all kinds of digital resources – “the laptops, and Blackboard, and how the library page has the databases, now allows me to do research with students. There is a satisfaction in knowing that I’m helping them get ready for college. They are much more college prepared if they’ve used these databases, and written some material with the information they’ve found and cited, than if they hadn’t [had this experience].” She does not view technology as something she has to cope with specifically but, rather, views it as a tool to help her teach better. However, she has many, many demands on her time that she does have to manage, and that is more the issue for her.

When asked where she thinks she will be in five years, Frederica believes she will probably still really enjoy what she is doing. “If I don’t like to do it anymore, then I’ll just be moving on to something else that I like to do.” She is mildly apprehensive about the new school next year, having spent most of her teaching career in Jesse Jackson’s old building. “I know where I’m going. I know what all the rooms are like, what the floors are like.” She trusts the new principal, and feels they share a number of similar goals. Frederica particularly likes the literacy initiative since it ties in closely with her concern

about students being engaged with more reading. Another concern is next year's new schedule when both teachers and students will only have half an hour for lunch instead of the current one hour. In the past, she used to suggest to students to come after school for additional help, however, this rarely worked out. "But when I said you can come during lunch, the percentage of kids coming just really went way up. I love that – in the middle of the day they don't have to postpone an activity, or arrive late, or get a ride, or any of that stuff." However, this will not be possible with the new schedule.

Frederica understands that life in a school never stays the same. "That's how I've lasted for many years. I know this is the push right now, but as long as you get on board and do it, the things that you need to do, there will be change." So while she acknowledges the enormity of the challenges ahead, Frederica remains hopeful that everything will work out over time.

Frederica's Views of a One to One Laptop Program

Frederica's attitude towards computers is to see them as a tool which can be used for good or bad purposes. Keeping in mind the book *1984*, she understands that people can be manipulated and monitored, and computers can facilitate this. Conversely, there are new possibilities of more leisure time, although right now she feels the trend is going in the opposite direction where computers add to the work people have to do. Frederica is also quite hopeful that digitalizing medical records can save lives and find new cures.

I think we're in that new era – sometimes I feel like a Luddite, like I'm going to take an ax and smash all the computers. Then other times it's like

I'm in awe of what they are allowing our human species to become...But I think that certainly the possibilities to enrich our lives are just incredible.

She does have one concern she feels very strongly about – “that the laptops should not be used to collect information from students that then will be sold as a commodity.”

When it comes to using computers in education, in English without a computer, “you can't write a paper and make major changes almost immediately.” As to research possibilities, “[computers] open the whole world of knowledge at your fingertips in the classroom to each child. I mean that's absolutely phenomenal.” However, she is concerned that computers can make people passive. For Frederica, “it's about thinking for yourself, and not letting the machine do it, and you just put it into a pretty report cover.” She believes that students only want the right answer, but her philosophy is “it's better that you get what's not quite the right answer but arrive at it by thinking it out yourselves, than simply copying and pasting the right answer on the paper.” As she teaches her English students, her challenge is “getting them to write their own answer. They are not as used to thinking for themselves.”

Frederica strives to use the laptops creatively and integrate them as a tool in her instruction. However, “I love the laptops as long as I wouldn't be forced to use them every minute and do certain things.” Given that concern, she believes there are many possibilities in using the laptops.

I think they are a great tool, a great tool to help students learn to think for themselves. I think care needs to be taken with the assignment given.

[Although] you can design assignments that are for mindless zombies, and

I think the administration needs to pay attention to that when they are observing; you can create assignments that require students to use a very high level of critical thinking. The computer can be used in so many ways as a tool.

Frederica has no problems learning from her students. She has always viewed herself as a learner. “That’s what my husband says. I’m just a natural – I love learning, and I’m a natural born teacher.” When a student shows her how to do something with the computer that she did not know, she will thank the student and send him or her off to show the other students.

I don’t have the view of the teacher as the authoritarian receptacle of knowledge that doles it out. But rather it’s shared learning. I’m more expert, and I will point that out sometimes. When we have a big disagreement, I’ll say, ‘Ok, I understand you think this. But I’ve had more practice. Remember I already jumped through all the hoops and got my degree, so you can believe whatever you want, but this is what I think based on my experience and reading.’ So then it’s up to [the students] to decide to hold their beliefs or go broaden their opinion about it.

When asked about whether old dogs can learn new tricks, Frederica believes that people have the capacity to learn all their lives. In the past, everyone had the idea that within the first year or year and a half after major trauma, that was as much you were going to improve. “It’s fascinating on the research on the brain that they now realize, if people have brain injuries, they can continue to improve years later.”

Frederica believes that computers are compatible with traditional education. She also feels that between being teacher or student centered, she is somewhere in the middle. For those teachers who are not currently using the laptops, she is confident this will change over time. Frederica thinks that Jesse Jackson is a school that tolerates teachers taking risks as well.

When asked if computers will ever replace teachers, Frederica thinks this will not happen for a very long time because “the human mind is much more flexible, and innovative, and responsive.” She feels that it will greatly depend on whether people stop thinking for themselves.

What do I think is the most important aspect of teaching? Definitely, it’s that – helping people to learn to think for themselves and question. I really think Socrates had the model – not answer the questions, but ask people questions in such a way that they begin to find their own answers. If that model is used for teaching, then the computer [won’t] replace the human mind.

As to whether the laptops make students better students, Frederica believes the answer is in how the computers are used. “The potential is there, but again, they have to be used appropriately. They can also make the worst students.” One of the first activities she used with the laptops was a WebQuest. But she found it to be a low level thinking activity. “That’s not really good because it’s giving the false impression that this is learning. Maybe the first time you do it that might be good. But if that’s all you do, that’s pretty bad.”

When Frederica learned that Jesse Jackson was going to become a laptop school, she was very, very excited. She has used her own computer at home for many years, and in the late 1970's, she co-sponsored a computer club at Susan B. Anthony (the ninth grade feeder school). Although she did not become a programmer in college after learning FORTRAN, her interest in computers has remained high. "I found the whole including of databases online just opened the world to research. It made it so much easier...It's just phenomenal."

Three years into the laptop program, Frederica does not describe herself as coping with the technology. "I view it more as utilizing and integrating, because I think the technology makes you a lot more productive." She tries to learn how to use these new tools to improve instruction and "decide how I can best use it to help kids become more literate, develop their research skills, their writing skills, and so on." What she mostly has to cope with is having enough time to do everything. "Yes, you have those little mechanical problems – somebody's computer freezes, and it's frustrating, and it annoys me – but I'm trying to learn the solution so that I can know what solution will solve that problem, and I can implement it quickly, and tell everybody so that when somebody has that problem, somebody else can help them and fix it very fast."

When asked about the initial vision for the laptop program, she feels it was about making students life long learners. "Obviously the school board members that voted this in understood that computers are the way of the future. It's going to dramatically change how we live, how we work, how we play. They realized that the schools were way

behind. They were trying to help us get caught up. I think they were right on target.” But now that the money has been spent and the students have the laptops,

[The school board’s] trying to figure out what we got for our money. How much money should we continue to allocate, or how can we allocate this money in such a way that the computer is used to achieve [their] goals?

Those goals are to have very high scores for the school system, to attract the brightest students from all segments of society, and not to have the students who come from families with financial means flee the public schools because they’re not going to challenge the students enough. In other words, I really think they’re very concerned about maintaining a high quality educational program.

Frederica agrees with these goals, although she does not always concur with how to achieve them. The school board members are not professional educators, she feels. “I think they need to appreciate our expertise just as we need to understand that their goal is to make this be a really good school system that everyone praises. They want praise; they want to be nationally known. They want this to be successful.”

As to what the school has gained or lost because of the laptop investment, Frederica believes it should be a balance between money and people. She feels, however, that there has been more of an emphasis on the money (and the technology), and not enough consideration that “we really need to make sure that the personnel are happy, and trained, and so forth.” Her impression has been that the technology is viewed as important as the staff.

I think that's a mistake. I don't think that was intentional... I think at some level, a message was communicated that younger teachers coming up to school now, know more about technology, so we have to put the resources there. But I [believe] teaching is really dealing with people, and the older and more experienced you are, that's more valuable. Not just knowing how to use a computer, knowing the latest programs, equipment, and so on, but how to use it effectively and interact with the students – I think that's more important.

Frederica experiences expectations to use the laptops from parents, administrators, the state, and her students. “A parent will say, ‘Can’t you email me a progress report from [the digital grade book] just like so and so?’ And you’re like, ‘Yeah, I knew I had that capability but I never did it.’” There are the Blackboard levels that everyone has to comply with from the administration. And even the state has technology requirements that every teacher must meet. From her students, they are doing some activity and she says, “‘I’m not sure if you can do that.’ And somebody will say, ‘Well, yeah, you can. Just do this.’” Sometimes, however, she finds that she can do things her students cannot because that capacity has been disabled on the student laptops to prevent abuse.

The biggest laptop benefit for her students is a view of the future. “This is the way our society is transforming itself in this century. It’s a glimpse of the future, also a connection to youth.” Frederica feels that the technology helps her stay young because she can remain in touch with what is happening electronically. “I think it’s kept my

interest in teaching so exciting. I am now able to share with kids things that I only became aware of in graduate school that now kids can see in high school – like all the databases.” In terms of the skills that students need, she remains concerned with how computers can be used. “It underscores for me the importance of students learning to think for themselves, so that they can question any particular use made of computers and find new applications for them.”

As to the administrative benefits the laptops bring to teachers, Frederica thinks that they allow more flexibility, but the online programs still require a time commitment.

I still feel like I have two sets of records. I have my paper record and my [electronic] grade book, and I’ve used some assessments in Blackboard, but it’s like having three things. I always feel that I need that paper record because of crashes and problems. You just never know what is going to happen. In some ways it’s made it somewhat easier, but I still have all the data entry so I don’t see a big change there. And in the grade book you have to make sure everything is coded right. It takes time to do that.

She also likes being able to quickly reorganize her digital grade book. “For example, I enter [the grades] as they do them, but, near the end of the quarter, I reorganize them so all the essays are together, all the objective tests, all the journals, and whatever.” Grade calculation is easy, but there is still the time needed to set everything up. She also believes that the administration expectations have changed. “Sometimes they don’t give us as much time as we still need to make sure that everything is accurate...to get that late work graded into the book.”

The digital attendance program is also beneficial although Frederica has had a lot of issues using the program. Some days it will not open, especially early in the school day. She has had the technology staff investigate the problem, but she still cannot count on the program to be available when she needs it. “So again I have the two records. I have my hard copy and then the [digital] copy.” However, despite the extra work, Frederica still likes the digital program because of all the data available on students.

For example, I can see if they took English 10 or English 10 honors and what grade they got in it. It helps me determine [whether] my suspicions about somebody being misplaced are founded, or I’ll have evidence that I can give to a guidance counselor or principal if I think somebody should be changed in terms of the class either up or down. I like being able to see all of the kids’ attendance records, so if they are absent from my class, I can see if they are absent from their other classes that day. If they are one of the kids that cut, what’s their cutting pattern? I will send a discipline referral to an administrator, saying ‘not only did so-and-so cut study hall; they also cut these other classes.’

Frederica can view each student’s class schedule and find out how many advanced placement (AP) classes they are taking. She feels it helps her understand more about her students, and provides information that helps with the instructional judgments she has to make.

For example, students aren’t showing up to make something up that they should have made up, and they say ‘Oh, I’ve got to make something up in

my math class.’ You look at their schedule and they’ve got four AP classes, and then you understand. This kid has a real time problem, and you just do whatever you can to extend it so they can get it done. This is opposed to somebody who has no other AP classes and has a study hall. ‘Why aren’t you coming in during your study hall to make up this test or whatever?’

She will also use the class schedule information to find a student if there is something she wants to give the student because they missed one of her classes. In addition, the standardized test scores are available in the digital attendance program. This information allows her to interpret their grades appropriately.

Another benefit that Frederica has found is teaching her students how to find their own answers to questions. This can be particularly helpful when the topic is very large, and the students need to understand how to tackle the problem by creating a set of smaller questions.

Answering the first question will shape the next little question, which will shape the next little question, until finally at some point you get to what you feel is an answer to the big question. Of course, that big question may have changed itself in the process of answering the little questions. The computer allows you to help them shape that first question so that they can approximate what they’re trying to get to.

Frederica does feel she has to cope with the many priorities of her job. “I’m not only a teacher using technology; I’m a teacher teaching people. And with people you

have these other strands of the job which involve helping those kids that are having trouble getting to school for whatever reason.” She has to work with the social workers, the school psychologist, and the special education teachers. Curriculum issues also take time. “You’re spending time with all of those essentials – there’re only so many hours.”

Another area where time has been an issue is in creating and managing her curriculum materials, and keeping her Blackboard classes current. She has also had to do Blackboard training, and that requires additional time to experiment and learn about its different facets. “As my husband says, ‘you used to spend time just doing the work, creating lessons, and then grading the work the students turned in. Now you have to spend time learning how to create the lesson, then creating the lessons, then teaching the lesson, and then grading how the students did the work on the lesson.’” Her solace in coping with all this is that “I think that the more I learn, the easier and faster I’m going to get at it, but this may be again an illusion since technology is constantly changing.”

Somehow Frederica has to factor in time for activities like special education meetings, or working with the school truancy social worker, or communicating with parents to make sure students come to class. She has a student with a serious medical problem that requires coordination with the principal and parent to provide the materials the student needs to keep up with the classwork. As a teacher of a class co-taught with a special education teacher, “I have numerous students with issues that take time in working with those human problems.” Teachers’ planning periods often get co-opted for staff development. Then there are department meetings, curriculum meetings, and

meetings for grade level teachers. “It’s all good – I’m not saying it’s bad. But it’s just – Wow – I’m exhausted!”

Frederica has a pacing guide but believes the laptops have had very little impact on it. On occasion, though, using the computers can help the pacing. “You can do your research paper faster if the kids have the skills that they need. Some kids can go much more quickly – of course, the other kids that are not as skilled, you have to teach them skills before they can do it.”

The students always have electronic access to the homework assignments which Frederica believes reinforces student responsibility. Some of her assignments must be submitted using a laptop. Again, the only problem is when students lack sufficient computer skills. “The more that they are taught the computer skills before they get to my class, the easier it is and the more helpful the laptops are in getting homework done.” Conversely, for students who have tremendous computer skills, she has heard of another teacher’s students inappropriately emailing completed assignments back and forth to each other. However, with the kinds of English literature assignments Frederica gives, she believes this would be much more difficult to do successfully in her classes.

When it comes to assessing her students, Frederica has incorporated Blackboard testing, and is using Respondus to create more digital assessments. “I’m not using it right now because I’m not doing things where they have multiple choice tests. But I’ll be using it again next year. I think it’s great.”

When asked what she has had to give up from the past in her classroom, Frederica observed that as an English teacher, “I have had to give up reading aloud literature

together with students in class. Rather than ‘let’s read Act 1 of Hamlet aloud together, and then talk about it’ – it’s now ‘read it, and now we’re going to talk about it and do some activity on it.’” She has not had to stop any past activity directly due to the infusion of the laptops. However, as a time stealer, the laptops do have an impact. The students and their computers need to be managed, particularly as the class begins.

It takes time for them to get their computers loaded, their batteries going, and to get where they’re supposed to be in the lesson. Inevitably some kids have a problem. They left something somewhere and have to go get it. They left their laptop – there is some time just managing the technology, and that time has to come from somewhere because we have a fixed ninety minute block. Although some kids are completely ready to go with their laptops turned on as soon as they get to the room, other kids are not, and that’s just human nature.

The computers can also malfunction during class time – something is too slow or the computer crashes or freezes. “I’m giving an assessment through Blackboard, a test through Blackboard, and a kid’s laptop freezes. I have to devote time on that. And that time is coming from something else that I would be doing.”

Frederica feels she has a good relationship with her students. She brings to mind one student who struggles in English but is very good with computers. “I know my relationship with him really became very positive once I realized that, and began to ask him questions, and asked him to help people.” Conversely, some of her students who do not have well developed computer skills are challenged by her expectations of computer

use. She believes strongly that students need to come to her classes well trained in how to use the laptops. “I should not have to teach how to use Blackboard as well as make up my lessons and then put them up on Blackboard. It’s overwhelming.”

She has no problems with classroom discipline and the laptops. Her routine is simple – “This is my can. You put your ID in here. Get your battery, and you have to give me your battery back to get your ID back. Obviously you have to have your laptop or you won’t get a grade for what we’re doing unless you handwrite it out on paper.” She walks around during the class to see what students are doing and, if they are off task, she redirects them accordingly. Infrequently when she has issues with students not bringing their laptops, Frederica has written the students up, and they received an in-school detention which has eliminated that problem. In her study hall, students have done inappropriate things with their laptops, but the threat of being written up puts a stop to those kinds of activities. As she tells her students, “Study hall is a period in which you’re supposed to be doing school work. You’re not supposed to play games.” She is quite willing to call home if necessary. “I use the parents, the administration, and detention, and that’s the end of it.”

Frederica believes nothing has changed visually in her classroom because of the laptops. Sometimes she will move to the back of the classroom and work from there. The only thing she has instituted is some rules, especially “Close it half way now, please.” She wants everyone’s attention when she’s teaching.

Frederica describes a particular instance that best illustrates the power the laptops have in her classroom instruction. The class was reading the play, *Oedipus*, and she asked

for a student volunteer who knew a lot about Greek mythology. One of her students volunteered to be the play's Greek mythology expert. Frederica explained that any time there is a reference to Greek mythology or to ancient Greek drama; the student needed to inform the class about to what in the author was alluding.

The student volunteer stayed after class today, and she showed me this chart that she'd created. So she's really working on this, and she said that 'this is as far as I've gotten.' I said, 'This is great. I'll tell you how you can do it faster. Why don't you research Sophocles, *Oedipus* and Greek mythology and ancient drama? Maybe somebody has written some articles on this. You'll just be able to paraphrase from the article (cited of course) and that'll speed up your work, and you'll have several pages you can share with the kids.' So she stayed after class, and we went into Blackboard and the school library page to the ProQuest Database, and went searching around. We didn't find anything in there. So then I said, 'Wait a minute. We can do another kind of search.' So I went to Google.scholar and we found this article title. And we knew this was just what we wanted. Unfortunately it's an article in a book, and we don't have the book. But I said to her that she could try to get this book, or we can start searching and get pieces of the article, or references to the article.

Another new activity that Frederica started developing the first year is study guides for the books they read in class. "I have created an electronic study guide which has a picture of the author. It has some biographical material. It has a summary of the

book. It can have links to literary criticism about the book or can be linked to somebody else's well researched study guide somewhere out there in digital space. I can have all kinds of research links."

For Frederica, if something she has tried does not work, it means she did not set it up properly. Learning from her mistakes, she will redesign how she has carried out the activity.

Sometimes a lesson does not work the first time the way you want it, so you have to go back in and change it. I don't think that's any different with laptops. If you don't get what you thought you wanted to get, then you've got to go back in and ask, 'Why didn't I get it? How did I not make it clear to them? What do I need to tell them or show them so that I get back from them what I'm expecting to get.' Also remember that sometimes when you totally goof, some kid gives you the response, and then you know, 'Oh, that's what I really want to get!' What you create can change based on the feedback you get back from the students, and you can change your instructions, rubric etc.

One function Frederica thinks is great is the discussion board in Blackboard. This feature allows all the students to see each other's work. She posts sample student essays in Blackboard.

I think that gives the kids a lot of information. Kids say 'That's too hard. Nobody can write an answer to that question.' And then they'll see phenomenal answers. While I often use the same students' work as

examples because they write the best in class, sometimes you get a sample from a kid who doesn't get much attention, but they did a great job. So you can have them post it up on the Blackboard discussion board, and everybody can see it and learn from what this student did. And then this student is going to be 'Like wow – my paper was up there!'

When the class was studying *Hamlet*, they had to analyze the major soliloquies and write a short essay. The Blackboard postings had some excellent answers and, for the students who were struggling, this also gave them a model for their own writing. "[The discussion board] serves many instructional purposes – motivation, seeing a sample, learning how to write one, following this model, and so on." Frederica finds Blackboard to be amazing because of all the opportunities it provides. "You can make documents available, PowerPoints available – they can search databases, you can give them any kind of web based assignment and they can just turn it in through assignments. It's just amazing."

Frederica does wish she had a few extra laptops for when students come to class with legitimate reasons for not having their own available. But she solves that problem with students sharing with each other.

One problem English teachers have had to address is the issue of plagiarism as copying off the Internet has become so easy. Although the school has made available the Turnitin program, Frederica has decided not to use the program because of the debate that has arisen over its use. In addition to the controversy, there is a technical problem in how the program presents its report. "The paragraphs and original formatting disappear. When you send it through and you get your report, it's not in paragraphs anymore, so it takes

time to interpret the results.” However, she has told her students that she can always use the program if she thinks students have not been clear where they have gotten their material.

‘I’m happy to have you go research something – that’s great. Integrate it into your paper, but just make sure you cite it. Your impulse is very good to go get the answer. You went and did some research – that’s great. But you have to put it into your own words. You have to paraphrase it, and you have to cite it.’

She also avoids the issue by having them do a lot of their writing in class where copying is not an option. In addition, Frederica tries to construct the assignment in ways that do not lend easily to plagiarism. That, she feels, is part of the art of teaching.

Frederica wishes that she had a class set of laptops because then all her students would have a laptop, and the rate of breakage would go down. “They throw them; they damage them; they use them inappropriately. They don’t take responsibility for getting the computers repaired.” But then she believes each student with his or her own laptop also has its advantages.

The network’s functioning has caused Frederica a lot of problems. “I always believe you have to have a Plan B because you just don’t know what is going to happen. Plan B is always paper and pencil or using the book.” She remembers the network being down a lot the first year, and it turned out her classroom had actual problems getting to the server – an issue other teachers did not appear to share. That summer the server was upgraded, but the following year the problem was with the wireless access. Again,

Frederica thought everyone was having this problem, but discovered it only happened in her room. The technical staff eventually fixed that problem as well. This past year, Frederica has found her own solutions for when the system does not work for her. When some students cannot access a program the class is using, Frederica asks herself,

‘Ok, does this child have too little temporary memory left, and do they really need to go to the laptop help desk and get the thing dumped because they’ve clogged up all the memory?’ Or ‘If we just turn it off and wait while it slowly loads back up, will they then have access?’ Or you’ll laugh – if I put them in a different seat, will things suddenly and magically start working which seems to happen. We turn [the computer] off, and then we turn it on, and then we move their seat, and then it just starts working. This is how you deal with the ‘whinny voices – ‘I can’t get on, and what do I do now, and blah, blah, blah...’

Frederica sometimes feels like the technology facilitator rather than the teacher. She must find solutions for a variety of issues, even as simple as a battery that has a loose plug. “They’re complaining that the battery is dead and broken when really they just didn’t push the plug in far enough.”

The school policies regarding the laptops are fine with Frederica, although she wishes there was a way to lock a student’s laptop down when students are off task. Jesse Jackson’s faculty had been introduced to a program at the beginning of the laptop initiative three years ago that would simultaneously show all the student laptop screens on the teacher’s computer with the capacity of locking any inappropriate screens

immediately. Frederica knows students are very skilled at shutting down windows quickly when a teacher walks around, so it would help alleviate that problem. Another area that Frederica would like to see change is to replace the English textbook with one that has digital resources.

Overall, Frederica feels the technology support provided in the school is fine, and the staff has done a good job with all the issues involving the laptops. She feels the same way about the training opportunities, and wishes they would offer more. Frederica appreciates the full or half day Blackboard training sessions, but she would also like to learn more about the Microsoft operating system.

Frederica believes that the laptop program did not really get going until the second year when Blackboard became available. She was in the first training cohort and started using it immediately. The first year there really was not enough software that facilitated students using their laptops. The students were also not experienced using the laptops. “The kids weren’t skilled so what we realized that first year was that the kids didn’t know enough, and they had to be trained. I know the second year the kids were more ready with better skills and better meta-cognitive knowledge about why you would have a laptop and what you’d do with it.” When asked how she has felt the laptop program has fared so far, Federica has found it

interesting and challenging, a chance to be creative, a chance to learn new skills, and a chance to connect with students in a new way. It has also made me realize how little time there is in a day, and how dependent we are on technology and electricity. It’s emphasized to me how we are

teaching children, not adults. The maturity level sometimes creates new problems in terms of accomplishing what you are trying to achieve. Kids aren't responsible for bringing their laptop, or completing an assignment on line, or going to the library. This creates additional challenges.

Classroom Observation

On the day that I observed Frederica's classroom, it was arranged in a traditional pattern with the desks all in rows facing the front of the classroom, although other seating patterns were used depending on the needs of the lesson (putting four desks together for cooperative learning, or moving the desks into a circle for whole class discussion). The walls were covered with student work as well as numerous posters of colleges. Frederica did not have an LCD projector but she worked around this by using Blackboard.

As this is the first class of the day, Frederica handed out batteries, collects IDs, and deals with laptop issues while the morning announcements came over the loudspeaker. There were seventeen students present, and they were quiet through these morning rituals. Initially, Frederica spoke to the class from the front of the room, talking about the assignment and the day's work. She had them go directly to Blackboard to the daily agenda and the discussion board for the current project postings. Then the students moved themselves and their desks so they faced each other into previously defined groups where they discussed an article that each group had been assigned. Each person in the group had a role, one of which was the recorder who had an ongoing Word document open and added notes as the discussion flowed in the group. Some of the students had a printed annotated copy of the article, while others had the article open online on their

own laptops. The students discussed their notes and finished compiling their presentation as Frederica moved among the students guiding and focusing them and making sure the group was on task and going in the right direction.

After about 35 minutes of discussion, each group came before the class to present their notes about their article. All students in the group had to speak during the presentation, and the recorder's laptop was passed back and forth for each student to use in their turn. After the presentations, the students posted the group's notes in Blackboard. The class ended with students continuing in their groups to answer the chapter questions and the Blackboard discussion posting on a specific prompt given by Frederica.

Summary

One of the major strengths of the laptop program, Frederica believes, is providing access to electronic resources. In the classroom observation, Frederica had made available both on paper and digitally, certain critiques which the student teams had to analyze. She also feels that the laptop as a tool can help her students to think for themselves and find their own answers. This was amply illustrated through the group discussion, the recording of notes, the presentation to the class, and last, the posting of those notes in Blackboard.

When the class started, Frederica had to cope with various laptop-related management issues such as batteries and missing laptops. Although she views these issues as annoyances, she also does not believe they are anything she really has to cope with and this was demonstrated in her observation. In addition, she had no classroom

management problems and the students were all on task and engaged using their laptops throughout the observation period.

In the remaining portion of this chapter, the innovator teachers' responses are analyzed together specifically to the study's seven subquestions. Second, while the literature's description of innovator characteristics was used marginally in the participant selection process, I return to these characteristics to discuss how the innovator teachers matched those attributes. Last, I discuss the two classroom observations as a whole in terms of three key aspects that emerged from the data.

Research Questions Summary Responses

Each of the seven research questions are answered from the perspective of the two participant innovators' responses. An analysis of those responses is provided as well.

How has being a digital immigrant affected their integration efforts?

When asked this question, both innovators agreed that they were digital immigrants as defined as someone who had grown up before the age of computers. However, neither felt that this had held them back in any way from integrating the laptops into their instruction. Richard and Frederica also agreed that old dogs can learn new tricks.

What problems do the teachers believe the laptops are supposed to solve?

Richard believes that the laptops are to help bridge the digital divide as there are students whose only access to a computer is through Jesse Jackson's laptop program. It is also one of many tools that the school provides teachers. Richard notes, "I want to use the computer as a tool but not as a replacement for anything." Frederica feels that the laptops

are to help students become life long learners. As computers are the way of the future, she believes the school board “is very concerned about maintaining a high quality educational program.”

What do the teachers believe they have had to stop doing in order to utilize the laptops?

Neither Richard nor Frederica feel they have had to stop doing anything in order to use the laptops. In fact, their sense of loss is more positive because they have been able to stop conducting activities that took time away from their primary content objectives. Richard has been able to move away from math instruction because he can harness the power of Excel to complete the math for his students which frees time to focus on specific physics principles. “You can get away from the math piece and begin looking at how does this data really look on a graph, and what does it mean with respect to how this entity affects that entity.” Frederica has found that the online research materials available to her students have freed students from relying solely on the school’s substantial but still limited library resources. In addition, she saves time from having to schedule visits to the library to conduct research, and finds the immediacy of the online databases to have a positive impact on what she can now do in her classroom.

What new activities, approaches and strategies do the teachers believe have emerged?

Frederica uses Blackboard’s discussion board which makes all the students’ work available to each other. She heavily uses the online databases available through Blackboard for student research, as well as Microsoft Word for writing essays. She is particularly enthusiastic about what Blackboard has enabled her to do. “You can make documents available, PowerPoints available – they can search databases, you can give them any kind

of web based assignments, and they can just turn it in through assignments.” Richard has found the use of applets particularly helpful in illustrating physics content. While he is not as enthusiastic about Blackboard, he does use the communication aspect of the program. Richard posts a To-Do list in Blackboard as well as homework assignments. The remainder of his content can be found on the student network drive where everything students need, from PowerPoints to reviews to lab activities, are available. Students rarely need to bring their textbooks to class.

Richard and Frederica are very clear about what the computers can and cannot do in their classrooms. They are aware of the machine’s limitations, and what is appropriate and effective in using the laptops. Richard explains, “There are times in the day when I tell them to turn [the computers] off and shut them down because we’re going to do something that specifically requires them to be off and not to be in the way of [the students’] attention.” He has also attempted to become completely paperless but has found that some activities such as drawing vectors can not be done effectively on the computer.

How has the teachers’ use of and attitudes towards the laptops evolved over the three years?

Both innovators were very excited when they learned Jesse Jackson would become a laptop school. Their enthusiasm remains unabated even after three years. Neither teacher has stopped using the laptops, and instead has fully integrated them into classroom instruction. Frederica explains that when something does not work out when using the computers, “that means that I just didn’t set it up right. I would just go back and redesign how I was doing it.” She still views the laptop program as appealing and demanding, and enjoys the creative opportunities to expand, learn, and connect to students in new ways. Richard believes that it

would be a huge loss if the school ever stopped providing laptops to students. “We’re taking each subject discipline, and each of us is teaching another aspect of how computers are ultimately going to be used in their careers.”

How have the perceived benefits and obstacles of the laptop program played a part in dealing with the laptops?

Frederica sees many benefits in using the laptops for instruction. Her students can conduct research more quickly, especially if they have the requisite computer skills – “putting study guides online so they’re at their fingertips, being able to use the databases to learn and read literary criticism.” She does have a number of obstacles that she has had to overcome such as getting students to bring charged laptops to class, and teaching them proper laptop etiquette – “I’m supposed to be teaching English literature, not technology, and yet it’s doubled my job in that regard because I have to teach all this other stuff in addition to my English curriculum.” She also finds that laptops take time – time to get going (such as turning on laptops and getting batteries), time to solve computer problems (when a student laptop freezes), and time to prepare lessons (and have a backup plan if things fall apart technically). However, ultimately Frederica believes that technology makes a teacher more efficient. While she has had to overcome a number of challenges from the wireless system, she explains, “I don’t see technology as a major problem to cope with. I see it as a major tool that can allow us to be more productive.”

Richard also has had to cope with obstacles such as inaccessible ports on student laptops, useful websites that get blocked, conducting some lab activities that just cannot be done on the student computers, or having to give paper quizzes because of software

limitations. However, these are simply obstacles he accepts for the moment in anticipation that new solutions will eventually emerge. Richard has found the computers to be so beneficial that he has attempted to become completely paperless, where every assignment is accomplished electronically. The student laptops have also allowed him to cover content more quickly, which has provided time to delve into the new physics of Einstein and others, and to extend the principles of physics to real life situations such as inclined planes and how this impacts disability regulations. Richard has invested a lot of time in finding and using applets, and “I’ve seen an improvement in their understanding of basic principles of science because they can see it in an interactive, video kind of format.”

How have the characteristics of the laptop and the program’s implementation helped or hindered the teachers’ coping?

Richard does not find computers difficult to use, but “if you don’t get started, you’re going to be left behind.” He believes that every student should have their own laptop, but he also feels that implementation would have been more effective if only teachers who wanted to use computers had been given classroom sets. “Let those teachers show the other teachers how to use them and show them that it works.” This would have built better buy-in with the teachers, and he would then have followed that with distributing the laptops to all the students. Unlike other forms of technology that have been historically provided to classroom teachers, such as film, television, and radio, Richard believes the computer is about “now”. It is current and flexible.

He has also been very impressed with how the file structure for the student network drive was set up, particularly since it has allowed Richard to build his entire

course digitally, and have it accessible to his students. Richard does wish the school district had picked a more robust computer or at least have provided some kind of covering that would have helped protect such fragile machines. The technical staff has done the best it can, Richard believes, to keep laptops functioning and in classrooms. Richard also wishes that staff development would shift away from one-size-fits-all to a more targeted approach. As an innovator, he would much prefer being told where to find information rather than sitting through training sessions that focus on developing skills he has already honed.

Frederica also does not believe computers are difficult to use but she is sometimes challenged by the lack of student computer skills, or in finding solutions to common problems such as thinking a battery is dead when it just needed the plugs more securely fastened. Frederica would like a classroom set of computers which would mean less breakage, and fewer students without laptops. However, she would still have to cope with batteries, charging laptops, and distribution – activities that also get in her way under the current structure. She feels that the technical staff has done a good job in keeping the laptops functioning. The network has been more problematic, but again, technical support has helped to address most of the problems, although her lack of faith in the system means she continually has a plan B. “Plan B is always paper and pencil, or using the book.” Frederica has enjoyed the training opportunities provided by the school district, and would like to attend more.

Innovator Characteristics

As noted in Chapter Three, a set of characteristics (described below) from the literature was to be an aid in finding appropriate innovators for the study. Although it turned out they were not useful to the selection process, I return, in this section, to discuss these characteristics in light of the two innovator teacher participants' responses. The analysis has also found several new characteristics that have emerged from the data.

Visionary user, technology oriented, willing to take extreme risks, experiment constantly, self sufficient, understand complex knowledge, cope with high degree of uncertainty, launch new ideas, experiment with new ways of relating and teaching students, individualize instruction, are student centered, do not have major laptop management issues, computers are virtually invisible.

Vision, Technology Use, Risk Tolerance

The literature defines innovators as finding solutions from the future and not from the past. In the interviews, neither participant mentions anything from the past that has either helped or hindered their laptop integration efforts. Instead, the focus has been on using the digital resources currently available to enhance instruction. Richard and Frederica view themselves as willing to change how they instruct their students in order to gain the benefits from using the laptops with their students. The teachers are not satisfied with the status quo in regards to the computers, and they are willing to experiment further, and take more risks to continue adapting the computer's functions effectively into their instruction.

Benefits, Obstacles, Loss

The innovator teachers have found many benefits in using the laptop computers, and, while they acknowledge various obstacles, this has not deterred them from integrating the machines into their teaching. Richard notes how applets and the Internet have helped his students learn, as well as utilizing the student network drive to provide full electronic access to all his course's resources. Frederica states repeatedly how Blackboard has assisted in researching, essay writing, and presentations. While both participants mention loss, it is within the perspective of letting go old ways of carrying out activities, and how this has led to new opportunities as well as additional time for instruction. Richard and Frederica have encountered obstacles as they've integrated using the laptops, but in both cases, they have either found solutions or simply have worked around the issues.

Specificity, Computer Visibility

Innovator teachers use very specific language when they talk about using laptops. Richard discusses how he uses the machines in conducting laboratory activities or extending content through applications using the Internet. Frederica notes specific databases or posting essays in Blackboard. One of the characteristics of full laptop integration into instruction is a shift in focus from the machine to the content, in effect making the computers invisible. The participants only discussed the laptops when they were specifically asked about the machines in the interviews. Throughout the remainder of the interviews, they each spoke about the activities they have used, and the role the

computer has played in those activities. It is the content that is the center point rather than the computer itself.

Training, New Technology, Filter for Success

Richard is concerned about the one-size-fits-all approach and has made efforts to help the trainers differentiate the training sessions. Frederica wants even more training but in areas such as the Microsoft operating system. As they have encountered new technology, such as the School Pad or the classroom clickers, each has experimented as time has allowed, but again, the emphasis is on how such technology can enhance what is already transpiring in class rather than on the attraction of using new technology. Richard had tried the School Pad but decided against using it as he'd already solved the problem of mobility and controlling the LCD projector through a remote presenter device.

Participant Classrooms

Each innovator participant had a classroom observation sequenced between the two interviews. The purpose of this observation was to place the participants' responses in the real context of how and what they teach. There is an examination of three characteristics that have a bearing on how the participants use the student laptops in their classroom instruction.

Responsibility for Learning

In both cases, Richard and Frederica model and explain what they want their students to accomplish, and then shift to individual or group work to meet those goals. The responsibility for learning is clearly placed on the students. In Richard's classroom, he demonstrates how to put together a laboratory's equipment, and then expects the

students to follow his directions in assembling their own materials. While he supports and assists students in this process, he expects them to have paid attention and to solve the challenges inherent in producing the equipment. Frederica also explains the goals of the day, and then shifts attention to group work on an ongoing project. Each student within the teams is expected to carry his or her own weight which is aided by each student having a specific function in completing the assignment as well as making a presentation to the class. Like Richard, Frederica provides support and assistance as needed, but gives the students space to sort things out on their own.

Placement of Attention

Frederica and Richard shift the attention from teacher to student and back as necessary. However, the teacher portion is fairly short, and the majority of the students' attention is focused on accomplishing the day's tasks. Each participant has found ways of helping students shift their focus by making sure laptop screens are down and not providing a distraction when the teacher is addressing the class at large.

Computers and Learning

Both innovator participants believe that the student laptops can directly and positively impact student learning. The machine is integral to most of the course activities, and neither teacher would have allowed this to happen if they hadn't seen positive benefits emerge for their students. The laptops not only enhance what takes place in the classroom; they can provide new opportunities that were not possible prior to the introduction of the laptop program. Richard uses Excel to get past math and graphing issues so that he can focus on building mastery of physics principles. Frederica uses

online databases and Internet websites to build student research skills and enhance critical thinking skills.

Summary

As innovators, Richard and Frederica have willingly embraced Jesse Jackson's laptop program, and have fully integrated the computers into their instruction. They look for electronic solutions to problems and tolerate risk while attempting to make the solutions work. The participants understand the specific benefits using the laptops bring to their classrooms, and been able to stop doing some activities because of having the machines. When each teacher has encountered an obstacle, they've either solved it or have found a way around the problem. Both Richard and Frederica view themselves as life-long learners, and want training that specifically meets their needs. When they are provided with new technology, each determines how such technology can solve particular learning problems. Their classes are a combination of teacher and student centered, with the center of attention moving from teacher to student, and where the expectation is that students will become responsible for their own learning. After three years, both Frederica and Richard continue to use the student laptops and are no longer focused on the machines but on the content, using the computers as they would any other tool to aid learning.

6. Adopter Participants

Three categories of digital immigrant teachers have been studied in this research – innovators, adopters and resisters. Each category has both a male and female participant and, for adopters, English and special education are represented within the curriculum subjects at Jesse Jackson. Both adopters were over 40 years old at the time of the study and had taught in the high school's laptop program for all three years of its implementation. In this chapter, the two adopter participants' data are examined first within each individual profile which starts with a brief biographical sketch, followed by the teacher's perspectives on their laptop program. At the conclusion of the profile, a brief description of the classroom observation conducted between the two interviews is provided to place the teachers' comments within the context of what they actually do in their classroom. The data are then explored in regards to the research questions. Finally, the participants' responses are analyzed in terms of adopter characteristics and their classroom observation.

Adopter #1 - Sean Thornton

Sean worked his way through several career choices before coming to teaching. After college, he joined the military but realized after one tour that he wanted to do something else with his life. He next worked at the National Gallery of Art in the department of visitor services during the early 1990's. In time, however, budget cuts

meant the liquidation of his department with zero chances of moving into any other department because of budget freezes. Consequently, Sean returned to school where it was suggested that he become a teacher. “So events just kind of fell into place that directed me toward teaching.”

The youngest of this study’s participants, Sean has taught at Jesse Jackson for the past eleven years. One of the cornerstones of Sean’s personality is that he loves old things that have stood the test of time. “So therefore when new fangled things come along, my initial response is usually going to be, ‘Come and talk to me in about fifteen years, and we’ll see if it’s still as great as they initially thought it was.’” Sean notes that his students reflect the opposite perspective, always looking for the new and the innovative. “Their idea of old music is from the 1990’s. Anything from when they were little as opposed to say a silent film by Chaplin or something like that – that’s a dinosaur as far as they’re concerned.”

I came of age prior to the computer revolution. Although I must say I might be a little archaic in this sense, I think you will find lots of people exactly my age who are much more computer literate than I am. This is the big stumbling block that I wrestle with. I’m not part of that spectrum you described, the total tech heads versus the troglodytes. Maybe stumbling block is not quite the right word but it’s an issue I’m still contending with. And perhaps it’s partly because of my own tentativeness with technology itself.

As a teacher, Sean views his greatest skill as the ability to disseminate information in a manner that is understandable. He knows many people who are very knowledgeable in their field but they cannot present that knowledge to others in a way that makes sense. His greatest challenge is when he has students whose learning styles are not compatible with how he teaches. Sean works most effectively with auditory and visual learners. If a student has a different style of learning, “then it becomes difficult for me to come up with ways to get them to understand what it is I want them to understand.”

Looking ahead five years, Sean wants to be as engaged as he is now in teaching his students. “I hope it doesn’t happen that I start either to become lackadaisical because of repetition or burned out because of all the standard challenges that teaching presents.” Sean is also ambivalent about using the computer. “As long as you don’t ask me to do something that’s a little too out there, I can get around on the computer fairly easily. But, at the same time, it’s somewhat intimidating when I see what other people are able to accomplish or the comfort or the dexterity of people have who are far more well versed than I am.”

Sean’s Views of a One to One Laptop Program

Part of Sean’s ambivalence towards computers is his perspective that such technology is impersonal. He sees two pitfalls with using technology. He questions whether technology will become such a habit and part of a teacher’s routine that the intrinsic value may have long been lost and whether technology will supplant the curriculum educators are supposed to teach? He explains further,

If you, as an educator or as an educator administrator, are confronted with some new task, do you automatically assume technology will be the savior of it? Are you even stopping and saying, ‘Do we need to use technology for this or is there an easier way?’ Does technology have to have its hand in every aspect of life or every aspect of education?’

Sean believes “there are some things that technology is better at than traditional ways but not everything here is better with technology.”

As an English teacher, Sean does not feel challenged by the technical skills his students display in his class nor does he feel he has to start all over again as a novice in using the computer to teach. Sean notes that English is about text, and one of the oldest functions of computers has been word processing. ”This function really has not made the kinds of leaps that other functions of a computer have made because there is not much left that you need to do.” Sean does use the spell check function but finds the grammar check useless. “It just doesn’t understand the nuances of grammar. It works on a very limited simplistic approach to grammar. Frequently you will see things you write that you assume are right – they are grammatically correct but the computer doesn’t recognize them.”

When asked if laptops are compatible with traditional education, Sean makes a distinction between modern and traditional education. He views modern education as “glorified vocational training where we become a society that is extremely specialized. Consequently, modern American society views an educated person as somebody who has merely obtained a high level within a field of study that is marketable to the economy. In

that sense, [the laptops] work great.” From Sean’s perspective, traditional education goes all the way back to Socrates. “I believe America to a large degree has abandoned traditional educational philosophies which are to make somebody who is a) cultivated, b) rational, c) well rounded, and d) knows how to think in the abstract. We’ve abandoned that.” So, in terms of traditional education, Sean does not find the laptops to be particularly compatible but, in regards to modern education, he believes they can be very useful.

When asked whether old dogs can learn new tricks, Sean states, “If [people] are receptive to change or at least they are constantly intellectually active, then they can learn new things.” Sean remembers a particular show that came to the National Gallery of Art which exemplifies this perspective. It was called “I’m Still Learning,” and the focus was on

all of these very great, very recognized artists and the works of their last years to show that they did not fall into complacency and so knock off just one more piece in the same style because they’d perfected their technique. It showed that they were still pushing themselves right up to their deaths. Two of the most famous examples were Monet; right at the very end [he] was turning his impressionism to total abstraction with those really gigantic water lilies paintings that he made. Another was Rembrandt who again, in his own way, kept drifting closer – moving, not drifting because he was conscious – more and more towards abstraction, with less and less

very detailed realistic representation... These artists never stopped trying hard, trying new things.

As to whether computers would ever replace teachers, Sean replies that “the essential element in education is the interpersonal communication between two human beings – the teacher and the student. If you remove that, I think the consequences can reverberate far beyond just education. You are talking about social effects and how people interact with individuals in society.” He illustrates this point with research that has shown that people who get too enmeshed in technology can lose their social skills. This reflects Sean’s concern about online learning because he feels that the relationship between teacher and student can easily vanish.

Sean knows some teachers use the laptops and some do not. He recalled a science teacher who has not embraced the laptops even though all his other science colleagues are very involved with the technology. When asked why he did not use the laptops, the teacher said, “I’ve been teaching this for many years; we’ve been learning this science for centuries without computers. We don’t need computers to learn this.” Sean’s point is that he wonders if all those other science teachers are using the laptops in a way that “nothing else that exists can do it and therefore it becomes an essential? Or is there an approach that already exists and may be less expensive, given how much this computer costs?” Sean wonders if a teacher who uses effective non-technological methods and, therefore, chooses not to use the laptops is somehow at fault?

Sean believes that laptops definitely do not make students better students. It is no more than “a really good hammer makes a carpenter a better carpenter. He’s either a good

carpenter or he's bad carpenter. That's all internal." Sean explains further that the computer is a tool and, as a tool, it just does what a tool can do. "It can't make the student."

In terms of whether Jesse Jackson has a culture that is tolerant of risk taking, Sean feels the school is not that different from any other school or school district in the nation. "There perhaps may be lip service given to risk taking in education but I think in reality people just like to see things run smoothly and precedent means almost everything in most education systems in America." However, he does feel the teachers at Jesse Jackson are much less regimented and have more autonomy than in neighboring school districts where "every teacher of this class, no matter where they are in the county has to be on this page on this date – that sort of lock step approach."

Sean's first reaction upon hearing that Jesse Jackson would become a laptop school was positive because he assumed all the textbooks and class materials would be put on the laptop. "I thought that was a good idea although I personally have an undying fondness for books." However, this physical conversion from printed to digital books never happened, and Sean surmises that cost was probably a big reason as licenses for the digital resources have to be purchased just like for other software programs.

Although he knows there are online resources available that can be helpful in teaching English, Sean feels that the laptops could have a much bigger effect in other content areas, especially in science and history. "It just seems to me at this point there must be things like virtual human bodies so that they can explore all the elements through the graphics, 3-dimensional stuff."

Sean does not know what the school has gained or lost because of the laptop investment. “It’s hard to say because it’s still so new. This may be something you need years of actual use to be able to see what it ends up being. Certain things can only be seen in terms of trends and not snapshots. I think this is one of those things.” He believes there is the potential for the laptops to become detrimental or incredibly positive but that it will take time to know this.

Consistent with most of Sean’s ideas about the laptop program, he thinks there are always positive and negative sides to his perspective. This is reflected in his assessment of the benefits laptops can bring to students. The computer allows students to take notes and, for those whose handwriting is poor, it can be especially valuable. But it is not necessary for other students who prefer to write their notes by hand. Some of the literature read in Sean’s class is in the public domain, and, if a student forgets to bring the book to class, Sean does not provide the student with an extra copy. “I refuse to sort of continue to be an enabler for them not to be responsible for their materials. So I say, ‘Ok, go online and here is where you can find the text for King Lear and follow along that way.’” For himself, Sean would never read a large work of literature on the computer because staring at the computer screen hurts his eyes, and he suspects it does so for his students as well. “But it has certainly helped students in a bind when they didn’t have their book with them so that they didn’t just sort of sit there and stare at the wall.”

In terms of the digital divide, Jesse Jackson, in Sean’s estimation, probably has “the widest demographic range or spectrum of just about any high school in America both in terms of ethnicity and economics. Therefore, one size can never fit all at [Jesse

Jackson].” Sean finds that some of the students have had little to no access to computers and, for these students, the high school laptops can be very helpful for college preparation or for entering the workforce. “They cannot escape the presence of computer technology in modern economics.” For other students, however, with computers at home even before the students were born, they have had computer access all their lives. Sean does not view this as necessarily good because this expertise is “actually providing [the students] with a new avenue of tuning out the teacher that did not previously exist...It is as if you have taken each female student and put a stack of fashion magazines on their desk and every male, a Sony play station on their desk and then expect them to pay attention to you when you’re talking about Hamlet’s soliloquy.”

Of all the priorities that Jesse Jackson teachers have had to contend with, Sean thinks it is important that there is such an emphasis on reading and writing skills for the students through the literacy initiative. “[Their reading skills] are abysmal and anything that would help would be welcome... Students don’t read as much as they used to. They don’t have the attention spans that they once had.” Sean sometimes feels that upwards of 75% of his AP English students are not reading at grade level. He believes that “there’s just nothing else that’s going to fall into place in a person’s life in our world if they cannot read. Writing is very important but it’s not as important because there are many occupations you can do that won’t require you to be a brilliant writer but there is just nothing out there anymore that will enable you to lead a comfortable existence if you can’t read well.”

However, when it comes to managing multiple priorities, Sean feels the nature of teaching gets in the way. Sean explains that teachers can have over a hundred students that they see daily or semi-daily and at fixed times. “That’s a lot of interaction with a group of people who are both draining and invigorating simultaneously.” In other professions people can say, “I have to do these things but it’s a nine-to-five job and I’ll be able to do that first thing in the morning.” But for teachers,

First thing in the morning is 25 to 30 kids [who] are going to be coming.

You can’t just say I’ll do it first thing in the morning. So you go along with all the things that control teaching and then you suddenly realize a lot of time has passed since you tended to certain things. Nobody is knocking on your door asking if you made your Blackboard entry today to remind you. You can just sort of lapse on it without your knowing it. Our tasks are people and they’re right there in front of you. That’s a more urgent presence so to speak than some of these other things. So it’s very easy for a teacher to say, “I can’t really attend to Blackboard right now. I have to do this first.”

Ultimately, what drives Sean’s instructional decisions is the fact his students must pass the AP exam at the end of the year. So he has to ask himself, “What can the technology do to enhance anything that the students need to get a passing or an impressive score on the exam? And what skills are needed which is essentially a handful of very critical upper level thinking skills?” For Sean, the AP English exam “is a test on the thought process and organization of thought.” The exam can pick from literally

hundreds of thousands of texts from all kinds of genres, from ancient Greece to 2008, and it is impossible for anyone to have read all those pieces of literature. “So instead of just digesting a body of material, it’s how to take whatever is thrown at you and untangle it. That’s what I mean by how to think, how to organize your thoughts, how to on the spot write an analytical essay three times and only once is it based on a play or a novel that you’ve read ahead of time.”

It’s all about thought and organization and what sort of methodology is best to attack a piece of writing and write about it, or read a piece of writing and answer some very difficult, hair splitting multiple choice questions. So it’s all about thinking. The big skill is how to think critically and express your thoughts coherently. That is the dominating force in terms of what I have to teach – otherwise it’s kind of a waste if they go in there clueless as to how to take on this four hour exam.

Sean teaches both English 12 and AP English. The English 12 course has a pacing guide, but the AP English class’s guide is the AP exam at the end of the year. When asked if the laptops have helped with the English 12 pacing guide, Sean steps back and notes that the pacing guide was created before the laptop initiative. “So it’s still textbook related, textbook focused, and I don’t know if anybody in any subject yet has sort of said, ‘let’s go back and adjust.’” Consequently, he feels there is not a particularly comfortable fit between the technology and his course’s pacing guide.

Sean also gives homework that either involves reading, since it is a literature course, or paper assignments. “I gave up a long, long time ago on daily answer-these-

questions kind of homework because I just saw repeatedly only about one fifth of the students actually do it, where it's their original work, and the rest either don't do it or they just copy each other." He has seen students copying homework in just about every content area. About three years ago, one of Sean's better students was working on a Spanish homework assignment, and it was clear she was copying someone else's work. She was going to go to a very prestigious college, so Sean asked, "I know your school has very rigid policies about academic honesty and what are you doing?" And you know what her response was? 'I don't want to take this course. They're making me take it so it doesn't matter.'"

In terms of assessment, most of Sean's tests are essay questions. "I don't waste much time with fill-in-the-blank or true/false or matching columns or multiple-choice except when we practice for the AP exam." The AP exam is still a hand-written examination although Sean believes this will eventually change. Sean, however, cannot ignore the importance of students building skills in non-computerized writing.

If they have to hand-write three essays in two hours, they have to get practice in hand-writing essays. They need to make sure their writing is legible. They need to be cognizant of the fact they can't rely on spell or grammar check functions to do it for them. They also can't just – when you word process, and I use this when I teach them how to write – insert anything you want, anywhere you want. Don't worry about starting at word one, sentence one. Start with your thesis because that's going to be the driving thing for the whole remaining essay. Type that first. You can

actually do it where you make your outline and then by inserting, you can turn your outline into an essay on the laptop. But they can't do that in a hand-written essay. So in that respect, hand-writing is counter intuitive. It flies in the face of all of the ideas of the value of writing your essays on your laptop.

As to what can get lost in using technology, Sean actually admits to a fondness in that the students still have to write on paper. He believes that when someone writes something on a word processor, in a sense it is impersonal. "There is a great deal of separation from the actual writer and the actual words on the screen. You haven't touched those words." He gives the example of Bill Gates who recently purchased the last remaining Leonardo DaVinci notebook for \$56 million, probably for the following reason.

Leonardo DaVinci held that notebook in his hands. He made those letters and drawings by his own hand. It is valuable because it is a manuscript. If he had made that notebook from a word processor, that's not an original manuscript. It may be an original printout but because you look at those pages and say it's Leonardo DaVinci who touched that – that's what makes it valuable.

For Sean, using modern technology in traditionally configured classrooms is a headache. The students all sit in rows facing the teacher who is in the front of the classroom. One of the first skills students learn is to become adept at screen shifting. "Create a page where you've got notes going, minimize that and then go to another

screen on the Internet, email, computer games, or fashion sites. They are appearing to be taking notes but what they're actually doing is completely off task and then if they see you approach, one button and the notes come back up." So Sean has to check if the blue light is on, which signals the student is connected to the Internet.

But as the blue light is in the lower left corner [of the laptop] a) you can't see it from the front of the room so you still have to travel, and b) the [student's] arm can cover it which sort of means you have to be searching like in the movies, 'Move your arm' and that is a disruption in that you're breaking your stride of what you were doing to make sure nobody is trying to pull the wool over your eyes. You know that at least somebody in the room is trying to pull the wool over your eyes.

As the blue light is behind the raised laptop screen, "it would be great if there was something in the front and I could instantaneously say, 'Your blue light is on, turn it off.'" Sean unfortunately sees no easy way out of this situation. His room is square and is crowded with students. There is very limited maneuverability of desks, students, or the teacher.

I refuse to teach from behind them so I can see their computer screens because that's a colossal disaster in terms of communicating with people. Nobody wants to be communicated to from behind them. I can't put gigantic mirrors up on the walls so I can see what their computer screens say or show because a) gigantic mirrors cost a lot of money, [and] b) this building's got five weeks of its life left and it's coming down so they're

not going to do anything regarding that. Plus it's so close to the end of the year, my students are all seniors. They've wandered off; they've checked out. They're just waiting for the limo.

While Sean watches for non-verbal clues that his students are not on task, it is hard to stay tuned to everything that goes on in the room and still teach. He looks for an abnormally intensive focus on a laptop screen that is presumably being used to take lecture notes or they are doing no typing or are clicking away with their mouse. The off-task student may be typing very fast, and Sean is not talking at that speed. "They are becoming very adept at deviousness with the laptops. They always master the art of doing things on the sly. They've mastered the art of doing cell phone stuff on the sly too which is obviously a problem. Sometimes you just say 'I long for the days when they were just trying to pass notes!'"

In addition, Sean believes that plagiarism and cheating have been taken to a new level because of the laptops. The students are writing an essay in response to a writing prompt. "All the information they want about Hamlet is on the Spark Notes and that's one screen and the essay is on the other screen and they're just going back and forth. As it's become a valuable research tool, it's also become a valuable cheating tool." Sean has never used the program Turnitin, but he has found his own solution for plagiarism.

First you have to suspect it and it's easy enough. If a person is quasi-literate all year and all of a sudden they're turning in doctoral dissertations in quality or professional writer quality work, you Google the sentence and just do Google search. Chances are pretty good it'll [respond] if you

type in enough. Usually one complete sentence or two complete sentences is enough and it'll find it. And then if it finds it, then [the student is] busted for plagiarism. So it's mostly just about instinct. It doesn't sound like what this person's written in the past.

Although Sean views the Internet as a helpful research tool, he is concerned about such websites as Wikipedia which he does not view as particularly reliable. He has personally seen instances where the Wikipedia entry was inaccurate. "[But] the anonymity of the Internet means that as research sources you sometimes have to be wary of what it is you're reading. It may not always be true." When students consult a physical book, the book has been published by a reputable publishing house, and "it's taken for granted that the information will be correct because the reputation of the people printing the information is solid." This is not the case with the Internet where anyone can say anything without many consequences. However, the Internet does broaden the research options for his students. In the days before the laptops, Sean would schedule a block of time for him and his students to visit the library and, unless a student had extra motivation to go to a public library, the students were restricted to the limitations of Jesse Jackson's library resources. Sean believes the Internet can supplement these resources if done carefully.

When it comes to using Blackboard, Sean believes his classes are coming along, but "it's certainly not what you'd call a completely and thoroughly comprehensive thing yet." Partly, he feels this is because of the school year being so busy with so many initiatives coming at once. "And two, in a way with each teacher having their Blackboard

sites, you're almost becoming a web page manager and that's time intensive." Sean is not fast working with programs like Blackboard. "I'm sure if you talk to the younger teachers, they probably already have their own web page that they've made." Sean wishes the computers were at a more advanced stage so he could simply tell the computer with his voice what he wants to do. "Computer, put in period three the following announcement' and just say it. It'll come eventually. Your computer will recognize your voice. But it still means the control panel and which one do I use – I want to import this."

For Sean, it comes down to triage – what is most important comes first. "The students in the room in the class period will always be first in line. Reading your emails and doing your Blackboard, all that other stuff – can never, if the teacher is any good – supercede the students." Consequently, Sean's Blackboard has some materials but not as much as other teachers. "But it probably has got more stuff on it than a different set of teachers. I'm either refreshingly or annoyingly in the middle of the spectrum."

Sean has conversed with many of Jesse Jackson's math teachers who have said their biggest headache is not having access to software that can really help with teaching math. He views this as an instance where the human brain is still faster than the laptop. "It's faster to do it on the board; it's faster on sheets of paper than it is on the computer." For Sean, his biggest computer headache, where he "constantly bangs up against a wall," is that some of the literature he covers in class is not in the public domain and not freely available on the Internet. Some authors are still alive, like Laura Escobel, who wrote *Like Water for Chocolate*. Her books can only be acquired through buying them. "It's the world that we are a part of – the world of writing, the world of publishing – because we

read what they make, any limitations they impose on it, we have to live with.”

Consequently, in reading the course’s literature, Sean believes that sometimes the laptops are useful and sometimes they are not.

For Sean, the area in English where he thinks technology is falling short the most is “the idea of teaching a student how to think in a way that they’re not used to doing and hadn’t done prior to your teaching them – it just seems to me a skill where one can question if the laptop is needed. Can you do it without a laptop?” What Sean believes as vital is teaching the students “the age old principles of logic. In its purist form, it is translatable to any other mode of activity. Doing a logical, systematic approach – I don’t think the technology is necessary.”

Although Sean focuses on studying literature, he agrees there are other aspects to learning English for which there are a lot of online teaching tools available. “I’ve seen lots of sites that deal with the teaching of literature, things like vocabulary building or writing seminars online, or virtual writing. Not even necessarily just online, but available in software, stuff that deals with the other elements of teaching English. And like anything else, it varies in quality – some of it’s quite good; some of it’s worthless.” However, he has not used such resources in his classroom nor does he incorporate the databases that are available through the library page in Blackboard, although the students are free to use them for research if they wish.

Sean remembers the laptop initiative starting with the students being given their laptops. Teachers got a little heads up, but he does not remember what kind of training the teachers received. “We get so much training that you sometimes lose sight of what

was what, what happened.” The reason he thinks the laptop program was slow to start was “we were kind of left to fend for ourselves to a certain degree. So a lot of us probably just went ‘fine but I’m not really seeing what’s there for us.’” Although he has some websites for students to use, the primary laptop focus in his classroom has been on word processing. Starting in the first year when he could make use of the network file structure for digitally receiving student work, Sean has had students use the laptops for essay writing.

In terms of whether laptops are easy or complex to use, Sean views them as both. He believes that having things prepared in advance helps the process.

People have set up systems in their classroom so that everybody can just go to a certain thing and everything is there, ready to go because it’s been laid out in advance and therefore you’re just sort of taking up where you left off the day before. But if you’re in a situation where you are not using it all the time – I mean almost on a daily basis – then the starting up and getting everybody to the right place and so on, I think that can be time consuming and therefore can be an impediment to the process.

Sean does not believe his students’ computer skills are weak. The situation is, in fact, just the opposite. “They don’t need to be taught how to use computers. They already know how to use computers. It’s just the idea of trying to herd cats. When you have a roomful of twenty five teenagers, the fact of the matter is, they’re not going to operate like a Marine Corps platoon.” He also does not believe learning to use the computers is beyond the skills of most teachers except for older teachers. “I think those that came of

age in the vacuum tube era are perhaps innately distrustful of many elements of the microchip era.”

When it comes to other options than students having their own laptops, Sean does not like the idea of the computer lab. “That was off in a different place – that really wasn’t very helpful. I don’t think it was really ever used to its best capacity.” For him, however, it is the wireless network that creates the most problems. Although he knows this is probably too expensive, Sean would have much preferred to see docking stations (like the teachers have) on each student’s desk for all the activities that do not require going online.

[Then] the teacher in the middle of the room can see what every student is doing, making sure that they’re on task... You still have mobility to use your laptop. You just don’t necessarily have the opportunity to go online except when it’s under a controlled situation. Right now kids can go [anywhere in the school]. It’s wireless and they can do anything they want... They can sit in the locker bay – and I see it all the time – and therefore there is no control over [laptop use] whatsoever.

When asked about the relative advantage the computer has over other forms of technology, Sean judges this by how the computer can be used in both positive and negative ways. “As long as it is viewed as a tool, you could say fine. We’ll work the bugs out. As with any tool, it gets refined, and improved over time.” Sean likens the computer to a modern hammer to which much older hammers have little resemblance because, over time, the hammer has been improved to make it better and better.

[But when] a laptop becomes not a tool in people's minds, but some sort of religion in and of itself, that's a cul-de-sac in education. That will go nowhere because it goes back to what I was saying – how can I teach these people to think in a way that is beyond just haphazard, illogical, with no connection to anything beyond itself. That perhaps would be one of the computer's pitfalls if it just becomes a thing unto itself, people just worship at its alter because it's technology.

The network has functioned fine for Sean. Although he does hear complaints about the quality of the laptops, Sean comments, “what do they want – the top of the line? They'll never be satisfied with the quality of anything. Personally, it's slow to boot up. It's kind of a pain in that sense but it's not anything that's going to kill me.” He believes that the school laptop policies have been made very clear to the teachers, but he is not sure to what degree this has happened with the students, but it does not matter because they ignore the rules anyway. “What is the amount – is it \$30 if they lose it or destroy it or break it or whatever? They're not getting charged the full dollar amount for the laptops. What are they - \$1100 a piece? I don't know if there are any real consequences.”

As to students going to websites they should not view, “you can block anything you want and all you need is one or two hackers to show everybody else how to get around it. That happens year in and year out. [The administration] shuts something down but if it's a popular site, [the students will] say, ‘Oh, here's how you get to it.’” The district has an electronic trip wire that keeps track of the number of times a website is

accessed. “Every fall when the students are looking at the various school web pages, as soon as a certain number of students go to it, the system closes it down. Then somebody has to go in and manually take that block off because it’s [a very popular university] site!”

Sean’s biggest issues with tech support for students are the limited access to assistance and, at least from the students’ perspective, almost an open hostility when they do come. “They don’t want to be bothered by the students with their computer problems. I understand they can be annoying, the students with their problems but at the same time, it’s just like with guidance – do not limit your availability if you’re there in a service capacity.” Sean feels that if Jesse Jackson is a wireless school with every student having a laptop there should be someone available every minute to tend to these problems. “But from what I understand, the help desk is anything but helpful to the students.”

In a recent faculty meeting, the staff was asked what kind of training they thought would be helpful. “At first one of the things I started noticing was the idea of just saying you have to do technology for its own sake.” Sean feels the staff does not need to know how to use the computer or how to navigate around on the Internet. “We’ve all been through training that somebody thought was really great but we’re just sitting and saying, ‘What the hell is this?’”

When it comes to resources Sean would like to have, he states “I would love to see all of my texts be available with complete annotations so that as the students read, they could see what experienced, thoughtful people in the know are pointing out in the

text as they read it, as opposed to the way it works here.” He has seen some annotated texts, particularly with Shakespeare, but it has been mostly footnotes provided by editors.

Usually what I do, I give them some ideas, things to look for. I believe if a person knows where it is they’re going; they’re much more knowledgeable on their journey than if you just say, “Go that way.” So I always begin with that. Then I just have them read and often times they don’t necessarily understand everything that’s in front of them. In a perfect world, they [could] read a text and as they are reading, highlighted, maybe in the margin or something, they could have sort of stuff by people, as I say, who know what they are talking about.

Classroom Observation

At the time of the observation, Sean’s classroom was decorated with colorful posters focused on literature genres along with shelves stuffed with books and filing cabinets backed against the walls. The student desks were lined up in rows facing the front. Sean had a teasing relationship with his students with whom he engaged both as a class and individually. Although Sean spent quite a lot of time informally lecturing – or rather a stream of consciousness to illustrate out loud his own thought process – most of the students were attentive, and it was obvious they liked him and had a good rapport. Discipline was relaxed, and he used an almost bantering tone to engage students. While the room had a battery tower, there were no keys with which to open the doors and access the batteries. One enterprising student plugged in her laptop to charge her internal battery

and, when it was full strength, she traded off with another student and recharged that battery.

After some time spent talking to students, Sean divided students into informal groups, charged with selecting a book to research. Each group was to create a kind of “cheat sheet” on all the relevant material about the novel. Most of the students had their laptops, and they turned on the machines and started the assignment. The laptop-less students shared the computers with the other students in their group. Sean circulated around the room as much as the limited space would allow, helping direct the students and answering questions.

Summary

Sean’s viewpoints are very evident in his classroom activities. He segregates the use of laptops to the last portion of the class time and emphasizes what the students are to do, rather than on who has a laptop and who needs to share. Sean does not specify where to find the information required for the assignment. This is left pretty much to the students. Sean’s focus is on preparing the students for the AP exam, and the assignment is to help them work through their critical thinking skills in assessing books they might encounter on the exam. In this sense, he is more like an innovator because of the emphasis on the assignment and not on the computers.

However, Sean also believes that the essential element for successful learning is the communication between the teacher and students, and he demonstrates this as he informally talks to his students on a variety of topics throughout class. He remains in front of the class for almost the entire block and only when the students start using the

laptop does he move up and down the rows. He does not pay much attention to what the students are actually doing on their computers which is in keeping with his frustration on how the technology makes monitoring the students' laptop behavior very difficult. The computers are somewhat obvious in the classroom because of the significant change in activities in the last third of the block.

Adopter #2 - Ruth Tobin

Ruth Tobin became a teacher at Jesse Jackson one year prior to the laptop program's implementation at Jesse Jackson. Previously, she had worked in the school's library as well as teaching adults. She cites two reasons for entering high school teaching.

One quite frankly was money because I was listed as support staff in the library [as] I didn't have a librarian credential. But the other thing was I missed regular contact with the kids. I missed that aspect of the transaction. A kid comes into the library, you might help them that day but that's the end of it. [But] I like the transformation that happens over a period of time and that's what I've missed.

Ruth was drawn to special education because of her own experiences with her sons – one of whom has very significant learning disabilities and the other's disability is mild. Ruth thinks "that gives me a better understanding of the day to day frustrations these kids experience in such things as how to express their frustration or how to form a question when they're confused or having the courage to express that confusion." Ruth teaches reading to special education students who have been evaluated as being mildly retarded (MR). "They are capable of being fully literate. They're capable of getting a

driver's license. They are capable of having jobs and owning their own homes. They're probably not capable of being plumbers but they could be plumber's assistants and people like that." Unfortunately, "most of these kids leave here and they live at home and in the case of the girls, they live at home until they get pregnant. Then they move in with whoever got them pregnant if they're lucky. But they don't have the kind of successful independent life most of them are capable of."

Ruth teaches three reading concepts the entire year - prediction, cause and effect, and the main idea. "It's always funny when I give them an article and I say, 'Predict what it's about.' And they say, 'How can we predict, we haven't read it yet!'" Her students also struggle with following a series of steps which is such an important computer skill for getting to programs or finding and opening documents. She starts with the end of the process and just does the last step first. This approach helps her students connect the steps to the final result, and it gives them more of a feeling of control.

One of Ruth's favorite stories about MR students involves the parts of speech and how they function in a sentence. She had her students make little trees with the verb as the trunk. She cut out a couple sample leaves to show them how the leaves could look.

My MR kids, and this is very typical, traced it, cut it, traced it, cut it – one at a time. They didn't even trace a bunch and then cut them. They did it individually because they did not trust their own perception and ability.

They had to do it THE correct way.

Ruth views her greatest skill as a teacher as having a kind of empathy which allows her to identify with her students' daily struggles. "Today, when I had one kid who

was able to do something on one of these activity sheets he has not been able to do all year – it was a real comfort moment for me.” Her biggest challenge is time management. Her to-do list is always much longer than the amount of time available. To help with pacing, she posts a daily written agenda on the board for her classes and, while some classes will complete all the tasks, “I already know just because I know the nature of the kids for 7th block, we won’t get through all of this.” Planning is very difficult for several reasons – partly it is because she does not actually know how long students will need to finish their assignments, and partly because “in special ed there are so many unpredictable things that can take enormous amounts of time.” Ruth has found, however, that the computers can help with lesson pacing.

The structured reading activity is a paper activity but because TeenBiz [on the computer] is a tutorial and they’re all familiar with how to use it, that’s my buffer activity. As kids finish doing their warm up and we’re not quite ready for everybody to talk about it, I can get kids into TeenBiz. With my first block group where they’re a little more independent, I can tell them if you finish one TeenBiz activity, this is what you are going to do with the Inspiration activity and they don’t need the same level of explanation. They don’t need modeling so they can go right into the things that are available to them through the computer.

Ruth’s Views of a One to One Laptop Program

Ruth “loves technology if it’s a good tool.” But she does not view technology as an end in itself. For her, computers just seem a normal part of life. How the world has

changed really comes home to Ruth, for example, “when the network is slow and you’re [waiting] for fifteen seconds and you’re thinking that’s taking a long time. And then you stop and think it used to take hours to do what you’re waiting fifteen seconds for.” She is delighted over how quickly information can be gathered “– it just tickles me to death. I can remember wanting information and going to microfilm libraries in the state capital or waiting for inter-library loans.” She notes, however, “some of my peers are very afraid of computers. But I think they’re still thinking back to the days when you can click on the wrong button and lose everything – which is very rare now.”

Ruth’s one strong reservation about using computers is “that we’re going to have less human contact.” At one point, Ruth was on crutches that limited her mobility so she had to rely almost exclusively on email to converse with colleagues. “But when I stopped and looked at the email, the communications were so stunted. There’s a lot that doesn’t come through. You can’t read body language.” She views IM (instant messaging) in much the same manner.

On the education value of computers, Ruth thinks knowing how to use a computer is a life skill that is just as important as learning a language or mastering math. “I think kids need to learn computers are tools; they’re not just another version of TV and video games.” For Ruth, students should know how to use common software, be able to navigate the Internet and find information, and can communicate through email.

Ruth believes a teacher is fundamental to learning reading skills although she feels her classroom is basically student centered. “I start out with a very good plan and a pace for what I want to get through, but I try very hard to tune in to where my kids are

level wise and speed wise.” If something in her daily agenda is problematic for her students, she’ll back up, reteach, or approach from a different perspective. “That’s one of the nice things about having this kind of a class as opposed to like an English or social studies class that has a pacing guide and you’re expected to be at point B at such and such a date. I can let the kids set the pace to a certain extent.” On other days, her students just do not seem to want to work at all and then she shifts to teacher directed. “I literally just tell them, ‘Tough, too bad. You have to do it.’”

When it comes to old dogs learning new tricks, Ruth believes that if people are open to new ideas computers are not that difficult to learn. “I think the biggest obstacle is when it’s shoved at you too fast. I think our Blackboard is a perfect example. A lot of people, frankly, are just not ready to climb into Blackboard yet.”

Ruth does not think computers will replace teachers, but she does feel the role of teachers is shifting more towards being facilitators than educators. She finds the priority is to computerize as much as possible, “almost to the point it’s a little unnerving because you just about feel like you’re being taken out of the equation.” She thinks computers can help teachers and enhance learning, “but no computer can look at a kid and see if he’s confused. No computer can calm a kid down when he’s frustrated. No computer can reword or rework a lesson to allow for the child’s world to make sense to him.”

Ruth knows that not all teachers at Jesse Jackson use the laptops, and she does not think it is necessary for every teacher to use them all the time. “If I put my kid in a music class in high school, I expect them to spend their time learning how to use the instrument and how to perform. I don’t care if they’re working on a computer during that time. It’s

not why I want them in that class.” Conversely, if it is a science or English class and the laptops are not being used, “then I’d say you’re doing a disservice to your kids because there is a lot of material that is content oriented, is definitely appropriate, and the kids need to be literate.”

When asked if laptops make students better students, Ruth believes the potential is there. “I think it takes a real effort on the part of the teacher to make the kids see them beyond being a toy.” Ruth feels computers can help students learn more, have access to more information, and gain a facility with the technology which will all be essential once students finish high school.

Ruth hesitates slightly when asked if there is a tolerance for risk taking at Jesse Jackson. “My impression of education in general is that safety is valued and risk taking is not. I think the only thing that’s going to look like you’re taking a risk is when you already know you have the support and you’re stating the obvious.” She knows she sounds cynical but believes education is generally a culture of followers. Ruth’s viewpoint may also reflect that at the time of this study she was in her third year of probation and was being evaluated on whether she and the other probationary teachers should be granted tenure – which she received.

When asked if she teaches the way she was taught as a student, Ruth explains that she went to school in an era, “when the students sat neatly, quietly in chairs and rows, and did exactly what was directed of them. Most of our stuff was objective; there was very little subjective or analysis types of work, lots of rote learning. That was the bulk of my education.” Ruth perceives integrating laptops into her classroom instruction as an

organic process. “I just sort of think of what the laptop offers and what I want my children to be able to do and try to envision that interface.” Ruth credits her mother with giving her a love of learning and “that’s more in my mindset when I approach setting up a classroom or whatever. It’s more about sharing.”

When Ruth first learned about the laptops coming to Jesse Jackson, she was still in the library and was most concerned about potential laptop abuse. “I was also a little taken aback that they were spending that much money on computers when they’re so reluctant to spend money on other things that are needed by the kids.” Ruth believes that if students were required to pay for their laptops they would take a lot better care of the machines. “Seriously, they’re much more careful with their own property. They don’t drop their iPod on the floor.” Another issue that first year was finding out the limitations administration had placed on the student laptops. For example, “students could not ‘right click’ and that diminishes the utility of the computer and makes the kids less respectful of it.” In addition, the kids have quickly figured out ways around the system to save music and porn sites and that also reduces students’ respect.

When it comes to the laptop program’s vision, “I don’t think when [the superintendent] made the choice to drive this program forward that it was based on the idea that it would give our children any special edge. I think it was based on the idea that it’ll bring prestige to the school system.” Ruth does believe that the new principal at Jesse Jackson takes the technology more seriously. “He sees it as not just the way of the future, but the way of the present. I think he sees it as an essential of life. Therefore, he’s much more open to using the computers effectively and getting the software or the hardware or

whatever to make it happen.” This includes getting more LCD projectors or better batteries. “I think he wants these kids to have that strength when they go out, whether it’s to college or out into the work force.” Where Ruth has issues with the principal is that she believes not every student will go to college. Consequently, “the skills and the technology knowledge that [these students] need are different than kids who are going to go on to college and use them as a means of attaining other levels of education.” One goal Ruth thinks is effective for all the students is the push to use Blackboard and other Internet based services.

When asked what the school has lost or gained from the laptop investment, Ruth says, “I think they’ve lost a lot of money. I don’t know if it’s wasted money but I think it’s gone.” She believes the students’ overall comfort level with the laptops has gone up as well as the knowledge for how to use the machines. “[However,] I think the learning curve has been much steeper and much more complete because the [students] have access to the computers on a ready basis.”

When it comes to expectations from administrators and parents about using the laptops, Ruth feels the administrators have been very clear “they want heavy implementation, heavy utilization of the computers.” The only time she talks to parents about computers is when they are following up on whether their child actually turned in an assignment electronically. Some parents have expressed interest in Blackboard, “but I’m not getting anybody saying ‘Gee, you should be using it more.’” She has also talked to parents about using TeenBiz at home, and “they sort of nod their heads politely.”

Ruth feels the laptops have been beneficial for her special education students. “By mid-year most of them are very comfortable with the Internet, very comfortable with typing things in Word, although some of the other functions obviously are a little difficult to keep track of.” Ruth believes it would have been helpful for these students if the tool bar had been adapted by adding some short cuts that would eliminate many process steps. Spell check and grammar check have been very valuable for Ruth’s students. “When they would try to write a sentence, you can just imagine – it would be horrendous. It would be green (underline) from beginning to end. They’d say, ‘What’s wrong with this?’ I still have to go back but [the grammar check] is like a second pair of eyes.” When they are writing a paragraph, the computer again may indicate a number of problems that students can start working on while Ruth works with individual students. “I don’t have to touch on every single error with them.”

Ruth tells her students to do TeenBiz at home, although her students’ responses are lukewarm at best. While she prefers to put material on the student network drive rather than “go through four or five steps to put it on Blackboard, it’s not that much more difficult. It’s just quicker.” If she uses the student network drive, however, students cannot access the material at home. “If I have something I want them to use at home or I want them to use it over a continuing basis, then I can put the stuff on Blackboard.” This is also true for all the electronic library resources available through Blackboard. “If the kid has the Internet at home, they have an extended opportunity to do what they would do in this building. Of course, that does not include the kids who don’t have the Internet at home and I have some of those.”

Her students are often visual learners in that they try to match what they see. “When it comes to PowerPoint, they love to make it fancy. They can have one sentence on their slide but, by God, it’s going to have a gradient background and four pictures.” One of her students taught himself how to put animated clips into his PowerPoints.

Reflecting on the priorities teachers have to juggle, Ruth remarks dryly, “they’re all *first* priorities. Every one of them is equally important.” She feels that administration has tried to do too much too quickly.

Change is sometimes difficult to manage even if you’re open to change.

But to change as many things as they did in a single year is disorienting. I told them, a little change is a good thing. A lot of change is a cataclysm and it leads to an ice age. What’s really happened in this building is that people have lived in literally a state of siege all year long, running around looking terrified, looking confused. It’s been incredible upheaval.

She views the paperless classroom concept as a perfect example of an idea “whose time has just not come yet. We’re not set up material wise or knowledge wise. It just won’t happen that fast.” When Ruth agreed to volunteer for the paperless classroom, she had a lot of reservations. “It was kind of like buying a car. They kept saying, ‘Don’t worry. It’ll be ok.’” Ruth found the experience over time just not tenable. Real obstacles appeared like a lack of power for the computers, no external batteries, a slow network, and often upwards of 20% malfunctioning computers. The technology itself also got in the way.

It was just too many steps to do each task because it had to be done electronically. Telling my kids they had to open their computers, log on to their computers, open the Internet, get on to Blackboard, go through all of these steps, go to this box, open this document, save this document – all those things – THAT was very unwieldy. And that was a very big eater of time.

When she began to see some of her best students act out because of all the frustration, Ruth opted out of the paperless classroom initiative. However, she does believe she learned a lot from the experience, and it was not a waste of her time.

Ruth has faced some real obstacles in trying to integrate the laptops into her instruction. In the first year, to put completed work in her IN box, students had to complete a great many steps – something difficult for her students. When student email was allowed the second year, Ruth tried to use it, but again, “it was such a cumbersome thing for them to go through the steps to set it up and to use it.” When Ruth wants her students to communicate with each other, she uses the Blackboard discussion group or “we can just have a human conversation.”

While TeenBiz has a lot to offer, she views the program as “drill and practice and not as a learning experience in and of itself.” Moreover, the feedback the program provides teachers has proven less than valuable for Ruth. “The reports you get from TeenBiz give you numbers but no feel for how the [students] are struggling or where they need help.”

One technique based on research I teach my kids is when you take this kind of a test [as in TeenBiz], read the questions first and then read the passage because that gives you a framework and you know what you're looking for. You can't do that with TeenBiz. You cannot see the questions before you read the article. The most you can see is the first question and unless you produce an answer for the first question you can't go on.

Nevertheless, Ruth continues to use TeenBiz because sometimes students find interesting articles. "It's always kind of one of those little nice moments when a kid starts sharing what they're reading. 'Ms. Tobin, did you know this or that?' Then they're really reading."

For Ruth, a real obstacle for students has been the problem of printing. The help desk inside the library is the only place they can go to print, and the help desk has very limited hours of access. Students cannot go to the help desk at all if the library is closed. Ruth believes allowing students to print to a teacher's printer would solve most of these problems. An additional issue and one that is frustrating for Ruth and her students is that printing must be picked up at the help desk by the end of the day or it is thrown away. "Let's say a kid prints something in your class and has to catch his bus so he can't go and get it. Even if he goes down the next morning, or at lunch the next day, it's gone." Ruth feels that part of the problem is that the staff members at the help desk are not educators.

They don't understand the limitations these kids have to work with, whether it is cognitive or whether it is purely practical. A child who has to be on that school bus can't miss his bus to go down and get a paper from

the library. If they ride the bus in the morning and they get here two minutes before the bell, they can't go down and get it in the morning. If I was going to put my finger on real issues, that printing business is just ridiculous.

Ruth does not have a standard curriculum for her special education reading classes. Working with the school's reading specialists, "I have created my own curriculum over the past two years. Last year, I literally figured it out as I went along." When things do not work, Ruth and the reading specialists rethink and retool the curriculum

Ruth almost never gives homework assignments. Her students need assistance in doing the work which has to happen in the classroom. In the few instances in which she has assigned homework, "it's really finishing up something we started in class and then they bring it in next time. I have a hard time getting them to even keep track of things from class to class, let alone do an assignment."

Ruth does not have formal assessments in her reading classes except for evaluations of whether students have met an assignment's rubric. There are no electronic assessments done in the class. On the final exam, she does not allow any computer use at all, not even to access an online dictionary. "For one thing, I think it's a matter of security and control and for another thing I think it's an enormous distraction. It would be just too tempting for my [students] if they are trying to finish a test and the Internet is calling to them."

When asked what gets lost in using technology, Ruth feels “we do lose a certain amount of time – not thousands of minutes – but certainly a few minutes.” If there are log-on problems or students have to go get their laptops or other kinds of mechanical kinds of things, those “can eat a few minutes. But rarely is that a big issue.”

Ruth does not believe laptops have changed her relationship with her students. “I think my relationship is probably about the same as it was [prior to the laptops].” However, classroom discipline has been complicated, partly due to the room configuration and partly because visually she cannot see what her students do on their computers. The small classroom she shares with another teacher is filled with desks that allow for almost no mobility. The students can spend a long time on the computers during a class block but she has no easy way to monitor their online behavior. “Kids are smart enough to toggle between their surfing and their classwork or whatever.” Conversely, if her students are working on a paper worksheet, she can easily tell who is working and who is not. So Ruth has learned the art of the bluff.

With TeenBiz, I’ve got my kids convinced I can tell when they’re wandering. If I see they’re not logged in and they’re sitting in front of their computer, I’ll say, “This says you’re not working at all.” They’ve got that ‘gotcha’ look and then they get on. So they believe me when I tell them that it flags me if they aren’t doing their work.

Ruth wishes that the synchronize program (a digital computer monitoring program) had been made available to the teachers. “It would be a much more efficient way to use

computers if we could tell when the kids were playing. They'd get the work done more quickly."

Normally, Ruth moves around the classroom as much as she can, although her crutches have limited her mobility right now. She tries for a lot of physical and verbal interaction with her students. While sometimes this interplay is for discipline, mostly it is to engage her students while they are learning.

Ruth believes that some teachers feel very uncomfortable if a student tries to teach them something. Her general philosophy, however, is that people will like you more based on what they can do for you than on what you can do for them.

If a kid shows me how to do something on the computer that I did not know or even something that they're especially proud of, I find that empowerment for the child is exceptional. It makes them feel so knowledgeable and so smart because they have this person that they see as an authority figure seeking help from them.

If a student misuses the computer in class, Ruth first warns the student. After that "I just close it which upsets them. They think it has destroyed the computer. They get very freaked. But it's a pretty direct thing." If this fails, she takes the laptop for the remainder of the block. Ruth usually returns the laptop when the student goes off to the next class. There have only been a few instances when she has taken the student's laptop to the principal, and it has to be for a serious offense. "Most of the time the misbehavior is just that they're on websites when they're supposed to be working. My kids aren't sophisticated enough to do much beyond that."

One activity that Ruth has tried is electronic journals. However, she has found her students are reluctant to write in the journals so she has not pushed it that hard. “But I think that is something that I would frankly like to encourage and try again next year.” She sets up the journals in Blackboard as mini-discussion groups of one. “Each child can enter comments that I can respond back to. As a moderator, I can always respond.”

Ruth likes the immediacy of anything related to computers. For example, she can browse for new interactive material she has not used before, “put together some websites, create a set of links that they can click on, and put it in the R drive OUT box or Blackboard, and as those kids come in, they can start doing that.” This is so much easier than having to prepare handouts or other paper materials. “As soon as I think of it, they can do it.” Likewise, students having their own computers mean everyone can do everything – no one has to wait their turn.

One of the things that Ruth feels can be lost in using computers is “that after a while we tend to think of the computers as a substitute for everything, the way some parents think of television as a babysitter.” She views this in the same way as handing a student a book and telling them to go learn history. Ruth believes that computers “really need facilitation and guidance, especially with special education. You need to direct learning. You can’t just sit back and hope it happens.”

Ruth uses the Internet in many ways. The school has made available sites such as BrainPop, although she’s not a big fan of the program. “This year I found some really neat interactive stuff. It’s just phenomenal. There is a really good jigsaw kind of program

that's interactive. When you put a piece of the puzzle in the right spot, it clicks into place. There are so many ways you could use that function."

Ruth believes online learning is appropriate for some learners. Some of her students might or might not be able to do it. "But it's like standardized testing. It's standardized learning. It expects a certain type of comprehension. It has certain expected answers." She feels for the really high functioning students at school who are learning fairly straightforward subjects like history, online learning may really work. "I don't know if it would work for more subjective things like social studies or philosophy, and I'm not impressed with its utility for math. I think math requires much more interaction."

In discussion with math teachers, Ruth feels that math instruction has problems making use of computers. "So much of math is manipulating and entering not just numbers but lines or things like that and you can't do that effectively on the computer." Ruth remembers the first year that students took the online math state standardized test and the teachers all had to go through training that included using an online protractor and compass.

I'd have failed the damn test because I couldn't make my protractor work.

And I think that's asinine. A protractor is a device that was designed to be used with one's hands on a piece of paper. But sometimes people want to use the computer because they think it looks good for them and makes them look sophisticated but not because it really helps the process.

One of Ruth's biggest classroom management problems is that her students often do not bring their laptops to class. Ruth explains that it is not because the students are forgetful or learning disabled or the laptops weigh too much.

For most of the kids in my program academics are not the priority. And quite frankly, carrying around books or a computer, and looking like a scholar is not high on their list. If they figure they're going to spend time outside with their friends, they don't want to be encumbered. So they don't bother to bring things, whether it is books or computers or they leave them in their locker. Then I have to spend the first ten minutes either allowing kids to go back and get a computer or telling them, "Ok, you can work with so and so." They're very happy to work in partners because it gives them more social opportunities.

The lack of academic interest, Ruth feels, stems somewhat from a certain learned helplessness and a lack of taking responsibility. The students do not have high expectations for themselves. "Most of them frankly come from situations in previous classes where there was a lot of play time built in." The students know they're supposed to bring their laptops to her class, "[but] if they don't feel like going back upstairs, they fall back on that comfort level, 'Well, I'm special ed. She'll understand.'" Ruth finds students not having a laptop a difficult problem to manage. She cannot force them to bring the laptop, although "I had a kid one day... 'you go back out there and you find a computer. I don't care where you get it from. But you come back with a computer.' And he did. I don't know whom he borrowed it from but he came back with a computer."

If the student's laptop is at the help desk, she has students share a laptop. However, some activities, like TeenBiz, can only be done by one student per laptop. So Ruth always has a backup plan with an activity done on paper. She has also found that in order to encourage students to bring their laptops, “you need something really boring, like ‘Here, alphabetize these words’ – something that they absolutely hate.” For those times when she only has one student with a laptop in a class of seven or eight students, she will “just shelve the whole idea of using the computers and do something different.”

Ruth's students have very poor summarizing and synthesizing skills, particularly with information that comes from more than one source. When she requires students to list the websites they have used (which are mostly ones she has already vetted for them), “I can see that a lot of them have copied the information. Their idea is if they change it ever so slightly – copy and paste a sentence and then cut it into two sentences, even though all the words are essentially the same – they think that that's different.” She has also found that what she views as cheating is not how her students define the term. “Cheating for them is if you did not do the assignment or got it wrong and someone else got it right and you erased your answer and copied theirs.” But Ruth explains, if the student has not completed the assignment because it is hard and someone else can show them how they did it, then they do not view that as cheating.

I remember one day very distinctly, I had them doing some kind of worksheet and one kid had a girl's worksheet on his page that he was copying. I said, “Johnny, you can't copy your answers.” And he said, “I ain't copying. I'm just checkin' to see how she did it.” And he meant it! I

thought at first he was being sarcastic and it literally took me a minute of absorbing and processing. And I went, “You know what? He means it. He’s not kidding. He really thinks this is not cheating because she knew how to do the task and he didn’t. “Oh, so this is how you did it.” There is a very fine line for them.

Ruth does not believe the teachers were given any preparation for the laptop program when it started. “Seriously, we were just told this was going to happen. Teachers, at least within my circle, were not given any real concrete instruction or parameters or even on what the computers would do.” She feels the first year was definitely on-the-job training.

While some teachers have suggested that classroom sets of laptops or laptops on a cart would have worked better, Ruth thinks the “maintenance would be worse because let’s say you’ve got thirty computers and thirty kids and one goes down. You’re still stuck but you can’t just tell the kid to go borrow one or send the computer down to the help desk and tomorrow it’s ready.” Where Ruth would like to see improvement is with the batteries and the power end of keeping the laptops working in a reliable manner.

Ruth also remembers the system being down a lot that first year. “It made the teachers have a certain perception that these things were not to be taken terribly seriously. It was kind of a neat toy to have but not something that they could rely on.” Although the system has functioned better over the intervening two years, Ruth still believes the power issue coupled with so many laptops having to go to the help desk for repair has caused this perception to persist, especially among the teachers.

Because the teachers had already been given a desktop computer, Ruth thinks “the switch over to laptops as a separate format has been relatively easy.” The biggest complaint she has heard concerns the laptop’s touch pad. “‘Geez, this touch pad thing is a bear.’ But you get used to it. I mean I’ve used this for three years and I’m pretty darn good with that little touch pad now.” But she still likes her mouse. The portability of the laptop is also a big plus. However, although there is a large flat screen monitor that teachers can use with the laptop in the docking station, Ruth finds the laptop’s small screen a challenge if she uses her laptop away from the docking station.

Reflecting on the relative advantage of the computer, Ruth finds the computer is better for some activities than others. She particularly makes use of the program Inspiration because it helps her students organize information. She still uses paper and pencil as “something tangible that they can manipulate and write on and make mistakes and just erase.” This, she feels, brings a comfort level for her students. However, there still remain many advantages unique to the laptop.

If the kids have the laptops with them, assuming that they do have their laptops with them, they can all do the same thing at the same time. They can get on the Internet and go to a website or they can all work on their PowerPoint or they can all work on their project or their typing or whatever it might be. So it levels things out and makes every part of a program accessible to every kid. I don’t think that’s distinct to laptops except for the fact that I can choose to do it on the same day that you

choose to do it and we don't have to reserve space in a lab or reserve a cart or anything like that.

However, as Ruth points out, there are times in life when computers are not available – like when you go shopping at grocery stores. "Every time you go out into the world, you have to be able to do certain things without a computer." She cannot "envision a society where we literally never write anything by hand or read [everything] in intangible form, where everything is linked to a computer system." She wonders, if this were the case, what would happen if the power failed!

Ruth has not been impressed with the network. All of a sudden you realize, 'Oh, geez, nobody can get to this or that.' And that's when you realize it's down." This year, during the standardized testing, the company who manages the backend of the online testing had their server crash. All the tests were lost, and the students had to start over again. "I wanted to circle the date and say, 'This is why we shouldn't depend on our computers for everything.'" Ruth also thinks power remains an issue as well as occasionally the laptop's processing speed. "I remember when I was in the library; they had a theory that in the afternoon, computers were slower because California came online. I don't know if that was true or not, but it is true that the computers are slower in the afternoon."

Ruth has read the Acceptable Use school policy, and she thinks it is good in case a student does something terrible and the administration can say, "You knew you weren't supposed to go on a porn site. You knew you weren't supposed to use the computer to cheat in this or that way." However, Ruth believes the key word filtering system the

district uses has real problems because it does not accomplish what the district wants.

“I’ve been blocked from sites like RayCharles.com and yet I have a child who was at a porn site the other day.” Even students who read at a third grade level know about proxies and can use them to get around the filtering system. Ultimately, Ruth believes “it comes down to teachers establishing their own parameters within the classroom for what’s acceptable use. Some teachers have very lax standards and some have very strict standards.” Ruth feels she is more on the lax side of the issue. In the past, she has allowed her students to listen to music as long as they are on task and working. Now, she does not let her students have access to music even though from what she has read in research, “some students do better if they have some kind of music or sound.”

Ruth has problems with the help desk especially when the staff erases important documents from the student’s laptop hard drive. “I had two kids who did big projects. They were done or almost done. One kid didn’t turn it in because he couldn’t get the R drive to work. That was the ironic thing.” The problem of access to the help desk both because of its hours and the problem of getting into the library also remain difficult for Ruth. “It’s not the kids’ fault that the help desk is behind the library. The bottom line is it’s hard for the kids to pick up their computer or drop it off.” Sometimes there is just a failure to communicate with the help desk staff, Ruth believes. She sent a student with her assistant during class to the help desk in the hopes that the presence of an adult might help. They came back empty handed, and “the reason [the technicians] couldn’t give the laptop back yet was because the headphone jack wasn’t working right. And I said, ‘I want him to do his TeenBiz test. He doesn’t need a headphone.’”

The batteries and the battery tower continue to be problematic for Ruth. One day she went to get her batteries and all the power cords were gone from the battery tower which meant that the batteries could no longer be recharged. She still has received no replacement cords nor has any idea who could have taken them or why.

Ruth feels the training opportunities have been good. “We can go to this class, go to that workshop or whatever.” The criticism she had at the beginning was the one-size-fits-all approach. “You had people who couldn’t figure out how to click on a mouse with people who had taken classes in programming and the trainers tried to teach them at the same pace.” However, she thinks this approach has begun to shift. “I took an Inspiration [workshop] mid-year and the first twenty minutes was a group thing and then they broke us out into two sessions – the people who had used Inspiration and the people who had never used the program.”

Ruth thinks there is always technology missing although she feels it is not so much missing as needing improvement. She likes TeenBiz but the program needs to be improved in how it functions. She would like more access to peripherals such as more ready access to printing for students and more access to the projectors, digital cameras and digital recorders. Ruth would like to work more with digital storytelling, but this cannot be done without digital cameras being available for reasonable periods of time. She is particularly looking forward to having her own LCD projector in the new school. When she has borrowed a projector to use in class, Ruth has found it engaging for her students. “I can project their work and they like that. It’s like being on stage to them.

When the students send me a PowerPoint and I look at it, that's fine. When we project their PowerPoint, everybody looks at it."

Ruth feels that while the computers have become more reliable over the past three years, they are also getting old so there are more maintenance issues than in the first year. Another problem for Ruth – "Last year we got this enormous list of programs the system had purchased, most of which probably die an ugly death every year because they don't get used." Ruth thinks there are too many cute ones that do not really serve the needs of teachers and students. She would prefer "buying two or three quality programs that teachers can make heavy use of." She notes last year that there were three or four reading/writing programs for lower level readers."

You can tell that they are essentially being marketed for younger kids but because we have lower level readers, they are available to us. We don't need that many of them. One of them would be sufficient and the money that they spend licensing say three to serve that one need, they could spend on sophisticated software or subscription services.

Ruth would also like a more manageable email system for the students. "Why can't we just have the same email system for every kid and teacher? They can email me, and I email them and that's how it is." Lastly, on her wish list, Ruth would like the student network drive available to students at home since using that system is much easier than Blackboard to use for her students.

Classroom Observation

When I visited Ruth's classroom, I found it was actually half of a larger classroom that had been divided down the middle by a permanent curtain. The room was filled with desks, making for very limited mobility, but there were colorful posters on the walls. Her room had limited board space, some of which was dedicated to a daily agenda.

On the day of the observation, the agenda read:

- 1) Warm up – TeenBiz
- 2) Review PowerPoint; be ready to share in next class
- 3) Synonyms/antonyms – Inspiration
- 4) Independent reading
- 5) Exit ticket – give an example of an antonym that changes tone.

Ruth established time limits for each of her activities, but she had to remain flexible, depending on how well her students could move through the activities.

On the observation day, she had nine students, none of whom had their laptops with them at the start of class. She had to cope with students leaving to get their laptops, battery problems, and passwords or logins not functioning properly. Eventually, the students went to TeenBiz and settled down. There was a lot of socializing among the students as Ruth worked through the agenda, and one student continually acted out, disrupting the class or feigning sleep. Ruth used the LCD projector to help her students navigate to various activities but had trouble getting them to focus on what she was demonstrating. The last thirty minutes of the class were spent in independent reading.

Summary

One of Ruth's particular challenges is that her students frequently come to class without their laptops and, on the day of the observation, none of her students had their computers. The first part of the block was spent in getting the laptops to class, getting logged on, and settling down. It was obvious this is something she has to contend with frequently.

Another of Ruth's issues is time management, and the daily agenda on the blackboard was her attempt to provide structure to the lessons of the day. It was clear the students knew how to use TeenBiz and, for the most part, worked their way through the daily reading. Since the students enjoy working on PowerPoints, they moved easily into the next activity. Not all students remained on task, and Ruth had to cope with a good amount of socializing among the students. Ruth also expressed problems monitoring her students' laptop behavior, and this observation was indicative of this issue. One of Ruth's wishes is to have her own LCD projector. On the day of the observation, she had managed to get a projector, and it clearly helped the students move through the agenda and understand what was needed from each of them.

In the following section, the study's subquestions are analyzed in terms of the two adopter participant responses. I then return to the literature's set of characteristics for adopters and discuss the relationship between the characteristics and this study's participants. The last section focuses on an analysis of the two classroom observations.

Research Questions Summary Responses

The two adopter participants' answers to the seven research questions in this study are summarized below. Unlike the more homogenous innovator participants, the adopter teachers have tended to be either more of an innovator (Ruth) or more of a resister (Sean) in how they have coped with the laptop program. However, the adopter participants also have their own unique characteristics as described in more detail in Chapter 8.

How has being a digital immigrant affected their integration efforts?

Ruth and Sean answer this question differently. Ruth feels being a digital immigrant has not impacted her using the laptops at all while Sean thinks his being born and raised before the advent of computers has significantly slowed down his efforts to use the technology. Both participants believe that old dogs can learn new tricks although they have noted that older teachers may struggle more probably due to an inherent distrust of machines. Neither adopter question the definition of a digital immigrant being based on age. In fact, Sean has quite identified with the concept of an adopter digital immigrant. "I'm not part of that spectrum... the total tech heads versus the troglodytes...I'm either refreshingly or annoyingly in the middle of the spectrum."

What problems do the teachers believe the laptops are supposed to solve?

Sean believes that the laptop program has been very beneficial for reducing the digital divide. However, he also thinks that students, who have had home access to computers all their lives, now use the laptops as a new means of tuning out a teacher. Ruth feels that adding prestige to the school district was probably the driving force

towards initiating a laptop program at Jesse Jackson rather than seeing the laptop program as a new tool to improve student learning.

What do the teachers believe they have had to stop doing in order to use the laptops?

Neither Ruth nor Sean feels they have had to stop doing anything because of the laptops. Although the adopter teachers both make use of the computers, the integration has been more supplemental than fundamentally changing how or what they each teach. In Sean's case, he does not think laptops help his students be critical thinkers, and he requires many of his writing assignments to be handwritten because the AP exam entails writing with pen and paper. Sean also agrees that the laptops have opened up more research resources for his students, although he has not taken advantage of these electronic research opportunities very often in his classroom.

Ruth considers the limitations of her special education students as setting the framework of what she can and cannot do with laptops in class. For her, using the laptops has expanded the activities she can assign as long as she selects computer applications that do not challenge her special education students by requiring too many process steps. She does not think the laptops have replaced teachers, but she feels the role of a teacher has shifted away from direct instruction to more facilitation with the laptops.

What new activities, approaches, and strategies do the teachers believe have emerged?

Ruth has tried using Blackboard's discussion board as a kind of electronic journal but her students have not responded enthusiastically. She attempted to go completely paperless in her classroom but the lack of reliable technology as well as the addition of many more steps to access programs or create projects eventually made the program

unfeasible for her students. Ruth particularly likes to use the Inspiration software program and has also found numerous interactive websites for her students. TeenBiz, an online reading program, is also useful in her classroom as the students can work independently, but she is often frustrated with the program's limitations.

Sean only uses the computers for word processing and as a backup when a student forgets to bring a book to class. Both adopter teachers use Blackboard, but for Sean, "It's certainly not what you'd call a completely and thoroughly comprehensive thing yet." He is aware of numerous online as well as specific programs that can be very helpful in teaching vocabulary or working on writing, but he does not make use of these resources nor does he incorporate into his instruction the online databases provided through Jesse Jackson's library.

How has the teachers' use of and attitudes towards the laptops evolved over the three years?

Sean's initial reaction to the start of the laptop initiative was positive because he thought the physical textbooks and classroom materials would be replaced with electronic resources. However, this did not happen. Sean feels the laptop program is still so new that he remains ambivalent about its education value. He finds the laptops to be impersonal and removed from the human connection which he clearly enjoys as he teaches his students. He also believes that work produced on a word processor is more disconnected from the writer while something handwritten has been touched by the author. Sean questions if laptops should be considered the solution to any and all education problems,

and he frequently asks himself if there is an alternative but effective way to do some activity that is not dependent on the laptops.

Both adopters are concerned about the new initiative for online instruction. Sean feels the vital relationship between teacher and students can disappear, and Ruth thinks online instruction can not be universally successful for all of Jesse Jackson's students. Ultimately, it comes down to a matter of triage for Sean – his students come first and everything else including integrating the laptops must find its place much further down his list of priorities.

Like Sean, one of Ruth's strong reservations is that using the laptops can mean less human contact in the classroom. She is also quite concerned about the rate of change that the technology and other school priorities, including the impending move to the new building, have placed on Jesse Jackson's teachers. Ruth has determined that integrating the computers into her teaching is an organic process, rising up from the needs of her students rather than from trying to look sophisticated because she uses the laptops. Like Sean, her students' needs come first. And again, similar to Sean, she remains concerned over the tendency to view the computers as a "substitute for everything, the way some parents think of television as a babysitter."

How have the perceived benefits and obstacles of the laptop program played a part in dealing with the laptops?

Ruth feels that knowing how to use a computer is a life skill, beneficial to all of Jesse Jackson's students. "Computers can help the students learn more, have access to more information, and gain a facility with the technology..." In particular, Ruth finds the

spell and grammar check functions to be extremely valuable as they function as assistant guides in helping her students improve their writing. She also thinks that every student having their own laptop means “that everyone can do everything – no one has to wait their turn.”

One of the initial obstacles Ruth had to contend with in the first year was the limitations the administration placed on the student laptops. Among the restrictions, students could not save favorites which meant finding the same website again extremely difficult if not impossible. She also thinks the filtering system not only does not prevent students from accessing inappropriate material but also blocks legitimate efforts from the teachers. Another frustration for both Ruth and her students is many of the skills students must learn in order to effectively use the laptops require mastering numerous series of steps. While Ruth makes extensive use of the software program, Inspiration, she feels that the online reading program, TeenBiz, is more about drill and repetition than about helping her students become better readers.

Another area that especially challenges Ruth and her students is the school’s system for students to print documents. Not only must the students find time to go to the help desk to pick up their printed work, they must do it the same day or else the material is thrown away. She finds this system “ridiculous.” Other obstacles include “a lack of power for the computers, no external batteries, a slow network, and often upwards to 20% malfunctioning computers.” She also feels that the laptops steal away small but consistent pieces of time. She has to contend with students not bringing their laptops, logging in issues, helping students move around in the program structure, and other

mechanical kinds of challenges. An ongoing laptop issue for Ruth is that her special education students often do not bring their laptops to class. She either has to send the students out to retrieve them or simply gives up on using the laptops that particular day.

Sean thinks that the very nature of teaching gets in the way of integrating the laptops. He gets caught up in the daily instructional tasks and has to set aside working on other priorities such as his Blackboard class sites or learning a new software program. For Blackboard in particular, he believes that teachers are almost forced to become web page managers and that takes a lot of time. Sean does believe the Internet expands research options but he is also very aware that much of the available information, in particular Wikipedia, is inaccurate so he is wary of conducting online research with his students. In addition, Sean feels that the laptops have taken plagiarism and cheating to new heights. If he suspects a student has copied from the Internet, Sean has developed the solution of Googling a couple of sentences which is usually sufficient to catch the culprit. Another obstacle for Sean is that much of the literature he uses in class is not available online nor can he find good annotations that could serve as study guides for his students.

For both Sean and Ruth, the configuration of their rooms has meant that they have trouble monitoring their students' work on the computer. Ruth has installed a system of expanding consequences when she finds that a student is off task. Sean knows his students have gone astray on their laptops but he so far has discovered little recourse in correcting this problem. Both adopters wish for technological solutions. For Sean, the solution might be docking stations for all the students or re-engineering the laptops to have some kind of signal on the top of the monitor to alert him when a student is on the

Internet. He even proposes having gigantic mirrors placed in the back of the classroom so he could see what was on the student laptop screens without having to teach from the back of the room which he refuses to do. Ruth would like to have an electronic monitoring software program such as Synchronize so that she could see in a glance all of her students' laptop screens at any moment during the class. However, for both adopters, the solutions to their students being off task are external and technological and not a matter of adapting their own behavior.

How have the characteristics of the laptop and the program's implementation helped or hindered the teachers' coping?

Sean feels the laptops are both simple and complex to use and, for teachers who use the laptops every day in class, integrating the computers is much easier than trying to do it when the teacher only occasionally uses the laptops. He sees the relative advantage of the computers as a good tool that will improve over time. When the laptop becomes an end in itself, however, he feels it is detrimental to good teaching. The network has functioned fine if a little slowly for Sean, and he dismisses student complaints about the quality of the laptops which he feels are after all free to the students. He knows that while the school laptop policies are very clear about appropriate use, students completely ignore the rules, recognizing that there are very few consequences for abuse. Sean states that students easily get around the school's blocking and filter system which seems to impede the teachers more than the students. One issue for Sean is the limited access to technical assistance for the students, and he finds the help desk anything but helpful. The training has been sufficient, but he dislikes the underlying assumption of learning

technology for its own sake. He believes that teachers and students do not need to learn how to use a computer or how to navigate the Internet. Last, one resource that Sean would like is to have all his literature texts made available with complete annotations. What little he has found so far has just supplied footnotes incorporated by editors.

Ruth understands the usefulness of having class sets of computers, but she also believes that this will not solve the problems of broken or malfunctioning machines. She would like to see improvements with the batteries so that the machines are more reliable in the classroom. Ruth remembers a lot of network problems the first year which she feels led many teachers not to take the laptop program seriously. Ruth does not believe the laptops are difficult to use since, at least at Jesse Jackson, all teachers already had desktop computers so the transition was relatively straight forward. She likes the portability of the laptops but finds the computer's small screen a challenge to use when it is not in the docking station.

Ruth agrees with Sean about the school's filtering system which she feels has not accomplished what the district wants. She cannot get on a legitimate website, but her students seem to access inappropriate websites with ease. Ruth also concurs with Sean about the help desk partly because of access problems but also because the staff erases important documents off student hard drives when the laptops are in for repairs. Ruth has found the training to be good, but her biggest complaint has been the one-size-fits-all approach although she feels this is beginning to change. One resource that Ruth would like to have is more access to peripherals such as an LCD projector, digital cameras, and digital recorders which would open up more instructional opportunities for her students.

She would also like a more manageable student email system as well as having the network drive available to students when they log in at home. Last, Ruth takes issue with the large number of computer programs available on the student laptops because she judges that many of them are never used and are often duplicates of each other. She would rather have the site license funding go towards just a few high quality programs or for more online subscription services.

Adopter Characteristics

In order to determine the study's teacher participants, individual sets of characteristics outlined in the innovation adoption literature were used very briefly (as described below). In this section, the characteristics belonging to the adopter participants are discussed, along with several more characteristics derived from the teacher participant responses.

Somewhat technology focused, proponent of evolutionary change, pragmatic user, willing to take some risks, somewhat self-sufficient but may need support, follow with deliberate willingness, somewhat willing to experiment, fairly skilled with computers, will initially use computers for traditional activities, begin shift from teacher centered to student centered, do some projects, have a fair amount of management issues but tolerance for problems increased, lots of time issues, increased productivity, begin to seek out new ideas, computers routinely used, computers are somewhat visible.

Vision, Technology Use, Risk Tolerance

The adopter teachers in many ways are an amalgam of the innovator and resister characteristics. Sean is more of a resister while Ruth reflects many of the innovator qualities. Although both teachers continue to teach as they have done in the past, unlike the other two categories, Sean and Ruth look to technological solutions to most of the obstacles they have encountered. Ruth is willing to take more risk and has moved more outside her comfort zone as a teacher, while Sean wants the technology to adapt to him rather than the reverse.

Benefits, Obstacles, Loss

Both adopters acknowledge benefits for themselves and their students in using the laptops, specifically in the areas of writing, reading, and online research. However, they both identified clear obstacles that have hampered their integration efforts. These include the network, help desk, software programs, time, printing, email, students off task, monitoring, and laptop restrictions. Neither participant has expressed any sense of loss in trying to use the computers but this reflects the supportive rather than the transformative role the laptops have played in their classrooms.

Specificity, Computer Visibility

The adopter participants identified both positive and negative aspects to the benefits and obstacles involved in integrating the laptops. Each participant is conscious of what the computers can and cannot do in their classrooms. Sean, in particular, does not use the computers very frequently so he is much more aware of them when the students engage in online or computer related tasks. Although hampered by her students'

unwillingness to bring the machines to class, Ruth uses her student laptops every day she can. Consequently, both she and her students are more focused on the tasks she has assigned than on using the computers. Because she has special education students, she has had to attend more to the mechanics of using the computers than Sean.

Training, New Technology, Filter for Success

The training opportunities have been fine for both adopters, although Ruth likes the fledgling shift away from the one-size-fits-all approach. As Sean does not believe the laptops are helpful in building higher thinking skills for his students, he is not attracted to some of the newer technological resources now available to Jesse Jackson's teachers. Sean's filter for success is whether any technology, including the laptop, brings sufficient uniqueness and effectiveness to make further integration of the laptops a viable solution. His integration choices have, therefore, been limited to supplemental activities that match his comfort zone.

Ruth has taken more risks in adapting the technology to her special education student needs. The laptops have not been sufficiently reliable or flexible for her students, however, and this has hampered her willingness to integrate the laptops. Ruth would like more technology resources especially in the areas of software programs, LCD projectors, and digital cameras. Her filter for success is how well the technology can match the special needs of her students. Ruth's attempt to go paperless is a clear illustration of how the lack of reliability and appropriateness made this approach untenable.

Participant Classrooms

The purpose for the classroom observation, sequenced between the two interviews, was to contextualize the participants' responses in terms of their actual classroom and instructional activities. Three characteristics are examined which help illustrate how adopter teachers use the student laptops in their classroom instruction.

Responsibility for Learning

Both Ruth and Sean provide a mixture of teacher and student centered learning. They individually feel responsible for their students learning and believe strongly that the human connection is vital to that process. Ruth, however, also had her students undertake considerable independent work using the computers while Sean only provided limited opportunities for students to conduct electronic essay writing or online research.

Placement of Attention

The placement of attention in Sean's classroom is clearly on the teacher. In the class observation, he spent the majority of the time informally talking to the students with the remainder of the block spent on student independent work using the laptops. He has fewer problems shifting the students' attention from the laptops to himself as he separates laptop time from the rest of the instruction. Ruth works to engage students but uses the computers as a buffering activity for those students who have progressed more quickly through the class's assignments. Her students require a great deal of individual support in learning and managing any instructional task whether it is electronic or on paper. Consequently, she conducts less general teaching and, instead, focuses on differentiated support depending on each student's learning challenges.

Computers and Learning

Both adopter participants believe in the value of the computer in helping their students learn. However, the laptops supplement what already transpires in the classroom rather than altering the fundamental instructional framework. Sean and Ruth want to continue using the computers, but Sean feels the computers have only limited usefulness in helping his students understand English literature and especially prepare for the AP exam. Ruth believes that her students must become computer literate but remains frustrated by the often poor alignment of the program to her students' needs.

Summary

Unlike the more uniform characteristics of innovators (Chapter 5) and resisters (Chapter 7), the two adopter participants demonstrated strong tendencies towards being an innovator (Ruth) or resister (Sean). However, the adopter category of integrating the laptops also has its own unique qualities. Sean and Ruth have integrated Jesse Jackson's laptop program to some degree into their classroom teaching, but many obstacles have thwarted their efforts. Sean remains unconvinced that the program can help his students become better thinkers while Ruth knows the laptop program can assist her students in many ways. However, she has found the laptops have not been adaptable enough in ensuring success. When each adopter has had to cope with obstacles such as plagiarism and being off task, both teachers wish for more technological solutions to repair the situation rather than adapting their own teaching to address the problem. Sean is ambivalent about the training which he often feels is based on learning for the sake of technology while Ruth likes a more focused approach to staff development that will

better help her use the laptops with her students. Both participants consistently see both sides, positive and negative, of any aspect of the laptop computers but neither has expressed any wish for the program to cease. Sean remains uninterested in new technology resources while Ruth is more willing to try them. Ruth's classroom is student centered whereas Sean's is more teacher centered. However, they both embrace the human connection as being vital to effective learning and teaching, although Ruth leaves more space for her students to work independently on the computers. After three years, these adopters continue to work with the laptop program but not without ongoing issues that have defined the laptops as supplemental rather than foundational in Ruth and Sean's classrooms.

7. Resister Participants

The teacher participants in this study are divided into three categories – innovators, adopters, and resisters. Each category has both a male and female participant, and, for resisters, math and government are represented within the curriculum subjects at Jesse Jackson. Both resisters were over 40 years old at the time of the study and had taught in the high school's laptop program for the three years of its implementation. In this chapter, the two resister participants' data are first examined as individual profiles including the classroom observation, and are then analyzed in regards to the research questions, and in terms of resister characteristics and their classroom observations.

Resister #1 - Chris Sligh

When Chris went to college, he had two goals – to play soccer for a living and to become a social worker. While playing soccer remained important, fairly early in college, Chris changed career direction. Deciding to become a teacher, he studied math and history. After getting his teaching credentials, Chris came to Jesse Jackson where he has taught for the past nineteen years. However, Chris has still managed to keep his love of sports alive by being one of the high school's coaches in addition to teaching math.

Chris feels his greatest skill as a teacher is in creating enthusiasm in his classroom and trying to get the students engaged and motivated to learn. "I try to make the class upbeat, and I don't know if they would find math to be exciting, but I try to make it that

way.” He puts himself in the shoes of his students as they go through their day at school. “I would like to walk into a classroom where there is somebody who is enthusiastic about learning and trying to create an environment that is upbeat and positive. So that’s what I try to do.” Chris is not sure his students feel the same way about being in his class but that is what he attempts to convey.

The greatest challenge Chris feels he faces is finding a way to engage all his students. Like any other teacher, “I think you’re always going to get across to some students, and to some students you’re going to get across fairly easily, but I think the biggest challenge is to work as hard as you possibly can to get across and motivate all the students.” Every day he confronts that challenge – “how do I get across to everyone regardless, and make sure everybody is involved in the class, and everybody can be in a position to be successful?”

Five years from now, Chris sees himself continuing to work hard to be the best teacher possible in his classroom. “Each year, I try to change some things; try to do some new things; throw out what I think didn’t work; maybe try something new, and definitely bring along what has worked.” He believes that teachers can never say, “I’m done. I’m as great as I can possibly be.” Consequently, he does not want to dismiss any idea that might be helpful. “But the degree to which a) you have a comfort level with doing that, and b) you can see that idea within your classroom, and the way you are hopefully having success, and trying to be the best you can” – then Chris believes he should consider that idea and take appropriate steps, even if they are baby steps. “If I do nothing more than

put a tutorial on my Blackboard site, and when the students are at home, they can get on – that’s a plus.”

When Chris thinks back to the way he was taught in high school, “I’m not going to blindly go forward just because that was the way I was taught – if that was a terrible way of being taught – then I’m not going to continue doing that.” He believes there is a filter that teachers use to decide what in the past might be helpful in teaching, discarding what they think did not work, and keeping what they think was effective. “But hopefully you teach also as a result of what you see up and down the hall as you’re walking around, and you see the people who are being effective, or things that are working well, and you incorporate part of that.” He also relies on staff development “and hopefully you incorporate what you think you can successfully put into action as a result of that.”

I grew up in the sixties and seventies going to high school and into college, and I think even then you weren’t taught one specific way. There were some teachers who wrote notes on the board, and we copied the notes. Some teachers lectured to you, and some were more interactive. There were teachers that gave you an assignment, and walked around the room, and helped you. There were ones that didn’t. There were some teachers where you were doing more project work. Even in the sixties, I was doing posters, and projects, and hands-on types of stuff. So I think there have always been examples of different styles of learning, and different ways of instruction that you bring with you as a teacher, filtering out the ones you don’t want to mimic or be like, and bringing with you the

ones that you do in addition to the stuff you want to see on a daily basis around you, that you read, that you hear about.

Chris's Views on a One to One Laptop Program

Chris has used the computer primarily for word processing and email, although he does not surf the web “or whatever that is.” He is comfortable with computers and is glad they are at Jesse Jackson. He sees a lot of uses for the computer, “[although] it would be difficult to see it dominating a math classroom, I could certainly see it being a valuable tool particularly as extra help, extra assistance.”

While Chris believes there is a role for computers in education, he is quick to note that “everybody is not the same. Everybody doesn’t do things exactly the same way.” He thinks having diversity in the classroom is a strength of education.

To me, teaching has a lot more to do with the passion that you bring to what you’re trying to do, and the desire to really do well, the desire to continue to move forward, and to continue to move. It’s got a lot more to do with that than trying to fit somebody into a particular box. As students it is also very enlightening to walk into one classroom with that teacher’s personality and the way that they go about it, and then you walk into another, and it’s a bit different the way that they approach it. I think it would be quite boring if we were all exactly the same.

Chris feels that it is wrong if a teacher does not even acknowledge that the computer as a tool could be valuable in certain situations. “It has such value in so many different ways, but I think that the way that you use it is going to be kind of up to your discretion in

terms of ‘I know what I bring to the table, and I know how maybe this could help me even get better.’”

Chris defines traditional education as finding the best way to help students. “Let’s look at everything available to us, and let’s figure out what’s the best way, and let’s make sure that we’ve been pensive about it, and we’ve thought about it, and we’ve experienced everything.” For him, the computer is another tool that perhaps can be useful in the classroom. “Then you make educated decisions based on how best you can use this within your classroom, and you make sure that you’ve thought it out, and you’re really passionate about what you’re doing there.” He believes that it is important to have diversity in teachers’ classrooms, and computers provide just another way to have different kinds of instruction. “It would be a bit boring to have your teacher at the board, blah, blah, blah for an hour and a half, and I think it would be equally difficult to sit in front of a computer screen for an hour and a half.”

When it comes to learning to integrate computers into the classroom, “it doesn’t bother me other than I would like to continue to be educated, to get more up to speed on the uses, [and see] the values that it could have in a math class.” However, Chris feels very strongly that in math computers will never replace paper and pencil “or working out the steps of a problem, grinding out the algebra that may be supporting the work for a problem – because I think in math, you have to be able to learn how to fill in the steps and know the background.” Despite that reservation, Chris would like to continue to take courses and learn about the options that will help him get up to speed and make more educated choices for when

I feel it's time for me to be at the board, or [decide] when might be a valuable time to bring the computer in. It's not really a frustrating thing to me; it's just an understanding that here's something that's fairly new, and it's going to take some time. I think you need to be open minded with regards with what it can do, but I think you also need to be open minded with regards to what it can't do and can't offer you.

Chris does not feel frustrated that his students know more about computers than he does. "I think that makes them feel they're bringing more to the table. 'I'm bringing something that's useful to you as well.'" Chris knows how to teach effectively without computers, and "obviously if you only know the one side, you're going to think that's better, because that's what you have comfort with." He wants to continue with useful training and would like to have time to really research to see what is actually available. "You'd like to level that playing field so that your decisions that you make within the classroom can be based on 'I can use both of these. I could go a computer route or I could go a non-computer route. Which do I feel is the best?' I think the best way to make those decisions would be to be competent in both types of learning."

When asked if his classroom is teacher or student centered, Chris hopes that it is focused on the students. "There are some times when I want it centered on me, because I want to be heard. I try to mix and match. I try to get everybody involved on a daily basis. I try to make sure everybody has said something, has answered a question, and has made a comment of some sort." Chris wants a kind of continual give and take between himself and his students as well as among his students. "It's sort of a sense that everybody's

opinion is important, and everybody at any point can raise their hand and interject. And anybody at any point may also be asked to interject without raising their hand.”

Chris definitely believes old dogs can learn new tricks, but the person has to be open minded, willing to listen and see what is working for other people, and willing to envision something different. He wants to continually ask himself, “What is going to be the best thing for me to do? Is this a time to use the computer? Is it not a good time?” In trying to find that balance, he feels he has to get up to speed on some of the computer’s capabilities in order to compare what could be done without using those facilities.

When asked if he thinks computers will ever replace teachers, Chris replies, “To me, teaching is about the human being. It’s about making connections with people, and developing relationships with people, and letting them know that you care; letting them know that you want them to do well, and that you’re there to help them.” He clearly defines teaching as trying to make human connections to people. “There’s unbelievable value to being able to look someone in the eye, and make eye contact, and see body language.” If computers were to replace teachers, Chris sees this as a huge mistake because, for Chris, removing the human connection would leave very little left.

Chris thinks that if he were a laptop student at Jesse Jackson, “I should have it with me, and it would just be so great to know that in this class I’m going to use it this much.” Chris returns to the idea of diversity of instruction. If students have to stare at the board all day long – that would be a bit dull. On the other hand, “I think if every single one of us for the whole class period were staring at the computer screen the whole time, I think *that’s* a little dull.” He would hope that there is a mixture of instruction “within

reasonable parameters where you're getting the values of both – of personality, the give and take a teacher can have, the value that there is to learning to take notes, the value that there obviously is to what you can do on the computer – I think that keeps learning most interesting.” Some teachers would use the computers more, and some would use them less but, for Chris, it is the diversity that would mean the most to the student.

When asked if laptops make students better students, Chris feels there are a lot of benefits for students in terms of leveling the playing field, which he believes is very important. Certainly, he thinks students can provide better products with the computer. Prior to students having their own laptops, “the student who had a computer at home could produce something that is perhaps a little more involved and impressive looking than [another student] could, because of not having a computer or a typewriter.” As to whether the computers make students smarter, “it’s another tool – there are a lot of aspects to them. There are tutorial type things that they could do on their own at home that weren’t available to them before. Here is just another outlet, another option – I get kids a lot, ‘Do you have extra problems I could work on?’ Now you have a worldwide web full of extra things that they could do.” Chris believes teachers now have another tool available that could perhaps help prepare better lessons. Students could have had a teacher “that maybe had a couple of dimensions of the things that they did. But now they have another dimension that they could prepare some things on the computer.” Chris admits to hedging a bit on answering this question about the impact of laptops on student learning. He feels that just because there is a laptop present it does not mean students will use them effectively. “I think that just overall by providing more opportunities, by

providing more diversification in the way that they can learn, either on their own, or in the classroom – sure, I think it’s just bound to help.”

Chris believes that, as an educator, it is important to have tolerance for risk taking in a school. If this environment is not present, he feels teachers would stagnate. “As you move forward year to year, you want to discard the things you tried or have used for years, but you’ve got to be critical of yourself enough to realize that that’s either not working, or maybe it never was a good idea.” At the same time, he wants to keep what is really working well. “But another part of that is being out there, looking around, and trying to find out what is working for other people, and what other people are doing, and being able to take a risk, and say, ‘Even though maybe that’s outside my comfort zone, I’m still going to give that a try, because it seems to be working well for so and so. Let me give that a try.’” Chris feels it would be silly for him to say, “Yup. I’m done. This is it. I’ve got the perfect product here.”

Chris believes computers have changed the world dramatically, “and there are so many things now that a computer can provide in terms of knowledge, and a tool to use both to learn and make learning easier, as well as obviously the production items that you can have with it.” However, he does not see the computer as an end in itself. People have to use the computer along with all the other tools available no matter what the field of interest is. “I think it would be ridiculous to pan the computer, and say ‘I’m not going to use this, and this is not ever going to be useful to me.’ I think it would be equally ridiculous to make it the end all and to see computers as the thing that is going to solve all your problems.” While the computer is a valuable tool, there are many things Chris

does in the classroom that the computer is not going to replace. For him, it is about finding the middle ground.

Chris is surprised that keyboarding is not offered in ninth grade, when the laptops are first given to the students. “Part of the way you can use a computer to its greatest value is if you have good keyboarding skills.” Chris thinks that students’ lack of typing skills keep the computer from being used to the greatest effect. Moreover, there are some things that bother him about the computer – “the fact that you can use a word processing program, and it corrects your English. It corrects your spelling.” Chris wonders what might happen when there is no laptop available. He feels it is important that students can still write and edit their own work. “Spelling – can they do the work without the spell check there?” Chris views the math graphing calculator in much the same fashion. “I don’t think we should just be pushing buttons to do addition, subtraction, multiplication – I think we still need to be teaching those skills that are useful.” However, as long as students develop the writing or math skills that underlie the computer or calculator, Chris believes students should know how to use both tools.

Chris took a keyboarding class in high school so he is familiar with the keyboard. He feels this has been very helpful with word processing and sending emails. He believes this keyboarding class is one thing from his past that has helped with using computers.

When he first learned that laptops were coming to Jesse Jackson, Chris thought it was a good idea. “I was curious as to how I was going to deal with them.” He already knew how he was going to use the computer personally, but he was concerned how they would fit in his classroom. Now, three years into the laptop program, Chris sees the use

of laptops as a supplement for additional practice and review, although it is not how he has been able to use them so far. He sees Blackboard in much the same light. “I’m certainly seeing it as a very valuable supplemental tool, because I can’t come home and do the homework with [the student]. But they can go online to this website.” His math textbook also has “a sort of interactive thing, and there is even a teacher talking, and seeing him or her writing it on the board.” Chris thinks the textbook tutorial is pretty good. “Again, I haven’t been able to investigate it as much as I would like, but it seems like the breakdown is good – that they are breaking it down into small topics, into small pieces. And then there are problems that you could practice.” However, Chris feels there is still one missing ingredient. “Yes, it’s a good supplement because now you’re at home by yourself without your teacher being there – but there still isn’t a way to ask a question if you don’t get it. There isn’t really a successful way to do that. And there are a lot of questions that come up on a step by step basis with a lot of this stuff.”

When asked about shifting his thinking in terms of making instructional changes, Chris believes “I do a lot of thinking out of the box, and changing the way I’m approaching something, changing the way I’m doing my grading, constantly thinking about it. But again, it is within realms of what I know I’m good at, and that I know I have an expertise in. At this particular point I don’t feel I have a good enough expertise with some of the computer ideas.” Each year Chris acknowledges he could have done better.

Every year I say “Why didn’t I do it this way last year?” I would not be happy if I was set in my ways, and I was doing things the same way every single year. I think, what you end up doing, is you keep the things that

really, really are working, and then there are some things that maybe you realize aren't quite the thing, and you bring something else on board, and retry that, and maybe it comes up in the pecking order a little bit.

Something else drops off, because that isn't quite as effective, and you're improving every single year. If you end up thinking you've arrived, that would not be good.

Chris hopes that the vision for the laptops is that "here is a tool that we're using in the 21st century, and this is a tool that has proven to be more than useful in so many aspects of life." He believes that a school system is "tasked to get people prepared for life." Once the students leave high school, they need "a familiarity with the laptop; the ability to use the laptop; and to be able to be computer literate." He does not remember what the defined goal of the program is, but he believes firmly that laptops will help properly prepare students for later in life. Consequently, he sees the laptop program's goals as helping "students to be computer literate in a society that is becoming more and more technologically advanced. You don't want a student who may be going off to a job where they're expected to know the keyboard and use the computer, and they can't because they never saw them on the high school level."

As to what the school has gained or lost because of the laptop investment, Chris believes "they've gained. I don't know what they could have lost really. I don't see anything but a big benefit to us having them, and having the kids exposed to them, and having the kids be comfortable with them, and having the kids work towards expertise on

them.” While there is a big financial investment, in every other aspect he believes it has been positive. “I can’t really think of any downsides to it.”

Chris acknowledges that he does not know much about computers. “It hasn’t been a tremendous interest of mine, or something that I have really wanted to delve into.” However, he has used them for email and as a word processor. He has also used the laptop for grades and attendance. “So there have definitely been uses that I hadn’t used before, and thought were quite useful.”

When it comes to other school priorities, Chris believes that problems need to be tackled in school. “There’s an area here that we want to address, and this is important, and we’re going to work towards addressing this. It doesn’t mean that there isn’t another area that we want to address as well. We’re going to do that, whether it’s in one area; whether it’s in twelve areas. We move forward, and try to deal with everything we can to make learning better.” The word ‘priority’ by its very definition means it is really important and should not be ignored. “I think it would be wrong to say, ‘Ok, we can have only one priority at this point, and we’ll worry about the other one five years down the road.’ In the meantime, that thing that’s an issue is still an issue. So you try to address as many things as you can.”

Chris feels finding enough time is a challenge in terms of learning about the computers. His classes are either standardized testing or AP courses.

There are so many things that need to be involved with regards to accessing AP material, and getting them prepared for the students, and just the lesson plans in general, and the tests, and quizzes – whatever the day

to day job is for the teacher – that it is difficult sometimes to find the time just to sit down. And really, if you're going to use technology successfully, it would take quite a bit of time to sit aside, and say "I'm going to now try to incorporate this more regularly." It becomes difficult to do that, because I don't feel that I have the time to take away from what I'm doing in the class at this point, or preparing for the next class. It becomes a time thing more than anything else.

Chris thinks that he needs time to "just meander back and forth with it." The training that has been day-long has been most valuable, especially when the content is kept limited, and he can take small steps. Most of the issues he has with Blackboard are not because he does not want to use the program. "It's just sort of a lack of time to really dedicate especially when you're in the course of a school year, and you're trying to stay after school every day to help kids that need help. My coaching – there are not many hours in the day for you just to sit there, and really play around with that."

Chris has used the laptops for standardized testing preparation, and he would like to use Blackboard more. He has some tutorials on his Blackboard class websites, and he would like "to have more time to play around myself, so that I could talk in a more educated fashion with regards to where the kids would get the most benefit, like going to some of those tutorial things." As he gets more comfortable with Blackboard, he wants to use it to diversify how he communicates with the students. Chris knows of some math teachers at a middle school who have used the Blackboard discussion board in their classes. "But for me it would take me a larger block of time to get that all really settled

and organized, than what I've been able to set aside. I'm already here every day until about 7:00." While he believes the training has been good,

When you get a day here and a day there, it doesn't mean that you can go immediately, and start making that part of your repertoire. In terms of the scheme of things, it's still new. It's not like it's been around with us for years, and years, and years. So maybe it just takes some time. And I do use it a little bit more each year. Last year I wasn't even on Blackboard. It's quite possible it becomes effective a little bit each year. It's quite possible that I'm unaware of the fashion or manner in which it can help me. But I really haven't had as much time as I would need to really, truly investigate it.

As Chris becomes more comfortable with the laptop program and with using Blackboard in class, he foresees that "I could do things that would almost force the students to get on there a little bit more, which I think would be good. But again, that's just a comfort level with regards to how comfortable I am. The students are probably ready to go, but it's me that's lagging behind there." In particular, Chris would like to use Blackboard to post assignments and other information, which he thinks is a tremendous value for the students.

While Chris believes that students should interact with each other for certain types of activities, when "we're having an open discussion, or I'm providing some information, or someone else is talking, I don't like them leaning over, and talking when someone else is talking." There are times he divides the students into groups or pairs, but he does not

like students talking to each other “in the name of helping. I don’t like it when someone is talking, and another group is whispering.”

There are some students that from day one are going to feel comfortable talking in front of the class and interjecting. There are other ones that will get more comfortable as they become more comfortable with the class.

There are other ones, like myself when I was a student, who are going to feel uncomfortable most of the time. What I try to do is not let anybody dominate to the exclusion of other people making contributions as well. I also don’t want to put students on the spot either. ‘Ok, you haven’t talked today, so I’m going to ask you this really hard question.’ You’re dooming them for failure at that point, because not only do they not want to talk, but also you’re making them give a wrong answer. So the students who are perhaps a little more hesitant to get involved, I will try to get them involved through a question that I know they could answer, or even an opinion type of thing, so it’s not even a right or wrong answer.

When it comes to teaching math, Chris believes word processing is not particularly relevant, and this makes it more difficult to use the computers in math instruction. “There is so much a need to have a board, an eraser, to show and instruct on a board.” Consequently, Chris does not use the student laptops at all in his classes. Chris believes that math is interactive. “It is not just ‘watch me,’ but rather, ‘watch me,’ ‘you try,’ ‘ask me questions,’ ‘let me tweak this a little bit.’ I mean there’s a lot of give and take on a consistent basis throughout the course of a class that is required in the teaching

of math.” He believes that students can, of course, use Blackboard or the Internet interactive tutorials. “But I think there are so many details that a student might ask about at any given second, that I don’t think it can be encompassed with learning directly from the computer.”

The computer can come in and supplement once I’ve talked about it, I’ve instructed, I’ve had the give and take, we’ve had ‘you try, now I’ll try, you watch.’ Once you’ve had all that, then the computer can be used as another way to learn it. But I think there’s a lot of instruction that needs to go on first.

Chris believes the laptops are more obviously a help in other content areas. “If I was an English teacher, and I was continuing to have students use a typewriter, it is kind of obvious that you wouldn’t do that. If it was time to read a section on something, or a particular event, or whatever – it becomes more obvious that instead of always cramming a textbook in front of them, then maybe you could do this.” These kinds of applications are not so useful in math. Chris finds it is much more difficult to type a math test on a computer than to type an English or history test because the latter uses words not symbols.

While Chris likes Blackboard and believes it will have a lot of usefulness for him, he has had problems getting up to speed with it quickly enough. He takes the training, “but then to just be able to come back, and automatically start using it – it is difficult to do without having time.” However, the uses he envisions would be supplementary and

not the main focus of what he does in class. In particular, Chris likes the announcement function of Blackboard.

I like the fact that students can – if you want to communicate – you can put something across the front with notes. I don't want that to be the main source though, because I think teaching the kids is my responsibility. They need to make sure they have listened in class, and have taken the appropriate numbers for homework down. So I still want to continue to instill in them that they've got your agenda, and they're taking your homework assignments down, and they have your tests – when they're going to be. I still want to emphasize that, but I do think it's nice to have that extra reminder on Blackboard.

When asked about preparation for teachers leading up to the laptop program's implementation, Chris is not sure what preparation would have been necessary. "I think it is important, if we have this initiative, that you get them into the hands of the students as soon as you possibly can. And yes, we could wait around and do all our Blackboard training, and whatever else, but we would still not have them out if that were the case."

For Chris, the best approach for students to have laptops is for them to have their own and be tasked, "Ok, you bring your notebook, your textbook, your pencil, and your computer." It would be far more awkward, he believes, if teachers wanted to use the computers on certain days, or certain weeks, or all the time, and they had to ask these questions, "Can I sign up for a lab? Where's the cart today? Let me pass them out and get

them back.” If it is financially possible, Chris feels giving all the students a laptop is the best system.

Chris does not find the laptops to be complex. “I think that there’s so much on there that it takes a while to really look at it, and to become comfortable with it.” When considering what he wants to try to use in the classroom, “it’s a little bit difficult, because there are so many new things you could bring with the computer. ‘Ok, I think maybe I should bring in this aspect, but I’m not sure if maybe the other aspect might be better.’” He finds it all a bit overwhelming for the most part – but he does not find the computers difficult to use. “As least for me as an educator, I want to educate myself, and bring into my class, or bring into my routines, what I think, based on my opinion, is the best thing for me to do this year. Sometimes it’s difficult with a computer, because there are so many things here I haven’t really had time to make a judgment [on].” He likes the training because it can break down some of the inhibitions. “Let’s look at just a couple pieces as opposed to...I think sometimes you take a day long course on the worldwide web, or something, and you could study that for years. So, instead, let’s take a day long course on putting a title on your Blackboard page – 2, 3, 4 things [so] you actually feel like you accomplished something.”

Chris believes the relative advantage that computers have is that they are different from anything already available in a classroom. You can produce things that are attractive. “Maybe as opposed to words written in chalk on a blackboard, you’ve got a nicer presentation on a nicer screen. You’ve got the sound obviously that’s available. I think that they’re an attractive way to present information.”

He has found the network to be fine and believes there is a lot of technical support for teachers. If the network does go out, Chris believes, “you also need to be able to switch gears. I mean if you did have something planned, and it’s not going to work out, then you’ve got to be able to switch gears, and go back and forth.”

For Chris, the impressive aspect about the laptop program is that students were not just given the laptops. “We obviously have computer experts in the building that are accessible to people who have questions. There is obviously training, both optional training, and training we all have to take. The direct emphasis is let’s get better on these computers.” He is aware of other technology options that are becoming available to teachers. “I know a couple of math teachers who have these magic boards [Smart Boards]. Magic board might be a better description.” In fact, Chris does not see any lack of technology but actually the opposite. “It seems like we’re continually trying to build upon it. It was not likely that they were going to just hand it out, and say we’re set. It certainly seems like we’re trying to continue to develop it, and move in a direction to even gaining more use of technology.”

Chris does not have any technology resources he would like to use. Nor does he have a wish list for technology that is still not immediately available. Instead, Chris expresses this philosophy -

I want to continue to educate myself so that I know when it would be best to use it, versus not using it. I don’t want to be missing out on something that would be better. But I also don’t want to just assume that something technological is better. I want to continue to be educated, and to educate

myself, so that I'm making decisions on what is best. For years I've done that with the [graphing] calculator. I point to the calculators, because I do have a really good understanding of those, and I choose when I'm going to use them, and when not.

Classroom Observation

Although Chris had his own classroom, he also shared another classroom with a teacher which is where the classroom observation took place. Because of this arrangement, Chris had no control over how the shared room was arranged or what resources were available. The desks all faced front and were arranged in rows with a walk space down the middle for the teacher. There was no LCD projector or even an overhead projector in the room. Chris's students had spread themselves out, with a few sitting near the front, several sprinkled through the middle of the room, and the entire back row was filled with students in the desks against the wall.

The class block was focused on reviewing a test the students had taken. Chris engaged the students by tone, and thought out loud about each problem and the process for solving it. He used key words for reinforcement "Plug in!" "Substitute!" "Need to Know!" These words were said very loudly, almost like a chant. Chris talked through the entire review, teasing his students, and working to engage them. It was clear the students understood Chris's approach and the method in which he was teaching them. At one point, the students all grinned, covered their ears, and warned me that "he's going to yell!" Chris shouted out the process's key words, and the students repeated along with him.

After the review, Chris had the students work on the paper standardized testing review which involved using the graphing calculator. He told them, “the calculator will always give an answer, but the person pushing the buttons is the one who gets the right answer.” Chris used the chalk board constantly to explain and reinforce steps in problem solving. He was the only one who actually wrote on the board. As the students worked on the review for the remainder of the class, Chris walked around and checked how students were figuring out the problems.

Summary

It was clear from the observation how much Chris valued his connection to his students in helping them learn math. Over the entire block, he constantly engaged, questioned, and motivated them. There was no sign of the laptops, and the students remained focused on Chris the entire time. He attempted to reinforce with his students that using the graphing calculator for the standardized test review was an assist, but it could not ultimately hide a student’s misunderstanding of a problem. Chris has consistently stressed that in mathematics, the students need to focus on how to solve problems with the graphing calculator (and the laptop) providing only a supplemental role. Also, while there are electronic practice versions of the standardized tests, Chris preferred that his students review on paper where he could easily monitor their thought processes. It was clear that Chris was effective in engaging his students and to ensure that every student participated during the class.

The Relationship between Math and Technology

When reviewing the literature on computer use in various content areas, math has historically ranked low. In a discussion with the math department chair, she wanted to make the following points as a way of understanding why this happens. Like Chris, she has to weigh what value the laptops can provide in a classroom setting that requires a large amount of direct instruction. “Is it going to enhance instruction enough? Is there another way that I can do this? Is it better for the kids to be seeing this, maybe a hands-on approach, as opposed to something using a laptop or technology?”

A topic that gets in the way of using laptops to teach math is the debate over skills versus applications. The department chair defines *skills* as “graphing an equation, as opposed to using technology to graph the equation. You actually graph the equation. Do you understand why the calculator is doing what it’s doing? Do you understand why that line looks that way or why that’s a parabola?” *Applications* is defined as using math for a real world problem.

So you take a problem, and now you show them that they can use a spreadsheet to collect their data, and you give them all of these tools. You do a web based investigation. But could they do it if you just gave them that piece of paper, with whatever the investigation was, or whatever the problem was? Are they putting all of the information into the spreadsheet because you’ve told them this is what you can do with this, and given them the steps?

The debate over skills versus applications became acute with the introduction of calculators. The department chair notes, in examining the math curriculum and how calculators could fit, “we found that you can’t really replace a skill with a calculator. It’s like saying that you no longer have to read music, because we can just have a player piano that will play. Is that what you want? Is that math instruction? I don’t know the answer.”

The department chair believes that technology “allows us to do math, but it’s not really a good tool for teaching math.” This is not necessarily a bad thing in her opinion, but there is no agreement in the larger math community on this point.

What you need to do is sit down, and really look at how we should be teaching math, beginning in kindergarten all the way through, so that there is some consistency, and maybe more of a focus should be on using technology, because we have technology. But we need to figure out what [the students] need to do, and, based on research, whether or not the laptop would be a good use, or technology would be a good way to achieve that or not. There is never going to be a replacement for direct instruction as far as I’m concerned.

For her, “Math is a process; it’s not just the final answer. Knowing the final answer doesn’t tell you why.” Many math students actually prefer pencil and paper to using technology even though they have grown up with computers. A student told her, “I need one-on-one. I need you to show me. I need to be there sitting with you.” However, for practicing basic skills like addition or division, the department provides a lot of

Blackboard websites. The department chair explains, “These are just engaging ways to practice the arithmetic, because now you’re talking about just recall. We’re not teaching the underlying concept. My only problem is, again, they can do that for twenty five minutes, and continue to score 20%. I’m not sure it’s an effective teaching tool.”

That whole internal locus of control, when you start using technology, what you’re trying to do is turn a lot of that over to the kids. I think that is ultimately where we need to be going, but if we’re not there right now, and there is a test coming up in May, then direct instruction is much more teacher directed, and kids are passing, and that’s not necessarily bad.

Her last issue with using the computer is the laptop’s word processing aspect. “Unless you’re asking the kids to respond with words, it’s very difficult. It’s very cumbersome for them to show their work by typing it in. It’s hard for teachers to construct assessments, or worksheets, or anything where they have to type, because we just don’t have an easy way to do that.” The department chair does acknowledge there are math programs available, but they are often unwieldy and can take too much time to use. “Geometry Sketchpad is fine. And there are other word processing programs that you can buy. Math Type is one.” However, she does not want to spend three times as long creating teaching materials like worksheets using Math Type if she can do it faster another way. “I’d rather put my time into working with kids.”

Ultimately, the department chair views computers as a way of extending learning but not replacing the interactions that go on in a math classroom. She does want students to become more independent and require less direct instruction. “But ultimately I am the

expert, and sometimes that's exactly what they need. They need one more time for you to say it in a slightly different way, or with a different visual. It's not to just say there's a website where they'll give you the tutorial." The department chair further notes,

I really don't think we're reluctant. I think we're careful. And we're also trying to be realistic. We've got our kids' best interests. I don't think we're not using it because it's too hard for us to use. Whenever I see something that I like, I incorporate [it]. I think it's a little bit of not having enough information about how it can be used specific to the subject, and also just being really careful in making those decisions that we have to make every time we design a lesson, "Is this the best way? Do I think this is the best way to get this point across?"

Chris had told the department chair that he was participating in this study. Consequently, she wanted me to understand that Chris's students "are reluctant learners. They're kids who really have never understood their role, or their part, and I think moving towards independent learning is way too much of a jump at this point." He does not use the computer or even the graphing calculator – not because he is philosophically opposed to them, but, because "for the kids for so long, everything has been, 'Let me do this with the least amount of effort, and the least amount of engagement.'"

Resister #2 - Leigh Johnson

Leigh Johnson decided she wanted to be a teacher at the age of ten because she liked school and was good at it. The child of second generation immigrants Leigh was the second of two daughters to go to college. "In the 1950's and 1960's, if you came from a

certain economic strata, i.e. working class moving into middle class, I think the old stereotype for girls was nurses, teachers, or secretaries. My sister was older. She'd already snagged the secretarial one." Leigh and her parents viewed teaching as a good profession, and Leigh herself found it interesting and stimulating. As a child of the sixties, Leigh also aspired to join the Peace Corp, but when that did not work out, Leigh decided that teaching "was a type of social work after all."

She began her teaching career just after college in 1972, teaching English and social studies in a middle school in the same district as Jesse Jackson high school. Thirty four years later, Leigh has been pondering whether to stay in teaching, even part time, or fully retire. For her, the push with technology is part of the equation.

This is one of the things that has nudged me out, because I'm not interested in meeting deadlines set by the administration on levels of use.

At the end of this year, you must be at this level, and at the beginning of next year, you must be at that level. I understand they have to do that, but I don't like the pressure that that puts on me. I think when you're younger and in the middle of your career or earlier, you do what you have to do to keep your job, and you want to maintain skills.

Ultimately, even if Leigh leaves Jesse Jackson, she does not feel she will actually retire from teaching. "I have to be careful though, if I think I'm ever going to teach again, I definitely have to keep up with everything. Otherwise a year or two out, I could be really out of it."

Currently, Leigh teaches two classes as a part time teacher – AP and ESL government. Of the two courses, her ESL class is the most unstructured. It is not a standardized test class nor is there an AP exam she must contend with. “It’s a nice situation for a teacher because you get to decide what you think needs to be taught, what needs to be slower, and you’re not under any pressure to pack in a certain amount of information.” Leigh finds her ESL students particularly challenging because she has never received formal ESL training. “I just go slower. I speak a little louder. I write more on the board. I keep in mind that my goal is to teach content. I’m not teaching English.”

As a teacher, Leigh views her greatest skill to be her ability to motivate and to get students interested in certain subject areas. Her greatest challenge is getting her work done outside school in an efficient manner. “It’s always been a challenge for me. I feel I’ve always taken the hardest route. Either I try to do too much, or I take too long, because I end up always with work at home, whereas not every teacher seems to.” When Leigh plans her lessons, she finds it very labor intensive. She gathers materials from her files “– paper, paper things, pieces of paper, hard copies – I have a textbook. I have supplementary materials, and books.” This is where Leigh believes the transition comes from the non-digital to the digital age. All her materials are physical, and she has to manually assemble them into her lessons. She does see other teachers who incorporate digital resources, and Leigh appreciates the speed at which this can happen. However, she is concerned about how the teachers use these resources.

I have seen other teachers in action, and the kids are sitting there working with the computer in isolation as far as I can tell. I’m able to talk to the

teacher at the desk, or the teacher comes outside with me, and we talk for ten or fifteen minutes or so, and the kids don't seem to mind. It's a different way of doing something, I guess.

In one of the few instances where Leigh has assigned computer work in her ESL government class, "I'm a lot more relaxed tonight, because I know that first class tomorrow, the kids are working with their laptops on the assignment I've already given them. Boy, that's nice." Leigh tries to keep up with how teaching is changing. She feels a strong pressure to stay current, "— gotta be on top of things! Although nobody has said a word to me, it's my own internal pressure. I'm pushing myself a little bit on things, and this is one of them, trying to get with the program."

Another challenge for Leigh has been to motivate her students and keep them interested. One way Leigh tries to do this is to teach government more as a current events-based course. "That requires me to keep up with everything in great detail, and be able to adjust my plans the night before, or that morning, depending on what's happening. I like to apply things that happen out there in the real world to the course."

When asked about how presidential elections and campaigning have changed — particularly how the Internet is used by campaigners to get their message across or to fundraise, Leigh acknowledges the change but has not used such a resource in her classes. "I probably would if I had more time to use computers in the classroom. Again, you're talking about students sitting in front of you looking at a screen, and I'm not a big proponent of that. I'd really rather be having a conversation, having them write, think, talk, as opposed to interacting with Hillary Clinton on the computer."

Leigh's Views of a One to One Laptop Program

Leigh views computers as a great information resource. "It's like having a library at your fingertips." It is also a different way to communicate with people, but Leigh is much more negative about this function of the computer. "I personally don't like spending a lot of time in front of a screen. I think people, in general, are spending most of their time in front of the screen, especially in their work life. They're not interacting. They're not on the phone."

I see this in other aspects of life too. I was visiting a friend who had a teenager, and, because she didn't check her email on that day, she missed the fact that the kid's game's time was changed, and so we didn't get back in time to pick her up, and take her to the game. The parents were all mad at my friend. In the old days, somebody would have called her on the phone... We're all going to be definitely wired to our machines. It's going to be a problem. We are going to miss a lot unless we're wired to our machine. What if you don't want to be wired to your machine?

When asked about computers in education, Leigh believes that students should know how to access information and that this is a skill that should be taught in school. She also thinks that the laptops can help teachers make presentations to their students. "They're an assist in other words. They're an aid. To me they shouldn't be primary, but that's because I'm not that adept, and I would really have to retool in order to make computers a centerpiece in my classroom." She does feel that computers are here to stay,

and they are going to the focal point in any profession. But for her, as a teacher, they are auxiliary to what she tries to do.

Leigh has seen changes in education over the past thirty years, but these changes have been incremental. One area that she feels has deteriorated is students' ability to focus. "I think we've fostered attention deficit disorder. The kids seem to do things in snippets and in limited time. The ability to concentrate, and work with something for a period of time, seems to have gone by the wayside." She also finds that students are much more grade oriented now which she believes is a general reflection of society's values.

School has become more business like, and outcome oriented. There is none of that 'learn something for the sake of learning. It might be fine. It might be interesting. It might be good for you.' There is not a lot of space, a lot of room to fool around, and try things. It's become more standardized. Teachers in the same school are teaching the same things, at the same time.

But simultaneously, Leigh also feels that schools have not changed that much on a fundamental basis. "Kids are kids. Relationships are relationships." She notes that standardized testing and technology have had their impact but, in reality, school is still school. Leigh also believes that computers can be compatible with traditional education. "You want kids to do research papers. You want them to learn to write. You can do all of that with a computer."

When it comes to the issue of having to start all over again as a student when learning to use technology, Leigh is very much bothered because she feels she must be

the expert in her classes. “I’m supposed to be the expert, and when I don’t know what the heck I’m doing, that’s not a great feeling.” She has learned to become more comfortable with not being the technology expert and tries to work collaboratively with her students. “Here’s what we’re going to do. I’ve done this, and this preparation. I think I’ve got a good website for you, but let’s see if you can work this out, and let’s collaborate.”

When the laptops were first given to the students three years ago, her students “didn’t know too much about anything, and I didn’t know too much [about] anything, so we were all fumbling in the dark.” However, she has not wanted to spend a lot of time trying to figure out the computers in class. “My job’s not to teach computers. My job’s to teach content.” Again, Leigh reiterates that computer skills are essential to almost any profession including teaching, and she has to get up to speed herself. She does believe old dogs can learn new tricks, but they have to be willing to learn.

So the [computers] make me feel incompetent, but it’s a little bit exciting, you know, because, when I do learn some things, it was like, ‘Hey that is pretty neat!’ But they make me feel a little bit over the hill, a little bit lazy, and less competent. I’m not adept at the things perhaps some of my peers are who spend more time with it, and are more interested in it.

On the topic of whether computers will ever replace teachers, Leigh believes, “it’s a revolution really in the classroom. It’s not just one tool; it’s becoming the main tool.” When computers first began to appear in public education, she remembers discussing this issue. The consensus was “nothing will ever replace teachers, the human contact, and all that.” Now that she is in a one-to-one laptop program, she is not so sure, “especially

when you have online this, that, and the other, and there is no real human contact.”

However, Leigh firmly believes that kids want teachers and desire the interaction with a human being. “They want the instruction, and they want us to talk with them, and instruct.”

Leigh feels her classes are somewhere in the middle of being teacher versus student centered. She thinks she leans more towards the teacher side of the equation.

I guess I’m a little bit aggressive and domineering in front of the room.

I’ve always been an in-front-of-the-classroom teacher, in the sense that I want you now with me. Look at me. Listen to what I’m saying to you. Do not sleep. I want the contact now. I want to know ‘Are you getting this?

Any questions?’ So that’s why, if they’re with the laptop open, I say

‘Close the laptop. Now is not the time for that.’

When asked if laptops make students better students, Leigh is unsure. She thinks the computer may help students to learn more because they have access to more information, but this does not make them better students. “It’s a tool for all of us, and that’s all I would want it to be. I want it to be a tool, maybe one of many.”

Leigh also believes that at Jesse Jackson risk taking is tolerated, and there is room for teachers to move. She has always felt this way. “There are some very innovative teachers here. They really know what they are doing with technology, and they are definitely allowed to do it.”

In terms of student laptop computer skills, Leigh believes all students should know how to type. They also need to know “how to access websites and do something

beyond Google.” This is not a topic that Leigh feels comfortable teaching, but she has taken some training and knows there are more research options than Google available. As a government teacher, she particularly wants her students to know how to access information, both current and past.

What has helped Leigh through the three years of the laptop program is having a good attitude. “At some point, you just have to embrace change and want to learn new things. You just have to get on board, and after the initial surprise perhaps, you have to change your attitude, or get out.” She has decided that she is resilient, and “if I really want to do this whole hog, I can do it whole hog too.” Leigh has tried not to resist or be too subversive but sometimes she just closes the door and does what she wants. “What else has helped? I guess having better equipment year after year – you usually get better printers and the ability to do other things that are wireless. We’re all moving along as a system.”

Another factor that has helped her has been the influence of past good teachers. “I think it is so important to know your information. I had teachers who did, who were able to converse, and teach about all kinds of things in detail, in depth, and having caring people whom you could talk to if you had to.” Being a good teacher who is essential in class and who knows her subject matter well – those have been her priorities. “To be well prepared, to be able to answer the kids’ questions, to be able to add things well beyond the textbook – that’s been a big goal for me.”

When Leigh heard the laptops were coming to Jesse Jackson, she was fine with the idea. Leigh believes there is a vision for the laptop program, but she is not sure it has

been communicated to the staff. In year one, Leigh remembers being told, “‘Don’t worry. Use it if you can. Incorporate it as you will. Some people will. Some people won’t.’ It was sort of do it if you want to. There was no push.” She does feel the new principal has instituted new requirements which she thinks is probably one reason he was hired. Prior to year three, she felt there were never any goals except that “they want us to become competent, know how to use the computers, and how to use a certain amount of equipment in class.” She believed the training was to expose everyone to what was possible and available, but, only in year three, has the training become serious both in volume and quality.

This year I don’t think you can do ‘not at all.’ Prior to this year, you could do nothing. And my feeling is, by the way, it’s ok, because they’re using the laptops in other classes. Fine, let them use them in other classes. I don’t necessarily have to if I don’t want to. I don’t feel that way this year. It’s imposed.

Ultimately Leigh feels all right in this new direction in year three. She would prefer to know what the vision is for the next year or two or even three years ahead. “If I were to stay another year, where would I be next year? Would I be required to use the discussion board? So all of that’s a question in my mind.”

When asked what the school has gained or lost because of the laptop program, Leigh believes overall there has been a gain. “It’s certainly updated our students who are in the forefront of high school.” In addition to being a teacher, Leigh supervises student teachers so she has seen some other high schools in the metropolitan area. “None of them

have the availability of laptops like we do or just the amount of equipment that we have. Course they may have functioning Xerox machines which we don't have. They may have toilet paper in the bathrooms. But we have laptops." Leigh has always felt Jesse Jackson high school has been a leader in education, and the move next year to the new high school building will ramp this up further.

Because Leigh does not use the student laptops very much, she feels personally that she has lost little in her own classroom. "Only a few [teachers] have a situation where a student comes to them saying, 'Good morning,' and they're saying, 'Sit down, and open up your laptop, and check blackboard.' If that's happening on a regular basis, then we've lost something. We've lost communication."

Leigh feels occasional pressure from the school's administrators to use technology, although that pressure is not directed at her personally. These expectations include using the electronic attendance and grading programs and the various levels of Blackboard. She gets no pressure to use the laptops from the parents at all. From her students, she feels "students are very accepting of whatever you want to do with it. If you have limitations and don't want to use Blackboard, for example, they learn to adjust to each teacher."

While Leigh sees benefits for teachers with the computers, some of what she has learned technically requires a lot of work to make usable in her classroom. She learned how to do digital assessment in Blackboard but has found both the creation process and actually taking the assessment labor intensive. "Whew – that's what a new teacher does. A new teacher is inventing their course. Good for the new teacher. I'm not doing that. I

pull the one up from 0506 [school year], copy it to 0607, make adjustments, and there it is. Print it out. Xerox it.”

When it comes to other school priorities, Leigh feels there is always something new. “There is usually some kick that somebody is on. That’s the way it is. There are trends, you know. It might go through a few years, and then you get a new administrator, and there’s a different kick.” Right now, she feels the school is on a technology push as well as the literacy program. “I’ve seen it come and go over the years. I started in 1972 with the literacy, and the reading teachers in the classroom, where every teacher is a reading teacher. They’re always trying something new to get the kids on board.” She does not think she is being bombarded with priorities, but there is always something to contend with.

Leigh feels the training over the years has been sporadic. “You have to squeeze it into your planning period sessions.” She tries to take advantage of everything that is offered and being part time helps facilitate this. She comes in on her days off on occasion or will stay late for training sessions. When Leigh worked full time, it was exhausting to try to fit everything in.

After about 40, [teachers] get tired. ‘I have to practice this now – when am I supposed to do that, and everything else?’ We’ve retooling on the job. We’re learning to do grades using the computer; we’re learning to do our email using the computer; we’re learning the Blackboard program. We’re learning all of that, while we’re also doing our other work we’re supposed

to be doing. For me, it's just added time to my job. It's added hours at home, and in school.

Besides the time issue, there has been a problem of training which she feels has not always been a good technological model. Sometimes she has been in a training session when the system goes down. The trainers tell everyone to take a break while they either figure out the problem or call in the experts. When equipment fails or the system goes down in her own classroom, Leigh cannot tell her students to take a break while she consults computer experts.

If I'm stuck in the classroom by myself, I can't do that. I hate to see a good lesson torpedoed by that, or if a kid says 'My laptop is at the help desk.' Students have legitimate problems. I'm [also] teaching two different classes out of two different rooms. I'm working in somebody else's room, and it's very cumbersome to be setting up a LCD projector, finding space for it, putting it in place, delivering the lesson, moving to another classroom... you've got classroom furniture; the layout may not work well for you. I have found all that to be fairly cumbersome. And if there's a glitch, I try to call for help; you've lost the time – it's a pain in the pattuti sometimes.

Before beginning the shift to using Blackboard, Leigh used the student network drive. "In the beginning, I remember I put the contact information on the classroom board. I put it in my classroom agreement, and I put it on the [network] drive. I'd say, 'Try this. Open it up. See if it's there.' And they'd say, 'Cannot access.'" Leigh found out

over time that the problem was she used WordPerfect. “No one told me it had to be done in Word. I know they are different, but I was using WordPerfect at home.” So now she only uses Word for documents she wants her students to access. “When I bought my new computer, I paid extra to have WordPerfect put on it [as] I was afraid of losing whatever facility I had gained initially with WordPerfect, so I thought let me stick with what I know.”

When Leigh was working full time, she had four AP and one ESL class. She also ran an intern program for 35 students she shared with another teacher. “I was killing myself, and with my style of teaching, it was exhausting.” She found that school just ate up more and more of her personal time outside of school.

Certainly as the years went on, there were fewer and fewer after-hours activities for myself. I didn’t have the energy. I had to get up early. By the end of the week, I was shot. Then I was starting to grade papers no more in the evenings because I was too tired. I used to grade papers, when I was younger, at 10:00 at night. And then, it got to be on the weekend, so the weekends were taken. And then, it got to be – I don’t see how I can grade these papers because I’ve got four AP sections. I can’t give them this essay, because I can’t grade all those essays.

The teacher that replaced her, once Leigh became part time, lasted two years. The new teacher, whom she is mentoring, is trying a paperless classroom for the government classes, and Leigh wonders if this will work better for the teacher. “Maybe she’s going to

be able to work this out, and fit everything in, and the sponsorship, and this, that, and the other thing.”

One concern that Leigh has had with the laptop program is the students’ inability to use the computers outside of school. For example, students were working on an assignment that she suggested they finish up at home. “Several of them at the end of class piped right up and said ‘I can’t use this at home.’ One said that it doesn’t work. Another one said it is dial up and slow. And then they’ve got other people in the family and they can’t cut off the telephone.” Leigh has also suggested the public library or Jesse Jackson’s library which is open until 8:00 pm for students to use, but she again gets the message that students cannot get to these places themselves. “The parents, and the families, and the kids are not investing what they need to make this succeed for them, and I can’t insist on it because I don’t know the circumstances. Maybe they don’t have bus fare. Maybe the parent doesn’t want them out of the house when it’s dark at night. Maybe they’re working. Maybe they’re taking care of kids at home.” The trainers have tried to assure Leigh that students will always find a way to make it work, but she does not feel this is necessarily true.

Just yesterday I met with a girl, and she didn’t have her assignment. She is an AP student, but she is a little bit irresponsible about some things. And she said, ‘I couldn’t get that particular assignment. I had to go on the program on the laptop, and I didn’t know what to do with it. I couldn’t find it. It didn’t work.’ And I said, ‘Now, wait a minute. We went over this. I gave you the access code. You have to click on this, this, and this.

Remember that other girl in class who mentioned she had the same problem? I told her what to do. You needed to speak up and say that I couldn't find it. I need a little extension. But you didn't do that, so that's why you got the zero.' She was upset, but here was an AP kid either using it as an excuse, or was genuinely clueless, and she gave up.

Leigh provides another example of how students can struggle with using the technology. When she was at an all day Blackboard training session, she found out about student email. "I didn't know I could email the kids because nobody told me that." She decided to try using the student email system in class. She picked a student and sent him a little email. She said 'You need to stay alert in class. We've talked about this, and please let me know as soon as you get this, because I'm doing a little experiment here.' He never got it." She asked the student about his email, and he said, "'Oh, I never check my email.' And then he asked, 'How do you check it?' I said I didn't know and ask your classmates. And that was the end of that conversation."

Leigh does not have a pacing guide for either of her two classes although she has a curriculum for her AP government class that she follows. When asked what impact the laptops have had on covering that curriculum over a set period of time, her response was "none."

She does require homework to be done, and some assignments must be word processed. She expects a certain number of websites for Internet research as well. Leigh also posts her homework on Blackboard and feels the students have no excuses for not knowing the assignments as she keeps all the current and past assignments on the site.

She further notes, “There is also a cartridge that was loaded on to my laptop, at my request, which goes with the textbook, and students can go to simulations, and practice various things using the textbook course cartridge. They can do that at home.”

Leigh does not use the laptops for any assessments in her classes. She acknowledges the laptops could play a limited role in helping her students prepare for the AP exam, but she does not assign these websites. Instead, she uses paper copies for test reviews.

When asked what she has changed in order to use the laptops, Leigh replies, “I would say on the whole, very little, to be honest, because I haven’t let go of that many old things.” She feels she has a good rapport with her students and believes it is good to have different teachers with different styles. Leigh admits, “I baby kids a little bit too much.” She provides an example where she had prepared a study packet for her AP students, and she provided additional copies to another AP government teacher.

She told me some of them had lost [the packet], and it was too bad. And I said I have extras. And she’s like no. They can’t have them. When I started using them in my own class, I said, ‘Let’s see your packet. Does anybody need an extra? I have extras. I probably shouldn’t tell you this but I have extras.’ Nobody asked for one, and I said that’s good. But meanwhile I am ready. I am not going to make an issue of it. I’ve learned to go with the flow. Instead of being overly demanding, I’ve gone the other way, because I can’t fight with kids anymore. So sometimes I provide people with two copies of things, even though I know I shouldn’t.

Leigh also supplies a copy through Blackboard in addition to the hard copy she distributes in class. “It’s redundant. I know it is. I’m being a little bit too accommodating. It’s just different styles.”

When it comes to classroom discipline, Leigh does not have a problem with the student laptops. She just tells them to turn the computers off. “It’s a minor problem, because they understand how easily the laptops can be taken away. In both of the classes that I’m teaching, I have just reached over, slammed it shut, and taken it.” She finds she only has to do this once in front of the class to get the point across, and she always returns the laptop at the conclusion of the block. On the fairly rare occasions when she has the students use the laptops during class time, she circulates to observe what is happening. “But I’m not trying to talk to them while they’re trying to look at a laptop. It’s too distracting to me.” When she does need to have their attention, she tells everyone to look up at her. She feels this shift in their attention is not a problem but, again, she stresses the rarity of this happening.

For Leigh, very little has actually changed in her classroom because of the laptops. She does use Blackboard to list assignments. “But it’s secondary. It’s not really even primary.” She does not email her students although she occasionally receives an email from a student. “I’ve posted my availability, and where I am, and what my email is. I always check my email when I’m not in school. Maybe five times in the whole year, I’ve gotten an email from somebody – I’m sick, I’m at home, what can I do?”

Leigh has been able to see how the laptops can be useful in small doses. When she assigned some computer work during the classroom observation,

The kids got right down to brass tacks. They seemed to like using that computer. They were familiar with it. It took a lot of work to get them to have it there, but I could see that this was good for them. It was a hands-on activity. It was good for variety. But what I didn't like about it yesterday was, for 45 minutes of an hour and a half class, it got very quiet. They were looking at the screen. They weren't working with each other, even though I've encouraged them. They weren't talking to me, except occasionally to ask a question. There was very little interaction. That isn't my philosophy of teaching.

In terms of teacher/student roles, she has become a little more comfortable with how students can use the laptops to interact with her. In her AP class, she has one student who is very adept using his laptop. Because one student had been absent and some others had not done the assignment correctly, she initiated a lecture to fill in the blanks. She told the students,

'Well, ok, the department of transportation, this is what I know about them...' and then I say a little something...and I sort of pause...thinking what else should I say here...I haven't researched this...and the boy starts adding...'They have a budget of \$26 billion...the secretary is...' I asked how he knew that, and he said that it was right there in front of him. Then, as we went on, I saw that he was able to fact check a little bit with me. So that was good. I let him. I didn't say close the laptop this time.

This kind of collaboration, even though it involves the laptops, is fine with Leigh. “If you have something to add, certainly add it because I’m not the ‘be all and the end all here.’” Normally, however, she wants her students to pay attention to her and to each other. They do a lot of question and answer, discussions, and inquiries. She tries not to do a lot of lecturing. “I want them to look at the person who is speaking. ‘Someone is speaking. Listen to them. See if you agree with that. React to it. And if you are reading your laptop, I’m not sure you can multi-task properly. So now you’re back on something else that’s caught your fancy. You decided to look that up, and when so-and-so speaks, you may not be able to take it all in.’”

Because Leigh feels it is very important that she is the expert in her classes, she was angry when she learned about the laptop program coming to Jesse Jackson. “In the beginning, when I was expected to use laptops, I didn’t know anything about them. And I felt it was putting me in a bad position – I’m supposed to be an expert in whatever I’m doing, and I couldn’t be.” She does not feel that it is a question of losing face. “It’s hard to teach something when you don’t know what you’re doing. It would take a long time before you become an expert.” She thinks this is probably a reason why she does not use the laptops much in class. Yet, Leigh is open to collaborative efforts between her and her students with the laptops. If she is doing some research on Congress, she tells her students,

‘These are some good websites, but let’s see what you can come up with here.’ And they work, and I circulate. I’ll say, ‘Oh, Christine came up with

something good.’ And I’ll say, ‘She came up with this, on this website.

You might want to take a look at that.’ So that’s how that works.

Leigh has no issues with any visual changes that laptops can present, because she does not really use the laptops. The physical layout of the classroom is a problem only in that she inevitably shares the space with another teacher. She also has no access to an LCD projector in either of her two classrooms.

Leigh primarily uses the laptops for assigned research, and she requires that her students cite the sources. However, she does not demand any one particular style such as APA or MLA. “It’s too much for me to keep up with, so I’ve given up trying. The kids are pretty acquiescent. If I assign them something, they do it. If something is for credit, they do it. I haven’t had much that I’ve tried that they haven’t done, or haven’t been able to do.”

In relation to her use of Blackboard, she has posted her contact information which she feels is particularly important because she is part time. She does not use the discussion board in Blackboard because she does not feel facile with it. Leigh has started posting assignments and using the announcements functions in Blackboard.

But I have to tell you none of this is useful at all unless the students access it. And they don’t, partly because I haven’t made it the only way they can get information. I tell them where it is. If you are absent, this is the way for you to get the information. I write an assignment every night. I update it every night, when I go home. I have to remember every day after school, or in the evening, to update Blackboard. Sometimes I put a little summary

of what we did, or more likely I'll put "For Friday, 3/24/07." And then I write what's due for that day.

Leigh uses Microsoft Word but not PowerPoint. She views that program as a note giving device, and she would prefer to write on the board. She does not use any of the other Microsoft programs available on the laptop. "I think I would really have to retool to learn to use all the equipment [and programs] properly."

If a student does not have a laptop, she has the student share with another, but as her classroom usage is low this is rarely a problem. Leigh acknowledges that plagiarism is a challenge, but she does not spend a lot of time on the issue. "I started to use Turnitin. I know what the objections were out there in the community, and my own students had some serious concerns. I agreed with them, so I let that go."

Leigh feels students "have become used to having and using their own laptops. It has become one more tool – one more textbook kind of thing." Although she feels the laptops are positive, she also believes students could function fine without having their own laptop. "They could probably learn a lot with classroom sets, or the computer lab, and so on." But ultimately, if the district can afford it, the students should have their own laptops.

Leigh believes that once teachers get beyond the first few years of a laptop program, the computers can become easy to use. But this was not the case for her.

The first few years were hell. If you've never used it, and all of a sudden you kind of work with spreadsheets (online gradebook), and all of that, it is difficult. Just of the basics, the clicking, the double clicking, the right

clicking, the scroll down, the arrows...I never took a basic course. I never did but I should have.

To help herself learn, Leigh bought books and her own computer in 2000. She thought she could teach herself, but it did not work out.

I do much better with somebody sitting there, saying, ‘You don’t have to scroll down that way. If you just hit this button over here, you scroll down.’ ‘Oh, I didn’t know that!’ And I discovered that I am not that happy sitting at home practicing anything. I thought I would spend my spare time in the summer working on it. And you know what, I found then, as pretty much now, that I learn as I go when I need to. I’m not a person who is very interested in sitting there and trying to figure out things on my computer.

She has found the laptops to be reliable with the laptops functioning properly 90 to 95% of the time. Only rarely does a student tell her their laptop is at the help desk. She believes this situation is because she so seldom uses the laptops in class. Leigh has also found the network to be fine when she has conducted online research in class. Leigh knows there is an acceptable use policy, because she is a homeroom teacher. “I think I have read the form that they have to sign at the beginning of the year, but I don’t remember what it said.”

The training opportunities have been helpful for Leigh. She remembers one teacher offering a cadre of teachers who could provide one-to-one assistance. “I decided that this was good for me. I need that kind of instruction.” Then she found out that the

teacher was not actually using Blackboard, an area she specifically needed help with. However, she has found the school's technology trainers to be particularly helpful.

You can go to them at any point. The availability of help now is extensive. Before, when we first started this, it was two people fixing the laptops, and handling everything, and supposedly giving you information. They were overrun with requests, and they weren't necessarily informed about everything. Now we seem to have specialists. So this year is when I have really started using Blackboard.

Leigh considers herself to be a linear learner and needs time to process what she is learning. The initial training she felt was chaotic and personally very frustrating. "I quickly got behind. I couldn't follow. I'd say, 'Wait a minute.' They wouldn't wait a minute, and the next thing I'd know, I'm lost. I'd just give up, and would look on with somebody else. I didn't learn too much." Now she feels the training has improved considerably. "The expertise is much better, the people who are teaching know more, and they also know how to teach better in smaller groups." She has learned how to use the electronic attendance program although it took longer than she would have liked. "But I'm learning these different things, and what I can do with them in the classroom, and even personally how it can benefit me."

Leigh does not know what technology she is missing besides an LCD projector. She has seen the SmartBoard in action but is unfamiliar with the School Pad equivalent. "I don't even know what's out there." She would like to use the clickers that are produced by the same company that makes the School Pad.

Classroom Observation

On the day of the observation, the classroom Leigh shared with another teacher was organized in a traditional pattern with the desks all facing the front in rows. Leigh's class size was small, and she just used a corner of the room, closest to the blackboard, where she constantly wrote notes for her students. Her agenda was posted on the board as well as in Blackboard, which students were expected to read by the start of class.

Leigh began instruction by asking her students to tell her about current events. She had the students look through newspapers and search for articles related to the United States government. There was a lot of specialized vocabulary that she had to explain to the ESL students, and she spoke slowly and carefully to help them understand. Leigh had on another occasion also used the classroom's television to watch CSPAN to help her students see the government at work.

After the discussion of current events, Leigh lectured about the structure of the US government, writing notes on the board which her students copied into notebooks. She next gave each student a paper worksheet for conducting research on a U.S. senator or congressman. Normally, Leigh would have conducted her own research and downloaded it into a paper document students would use to complete the worksheet. However, this time she was having the students try to find the information on websites themselves. Leigh cued them on where to start, and how some websites would be more helpful than others. "In this case, I did the research for them in the sense I explored the websites, and I picked what I thought was the best one for what I wanted. I short cut the research process a bit, which I suppose has its pros and cons. But I'm interested, in this

case, of having the information, and not so much on doing the research, because I'm interested in content." The rest of the class was spent with the students searching for information online – an assignment that Leigh was willing to extend into the next day's class because the students struggled with finding the relevant material.

Summary

As Leigh tries to make the course event based, she had the students look through newspapers for current events, but just as clearly, she could have accomplished this with the computers. Leigh also sees herself as a front-of-the-room kind of teacher, and this was where she spent the majority of her time. She moved easily back and forth from the board to her students and worked to engage them with what she was discussing. She clearly felt comfortable being the expert in the class when it came to her course material but much less so when she initiated the laptop activity. She believes that students should know how to access information, and her assignment was for them to fill in a worksheet with information she had found online. As Leigh moved around through the class while her students studied their computer screens, it was clear that she felt sidelined from what was going on. She was unsure how to help her students and what her role was in relation to the laptops. Although the lesson was well crafted, she had vetted the most useful websites prior to class.

In the following section, I return to the study's subquestions and analyze the resister participant responses in light of those questions. I then turn to the literature's characteristics for resisters and discuss how these attributes are reflected by the study's

participants. The two classroom observations are then analyzed in terms of three key features.

Research Questions Summary Responses

The seven research questions of this study were asked to both resister participants in each of their two interviews. Their answers are summarized below.

How has being a digital immigrant affected their integration efforts?

Neither of the two resister teachers expressed an opinion about being defined as a digital immigrant for the purposes of this study. However, it is possible that the participants are not prone to thinking in such terms as they have used the laptops very rarely if at all. Chris believes that old dogs can learn new tricks, “but the person has to be open minded, and willing to listen, and see what’s working for other people, and be willing to envision something different.” Chris constantly asks himself what the best thing is to do with or without the computer. Leigh believes that younger teachers or teachers in the early or middle point of their teaching careers would respond better, but Leigh resists the pressure at this late point in her career.

What problems do the teachers believe the laptops are supposed to solve?

Although Leigh thinks there has been a vision for the program, she does not know what it is. More importantly, she would like to know what the vision will be for the next several years. During the first year of implementation, Leigh felt there was no push to get on board with the program, but with the new principal, “This year I don’t think you can do ‘not at all.’”

Chris hopes that the vision for the laptop program is that this is a 21st century tool that has proven useful in many areas of people's lives. Since school is about preparing students for life, students need "a familiarity with the laptop; the ability to use the laptop; and to be able to be computer literate." Chris does not recall any specific goals for the program, but he also believes that the program is still very new, so maybe what is needed is more time.

What do the teachers believe they have had to stop doing in order to use the laptops?

Chris does not believe he has had to stop doing anything in his classes, but Chris also notes that he does not use the student laptops at all. Leigh feels that she has lost very little in her classroom, because she very rarely uses the student laptops. "I haven't let go of that many old things." She has seen other teachers greet their students at the beginning of class by instructing them to go to Blackboard, but Leigh feels what gets lost in this approach is human communication. She has also entered classes where students are all working on their laptops so independently from their teacher that she has been able to carry on a conversation without the students paying any attention. "It's a different way of doing something, I guess." Both Chris and Leigh think that it is good for students to have teachers with different styles of teaching – some with and some without computers.

What new activities, approaches, and strategies do the teachers believe have emerged?

Leigh believes that all students should know how to type, know how to use the Internet and, in particular for her government classes, know how to access both historical and current information. However, Leigh is uncomfortable teaching any of these skills – "My job's not to teach computers. My job's to teach content." She has required some

assignments to be word processed and expects a certain number of Internet websites to be cited. Leigh also posts a list of ongoing homework assignments on Blackboard and has made available to her students her textbook's electronic cartridge for use at home. Because Leigh teaches part time, students have her email address, but they almost never communicate with her that way. Although Leigh considers herself to be the expert in her classroom, she has grown a little more comfortable working collaboratively with her students when using the laptops.

Leigh has started using Blackboard's announcement function; however, the effort is unproductive "partly because I haven't made it the only way they can get information." While Leigh makes use of Microsoft Word, she is not attracted to PowerPoint which she views "as a note giving device and [I'd] rather write on the board."

Chris primarily uses his own laptop for word processing, grades, attendance, and email but does not use the student laptops in class. He admits that he knows very little about computers. Chris believes the laptop has very limited usefulness in teaching mathematics except for supplemental practice. Last year, Chris did not use Blackboard at all. This year he has put some tutorial websites in Blackboard including his textbook's tutorial website that Chris feels is quite well designed. However, he has not encouraged his students to make use of any of these resources. Ultimately Chris, like Leigh, believes strongly that he is the one responsible for teaching his students, not the computer.

How has the teachers' use of and attitudes towards the laptops evolved over the three years?

When Chris first learned about the laptop program, he thought this was a good direction for the school. He was also curious about how he would deal with the computers, not just personally, but how they might fit into his classroom. As with the graphing calculator that Chris uses only periodically in class, he is convinced that students must first master the essential math skills before learning to use the calculator or the laptop. It is the human connection that Chris strongly believes is the means of helping his students become successful, and the students practicing on their laptops makes that interaction much more difficult.

Diversity among teachers in how they teach and the tools they use is a key theme for Chris. Even though other teachers use the laptops and Chris does not, he does not think this harms students in any way. While he does not view the computer as difficult to use, he has expressed feeling overwhelmed with all the possibilities the laptops can offer. Chris wants to be open minded about what computers can contribute, but he also wants to be receptive to what they cannot do. This requires, from Chris's perspective, that he eventually become an expert on the computers so that he can make educated decisions about the best approach for teaching his students. However, he does not think using the computer should be an end in itself.

Leigh sees the computers as an excellent information resource. "It's like having a library at your fingertips." Conversely, she does not think the computers are good for communicating between people, and she has no desire to sit in front of a computer screen

to converse with someone else. When the laptops first came to Jesse Jackson, Leigh found that neither she nor her students knew much about the computers. She did not want to spend time trying to figure them out even though she eventually purchased her own computer and tried ineffectively to teach herself how to use it. Leigh has felt uncomfortable, even incompetent, when faced with the prospect of integrating the laptops, but she also confesses to feeling a little excited when she has managed to learn something new about the computers.

An essential theme for Leigh is that she must be the expert in her classroom like the teachers she grew up with who demonstrated mastery of their material. "I'm supposed to be the expert, and when I don't know what the heck I'm doing, that's not a great feeling." While Leigh has tried to keep a good attitude and not act subversive towards the laptop program over the ensuing three years, she often just closes the doors and gets on with instructing her students in the way she feels serves them best.

How have the perceived benefits and obstacles of the laptop program played a part in dealing with the laptops?

Although the 2008 presidential campaigning had begun at the time of this study and the various candidates were all providing their own websites for voters, Leigh has not explored this electronic influence on America's democratic process. This is partly due to the amount of time required to implement this into her curriculum. Leigh acknowledges that lesson planning is very labor intensive for her; particularly because all her materials are paper based and must be manually assembled. However, she has seen other teachers plan lessons electronically, and she appreciates the speed at which this can

happen. For Leigh, the computers can provide assistance, but they are just a tool and one that she does not feel very adept in using. She believes that school has become much more business like and outcome oriented, and learning something for its own intrinsic value is no longer acceptable.

One benefit that Leigh talked about is electronic word processing. In addition, while she does believe that the laptops help her students learn more because of their access to so much information, she does not think this makes them better students. Leigh has also been surprised with how much her students enjoy using the laptops. When they turn on the machines in her class, everything becomes very quiet; they do not work together, and the only interaction happening is between the student and the laptop. This, Leigh believes, is not what learning should be about.

Although Leigh has learned how to create digital assessments in Blackboard, she has found both the act of creating such assessments and giving them to her students to be labor intensive. She keeps finding significant gaps in her knowledge of computers. For example, Leigh has used Word Perfect at home, but she did not realize that the program was not compatible with Microsoft Word at school. She only recently discovered that her students had an email system, but when she tried to communicate with a student, the effort failed – partly because the student did not know how to use the program.

When it comes to classroom discipline and student laptops, Leigh does not have a problem; she just tells them to turn the machines off. In the rare times that she has had students work with the laptops on an assignment, Leigh feels uncomfortable trying to communicate with a student whose focus is on the laptop and not on her. Yet, she

recognizes that the laptops can add variety to her classroom activities, and they can be very hands-on which she thinks is good for the students.

Chris believes that while the laptops do not make his students better students, the students can create better products when using the laptops. However, just because laptops are present in a classroom does not mean they are being used effectively. Chris does believe the computers provide more opportunities, and, like Leigh, offer more variety for classroom instruction.

One skill that Chris thinks is missing is the ability to type – a skill that he learned in high school and has found very beneficial when using his own laptop. He also does not like the spell check which is in line with his concern about using a calculator when a student does not have basic math skills. Time is a constant obstacle for Chris, as it is for Leigh, particularly since Chris wants to become an expert on the laptops before he attempts using them in his classroom so that he does no harm. “There are not many hours in the day for you just to sit there and really play around with [the computer].” In addition, Chris believes that the laptop is basically word and text based, and his content, mathematics, is symbol and number based. Consequently, he does not feel the laptop is a good fit, at least for now, for teaching math. Chris further thinks that learning math successfully must be based on a human connection with the teacher so that, in every step along the way, the student can constantly ask questions. In Chris’s opinion, the tutorials and other math programs can not effectively and continuously answer such questions.

How have the characteristics of the laptop and the program's implementation helped or hindered the teachers' coping?

While Chris does not believe that the student laptops are a very good tool for helping his students learn math, as long as they become adept with the basic skills, he also thinks they should know how to do math both with and without computers or graphing calculators. However, he thinks that the computers are of much greater use in other subjects, such as English, and those teachers should be taking more advantage of what the laptop offers.

When it comes to computer complexity, Chris does not find the machines difficult to use – just fairly overwhelming, because of all the opportunities the machines can make available. He thinks the laptop's relative advantage is that they are different from anything else a teacher has historically used in the classroom, and the students can produce better assignments. The teacher can also create nicer presentations including using sound. The network has been fine for Chris, and he feels there is a lot of technical support available. If the network goes down, Chris just thinks he, like every other teacher, should be able to switch gears. There is no technology that is missing in Chris's classroom nor does he have a wish list for more.

Chris would like to continue training and learning from other colleagues to develop his own teaching expertise with computers. The staff development that has been scheduled for an entire day, is kept limited in its goals, breaks down some inhibitions, and allows Chris some time to take baby steps, is the kind of training Chris responds to

best. He recognizes though that even a day here and a day there “doesn’t mean that you can go immediately, and start making that part of your repertoire.”

Like Chris, Leigh believes that it takes a long time to become an expert with computers. “It’s hard to teach something when you don’t know what you’re doing.” It is this lack of expertise that Leigh feels holds her back from using the laptops in class. She also thinks that effective student learning can happen even if the laptops are not open.

While Leigh has taken a lot of training at Jesse Jackson, she does not respond well when the technology breaks down, and the trainers tell the teachers to take a break while they consult the experts. Leigh feels she does not have the same luxury when the technology fails in her classroom. Leigh has great praise overall for Jesse Jackson’s training programs. Having two people dedicated solely to helping teachers learn about the laptops, Leigh feels, has been especially advantageous. However, she considers herself to be a linear learner and needs time to process each step – time that is often not available during training, so she gets further and further behind what is happening in the staff development.

Similarly to Chris, Leigh has found the network as well as the laptops, to be reliable but admits she is less aware of problems because she so rarely uses the computers. She also does not know what technology she might be missing, although she wishes she had her own LCD projector. She has seen a Smart Board in action but is unfamiliar with the School Pad equivalent. She is attracted to the idea of the clickers that are made by the same company.

Resister Characteristics

In Chapter three, a set of characteristics taken from the adoption literature was used to find the teacher participants in this study and are described below. In this section, the resister characteristics are examined in light of what the adopter participants have said in the interviews along with several more characteristics derived from the teacher participant responses.

Not technology focused or may be phobic, want little or no change, traditional user, past oriented, adverse to taking risks, look for well proven applications (mostly from past), will require considerable support and can be suspicious of change agents, are skeptical and cautious, will wait until most uncertainty is removed. Critical of computers, discourage use, avoid involvement, may alter some activities to use laptops in traditional activities, have few computer skills and have problems using computers for classroom management tasks, computers are highly visible.

Vision, Technology Use, Risk Tolerance

Both of the resister participants have stayed in their comfort zone and continue to teach as they had taught before the arrival of the laptops. Leigh and Chris have been a little willing to take small risks, but, when they encounter problems, neither resister looks to technology as the solution. The teachers view the computers as supplemental to their efforts. Leigh feels that, after thirty years, she knows how to best reach her students, and does not wish to take on more work, while Chris does not use the laptops at all because he believes that learning math requires face-to-face interaction with the teacher.

Chris's vision of how he teaches is that he keeps elements that are very effective and reconsiders activities and approaches that perhaps were not quite as useful as he'd originally envisioned. He also tries to revisit things he has done in the past and decide if they would be appropriate again. "If you end up thinking you've arrived, that would not be good."

Benefits, Obstacles, Loss

The resister participants both recognize there are many benefits to using the computers, but these have not persuaded either teacher to use the laptops. Because their computer use is almost nonexistent, they have had to cope with very few obstacles or any loss. Both emphasize how important it is to be the expert in the class. As both consider themselves neophytes when it comes to the computer, this lack of expertise, in addition to the potential loss of the human connection, has kept them from integrating the laptops into instruction.

Specificity, Computer Visibility

Both resister teachers are very unaware of many of the functions of the computer. The machine is consistently referred to as "it," and they consistently speak in very general terms about what the laptop could bring to their classrooms. Although Chris does not use the laptops at all, were he to begin working with them, they would be very visible as an unaccustomed tool. Leigh has tried using the laptops, but she is very aware of the machines because of her own level of discomfort and the resulting disconnection with her students when the laptops are on.

Training, New Technology, Filter for Success

The resister teachers both speak well about the available training which has facilitated the technology baby steps each has taken. Both Leigh and Chris appear to be linear learners – Leigh because she has described herself that way, and Chris by implication because he teaches a very linear subject, math. As linear learners, they need lots of practice in working out each step in the process, and there is frequently little time set aside in the training to help them.

Neither has any wish for any new technology as the laptops are more than enough to cope with at present. Leigh's filter for success with the laptops is whether she can continue to connect with her students and not add additional work and time to her lesson preparation. Chris feels bound by his wish to become an expert in using the computers before he attempts to introduce them into his instruction. He also wishes to avoid any loss of the human connection as he focuses on teaching basic math skills. Consequently, Chris is very careful when he allows his students to use the graphing calculator and has the same concern about the laptops. He believes these tools are appropriate for practicing but not for learning math.

Participant Classrooms

Each of the resister participants had a classroom observation scheduled between their two interviews. The purpose for the classroom observation was to contextualize the participants' responses in terms of their actual classroom and instructional activities. Three characteristics are examined which help illustrate how resister teachers use or do not use the student laptops in their classroom instruction.

Responsibility for Learning

Because Chris and Leigh believe they must be the experts in their classrooms, they correspondingly feel that they are the ones responsible for teaching their students and do not wish to share that responsibility with the laptops. The resisters' classes are almost completely teacher directed, and the overall emphasis is on the interaction between teacher and student. While the students can work independently on math problems or on reading the newspapers to search for current events, the teachers work with them each step of the way, explaining, discussing, and guiding as needed.

Placement of Attention

Leigh and Chris are very clear that they want their students' attention on the teacher when instructing or working on classroom material. Chris works to be very engaging and motivational as he interacts with the students while Leigh spends a fair amount of time explaining her content for the day at the board and checking for understanding. Because Chris does not use the laptops, he has had no trouble keeping the students focused on either him or on the math review on the day of the observation. Leigh prepared her research activity in advance, which involved using the laptops. However, she had already vetted the recommended websites, and, during the observation, she primarily attempted to help the students negotiate through the web content to answer the worksheet's questions.

Computers and Learning

The resister teachers believe in the intrinsic value of the laptops but have not come to an understanding themselves of how to translate those benefits into their own

classrooms. Leigh's use of the laptops is more of an experiment and as a supplement to how she teaches while Chris believes the laptops are not an effective tool in helping students master math concepts. They both firmly believe that it is the dynamic interaction between teacher and student that spells successful learning. Neither participant really knows how to make the laptops work for them without losing that key connection.

Summary

Three key perspectives govern how the resister teachers have approached Jesse Jackson's laptop program. The teachers both feel they are the content experts in their classrooms but find themselves very limited in technology skills. So they are hesitant to tackle the laptops when they do not feel they can make educated decisions and could potentially hurt their students' chances for success. Secondly, human interaction is the foundation upon which Leigh and Chris teach, and each views the laptop as interfering with that connection. It is only through ongoing direct involvement with the learning process that the teachers feel their students thrive.

The third perspective, diversity, is interpreted by the resisters to mean students should have access to teachers who use the laptops and teachers who do not. The emphasis should be on what is most effective in each classroom and not on using technology per se. Consequently, these particular teachers very rarely, if at all, use student laptops while teaching. However, the participants agree that Jesse Jackson's laptop program is good for all the students, and they have no desire to see the program end.

Both Chris and Leigh acknowledge there are many benefits embedded in using the laptops but insufficient time, in particular, is an obstacle that has defeated much of their integration progress. Because the participants are linear learners, they need ample time in training opportunities to digest and feel comfortable with the laptop's many process steps. New technology resources hold no interest for these two teachers as they already feel they have yet to become sufficiently knowledgeable about the laptops to make educated integration choices. Leigh and Chris believe they are primarily responsible for what and how their students learn and do not wish to relinquish that responsibility to a computer.

Consequently, laptop integration has been a series of baby steps for Leigh and remains more as theory than actuality for Chris. Three years into the laptop program, these resisters continue to teach as they have in the past, looking for non-technological solutions as they refine their teaching approaches. Neither teacher has truly turned his or her back on technology, and they remain hopeful that new technology opportunities will eventually emerge that will help them be ever more effective in their classrooms.

8. Findings

The purpose of this study has been to discover how digital immigrant teachers have coped with the first three years of their school's laptop program. First, Jesse Jackson High School administrators were interviewed, and their data, in the form of the case profile, were both summarized and analyzed in Chapter 4, with the complete profile available in Appendix H: The Case Profile. This chapter also provided the context for the six digital immigrant teachers whose characteristics placed them in one of three categories – innovator, adopter, and resister. Each teacher participated in two interviews and a classroom observation with the data from this process forming the foundation for Chapter 5 Innovators, Chapter 6 Adopters, and Chapter 7 Resisters. In Chapter 8, all of the data and analysis are brought together around four themes and a new conceptual framework.

Maxwell (2005) describes two kinds of generalization possible for qualitative research – internal and external. “Internal generalizability refers to the generalizability of a conclusion *within* the setting or group studied, while external generalizability refers to it generalizability beyond that setting or group” (p. 115) The four themes are focused on the internal generalization of the study, while the new conceptual framework seeks to provide an external generalization which becomes the foundation for the conclusions of the study.

In this chapter, I first examine the underlying concept of a digital immigrant as it was one of the three criteria for choosing the teacher participants and because it forms the external boundary of this study (no one under the age of 40 was included). Second, while previously each digital immigrant category's data were analyzed separately, in this chapter the seven research questions are scrutinized from the combined perspective of all three categories, innovators, adopters and resisters, as well as the three theories discussed in Chapter 2 – coping with change, innovation adoption, and laptops and learning.

Third, three original sets of characteristics taken from the literature were used to help select the six teacher participants. In this chapter, these characteristics are reconstituted and evaluated through the data previously discussed in the study. Fourth, I explore the six classroom observations to offer an insight into how each teacher's classroom learning process impacts their integration efforts. Finally, I present a new conceptual framework that represents the themes of this study, including answering the study's foundation question – How do digital immigrant teachers cope with laptop computers as an education innovation?

The Concept of a Digital Immigrant Teacher

Prensky (2005) refers to digital immigrants as “those of us who were not born into the digital world” (p. 9). In order to provide insight into how digital immigrant teachers have coped with integrating a laptop program in their classrooms, a variety of attributes, as outlined in Table 5, guided the participant selection process to allow for as much diversity among teacher participants, aged 40 or older, as possible.

Table 5

Teacher Participant Attributes

Group	Gender	Age	Subject	Years Taught
Innovator #1	Male	62	Physics	18 years
Innovator #2	Female	53	English	30 years
Adopter #1	Male	47	English	11 years
Adopter #2	Female	52	Special Education	4 years
Resister #1	Male	48	Algebra, Calculus	19 years
Resister #2	Female	56	US Government	35 years

As this study has illustrated, digital immigrant teachers are not a homogenous group of individuals. Likewise, the innovator participants believe that digital immigrants also have a variety of reactions to technology, and digital immigrants can be found at any age. Richard explains that as a teacher,

Even [with] children coming up through the schools today, I have kids in my classroom I have literally said do not ever use a computer the rest of your life. It's not going to happen for them. And there are some people who, for purposes of how your brain works, how do you logically process things, do you see sequences, do you see those kinds of things – it is not a good idea for them to try and use a tool that is that structured.

Fellow innovator Frederica expresses a similar idea, “The digital experience now is so qualitatively different that you can't assume that just because someone grew up when there were computers in the school, that they use them, experience them, begin to

see the world through the computers in the way that kids growing up today do.” She further notes, “I use computers in my teaching [and] there are extremes among the kids themselves – the same degrees of extremes among the individual students you actually work with.”

The Research Questions of this Study

The foundation research question for this study is - How do digital immigrant teachers cope with laptop computers as an education innovation? In order to answer that question, seven specific research subquestions have guided the study’s process. Each of those questions is analyzed below in light of all three categories of teacher participants as well as the three theories used in this study, coping with change, innovation adoption, and laptops and learning. At the conclusion of this chapter, the foundation research question is answered and exemplified by a new conceptual framework.

Research Question #1 – How has being a digital immigrant affected teachers’ integration efforts?

This research question focused on how being a digital immigrant teacher impacted the integration efforts of the six participants. Three of the teachers (both innovators and one adopter) believed that being a digital immigrant had no bearing on their integration choices. The other adopter stated that having been born before the age of computers had an impact on the speed of his adopting the laptops. The two resisters, although by definition digital immigrants, expressed no opinion about the concept. All six of the teacher participants believed that old dogs could learn new tricks, so all of them, at least theoretically, were open to change.

Research Question #2 – What problems do the teachers believe the laptops are supposed to solve?

When I formulated the subquestions for this study, I based them on the data from the literature review and that data discussed the visions of various laptop programs, including that of Jesse Jackson. However, I also wished to incorporate Bridge's (2003) change theory that discussed how individuals had to understand the problems the change was intended to fix. Consequently, this question explored not just the vision of Jesse Jackson's laptop program, but also the underlying problems the program was supposed to address. Consequently, some participants talked about the laptop vision, while others spoke about the problems, and some went even further afield.

The most common response was the importance of addressing the digital divide. Several participants felt the laptops were an important tool but not as a replacement for any other teaching device. One resister thought prestige was one of the reasons for the program, while several teachers believed that preparing students for life after school included becoming computer literate as well as life-long learners. The resisters were the most unsure of the program's vision as presumably they did not perceive any problems in their classrooms that the laptops could solve.

Research Question #3 – What have teachers ceased doing in order to utilize the laptops?

When faced with using the laptops, teachers often have to stop doing something else to make space for the computers. Bridges (1991) describes this as a process of letting go old ways of doing things in order to allow new activities to emerge. None of the

teachers felt they had had to stop doing anything while incorporating the laptops into classroom activities. For the innovators, their sense of loss was much more positive in outcome as the computers allowed the teachers to do activities they never previously had time for. Both the adopters believed that the laptops were more supplemental than fundamental in changing anything that happened in class. Again, for these two teachers, they either did not believe the laptops could help in the critical tasks students needed to learn or the limitations of some students made integrating the laptops more difficult. The two resister teachers did not replace any traditional activities with laptop generated ones, perhaps because of the perception that taking even small steps could lead to substantial loss in the human connection between teacher and students, and in the loss of being viewed as the expert in class. None of the teachers thought that the computers were going to replace teachers, although one resister was no longer quite so sure three years into the program.

Research Question #4 – What new laptop activities, approaches, and strategies have teachers begun to use?

In using the student laptops, most of the teacher participants have created new activities, approaches, and strategies. This research question sought to understand what those were in the context of Roschelle et al.'s (2001) four fundamental characteristics – “(1) active engagement, (2) participation in groups, (3) frequent interaction and feedback, and (4) connections to real-world contexts” (p. 5). Although active engagement can happen when the laptops are not being used, the laptop research has indicated that using computers enhances student engagement in the learning process. For both innovators,

their students were deeply involved in their respective learning tasks while using the laptops.

Likewise, students are able to work in groups with or without laptops. However, Roschelle et al. points out that the kinds of activities possible with the laptops can make group work even more meaningful. Again, both innovators assigned activities that students had to complete working in groups. In one instance, the students figured out their own roles, while in the other, the teacher assigned a specific job for each student. In the physics classroom, the students had to construct a piece of equipment which they then used to analyze the field of electrical charge. One student used the laptop to record each result. In the English classroom, students analyzed a critique of literature, and, within the groups, one job was to be the recorder of the discussion results. That record then became the template for the group's presentation later on as the laptop was passed back and forth among the students while talking to the class.

Teachers can always provide feedback to students. However, depending on the software being used, computers can supply continual individualized feedback through engagement with each student. For the adopter teacher who taught special education students, she found that the spell and grammar check functions in Microsoft Word provided instant feedback to her students on their writing problems. This freed her to work more intensely with the students who were struggling the most with the writing assignment. She also used a reading web based program, TeenBiz, which daily made available specific reading passages aimed at each student's reading level. The program supplied comprehension questions and gave feedback on student answers. While the

teacher was not altogether happy with the form of that feedback, the program, made possible because students had a laptop, still allowed for differentiated learning.

However, it is the fourth characteristic, connections to real-world connections, where laptops can particularly shine. The use of the Internet allows students to connect to the outside world with ease, and it just remains for the teacher to harness this access to make real-world connections with the course materials. One of the innovators took special advantage of this characteristic when he presented a real-world problem for his students that required them to do Internet research and understand how physics' principles had solved that problem.

The innovator teachers had a long list of new specific activities used with the computers. The adopters' list was smaller and more general in nature. The resisters' list of new laptop related activities was very small and general in scope. For example, one innovator discussed how Blackboard assisted her students in conducting online research, using the electronic databases, and posting responses in the discussion board. An adopter noted that he was aware of the many resources available through Blackboard, but he did not use them in class. A resister had posted several tutorial website addresses in Blackboard as a level 2 requirement, but he did not encourage his students to use these sites, preferring instead to work directly with the students.

Research Question #5 – How have teachers' use of and attitudes towards the laptops evolved over the three years?

From an historical perspective, this question delved into how teachers' attitudes and use of the computers had evolved over the three years of the program. The

participants' responses, upon learning that Jesse Jackson would become a laptop school, ranged from very enthusiastic to positive, and none of the teachers later expressed any desire to see the program end. After three years, this enthusiasm has not abated with even the resisters remaining positive about the program. The program's newness was a point brought up by several teachers to explain their ambivalence about whether the program could be judged a success. All but the innovators were also concerned about the potential loss of the human connection if the students spent too much time focused on the computers. For the resisters in particular, this concern was painted in black and white – the teachers interacted with the students in the learning process or the students interacted with the laptops – the latter situation the teachers judged would significantly reduce the effectiveness of the learning environment. Both the adopter teachers especially made the point that the students' needs always came first, and that the laptops should not be viewed as the solution to every problem.

Research Question #6 – What roles have teacher perceived laptop benefits and obstacles played in integration?

When making laptop integration choices, each teacher had to evaluate the benefits and cope with the related obstacles. Again, the inventory of benefits started with a long specific list by the innovators, became reduced in number and were more general for the adopters, and for the resisters, the list of benefits was both short and very general in description. For example, one resister said that the laptops allowed students to make better products like typed essays. An adopter found the spell and grammar check very valuable in helping her students write better as well as the benefit of her students having

access to specific websites and web-based programs. One innovator noted how the laptops had helped him cover his curriculum more quickly while the students gained better mastery over the material. He further noted that the Internet helped him extend classroom activities into the real world to assist his students to a move from theory to application. He also created a library of applets to demonstrate physics principles in a video style format to enhance his students' understanding.

As for obstacles, the innovators enumerated a number of problems, but, for both teachers, these were issues to be dealt with or minimized. The resisters felt that finding time was probably the biggest problem, coupled with a lack of personal computer expertise and knowledge. Both resisters believed that the way to make informed integration decisions was to first become an expert on the technology, and this would likewise take time. The adopters had the largest list of obstacles, including the limitations the administration placed on the computers; the student printing system (not particularly liked by any of the teachers); power for the laptops, both external and internal; a slow network; lost or broken laptops; the attributes of the laptops; and the physical layout of their classrooms. While this catalog of obstacles did not stop the adopter teachers from using the student laptops, these challenges have made integrating the laptops more difficult. Ultimately, the adopters would prefer that other technological solutions be found for these issues rather than adapting their behavior and activities in the classroom.

Research Question #7 – How have laptop characteristics and the program's implementation helped or hindered teacher integration efforts?

The attributes of the laptop machine as well as the implementation and structure of the laptop program have had a bearing on the teachers' integration efforts. Rogers (2003) believed that compatibility (how consistent the computer is with existing values, past experiences, and needs) is an important factor in deciding to adopt (or integrate) an innovation. For the innovators and one adopter, the computers were very compatible with these teachers' standards, knowledge, and desires. There was more of a disconnection for the other adopter. He did not feel the computers were well-suited with his desire to help his students develop critical thinking skills, nor did he believe the laptops were conducive to enhancing traditional education goals as he defined by Socrates' principles. However, the teacher did make use of his past experience with laptops, and the machines met some of his needs for the students to take notes or do research or to read a book online. The resisters had the lowest level of compatibility as the computers did not fit their values at all. These teachers placed significant emphasis on the human connection upon which they both believed the laptop had a negative impact.

Another adoption attribute, complexity, described by Rogers (2003) as how difficult an innovation is to be understood and used, also influenced the teachers integration choices. The innovators and adopters did not believe the laptops to be particularly complex, although one adopter did find the computers' level of complexity (and limitations) were often an obstacle for her special education students. The resister participants felt the computers' complexity to be overwhelming with possibilities that

positioned each teacher in the role of learner. This meant they were no longer the experts in their classroom – a role they both believed was essential for successful learning.

Last, Rogers (2003) discussed one more adoption attribute that had particular relevance to the teacher participants – that of the laptop's relative advantage or the balance of benefits to obstacles. It was clear from this study that three teachers (two innovators and one adopter) believed there was a large relative advantage to using the computers, while the second adopter and the two resisters found little to no relative advantage for themselves. The math teacher felt that paper and pencil had a significant advantage over either the computer or the graphing calculator in terms of students successfully mastering mathematics. He simultaneously acknowledged that the laptop's general relative advantage is that they are different from anything a teacher might have done historically and so can provide unique opportunities. The innovators likewise believed that unlike previous innovations introduced into classrooms such as television, radio, and film, the computer is both immediate and flexible with multiple applications possible.

The attributes of Jesse Jackson's laptop program including its implementation were perceived in a variety of ways by the teacher participants. The general consensus was it was important to get the laptops into student hands fairly quickly upon starting the program. However, two teachers (an innovator and an adopter) would have favored having class sets of computers, although they both recognized that such a system would not have solved many of the prevailing technical problems. Three teachers felt the network was fine, while the other three (the innovators and adopter) had problems. Both

an adopter and one innovator liked the network file structure and preferred it over using Blackboard. Four of the teachers felt the school's Internet filtering system had major issues, but mostly for the teachers, as the students seemed to work around any blockage with ease. The opinions about the technical support for students was evenly divided with the innovators believing the staff was doing the best it could with such fragile machines, while the adopters felt the staff was not helpful to the students. Last, there were a variety of views regarding teacher training. Two teachers (one innovator and one adopter) did not like the one-size-fits-all approach. Two other teachers thought the staff development had been fine, although one adopter did not like the perceived focus on technology for its own sake. The resister teachers particularly liked the kinds of training that allowed them to take baby steps and have considerable time set aside to practice and understand the very limited staff development goals.

Participant Category Characteristics

Prior to carrying out the data collection for this study, I decided to use a set of characteristics provide by Rogers (2003) and Geoghegan (1994) for the three categories of this study: innovator, adopter, and resister. However, during the selection process, I put these characteristics aside because they were not particularly helpful to the process and focused only on how much a possible candidate self-reported their level of use – a lot, some, or little to none.

When I developed the findings of the study, I returned to these characteristics to see if they fully and accurately described the participants. Despite not being used to find the teachers, the characteristics of each adoption category proved to be accurate in

describing these individuals. In addition, three more characteristics, applicable across the innovator, adopter, and resister categories, emerged from the study's data. I then took all the characteristics and placed them in Table 6, and have marked the new attributes with a “*.” I then explored each set of participants' data and how they corresponded to these characteristics.

Table 6

Participant Category Characteristics

Characteristic	Innovator	Adopter	Resister
Vision	Future	Future/Past	Past
Technology	Looks for solutions, willingness to change	Predictable success, no real changes	Unaware of solutions
Risk Tolerance	High, will retry if initially fail	Medium, within comfort zone	Low, must become expert first
Benefits	Very specific for problems	More unsure about benefits	Acknowledges benefits
Loss	Positive letting go of old ways	Negative if too fundamental	Negative, all loss fundamental
Obstacles	Finds solutions	Real obstacles	Real obstacles or used as excuses
Specificity*	Very specific functions	Some specific functions	Computer looked upon as “it”
Computer visibility	Invisible	Somewhat visible	Very visible
Training	Must be very specific for precise problems acknowledge skills, self sufficient	Needs basic, actual applications, somewhat self sufficient	Must be convinced, all doubt removed, need significant support
New Technology*	Shifts to problem solution	Unsure what problems are to be solved	Has trouble perceiving possible functions
Filter for Success*	Can it solve specific problems?	Are computers really needed for this task?	What is needed prior to trying this?

Innovator Characteristics

Both innovators are remarkably consistent in their relationships to technology. Although born before computers were invented, the participants had each studied FORTRAN in college, and computers have had a persistent presence throughout their adult lives. Despite the differences in subject matter that they teach, being male/female, and years of teaching, these teachers are very similar in how they instruct students, how they view computers, and how they use the student laptops. For these teachers, computers have enhanced and expanded what is possible in their classrooms.

Innovators – Vision, Technology, Risk Tolerance. An innovator educator seeks answers to problems or refinements in strategies, materials, and activities through ideas and solutions oriented to the future (visionary in terms of what has never been tried before). These possible solutions are often technology driven or oriented (new website, new software program, new visualization, Internet 2, and new hardware), and they carry a considerable degree of possible failure when used in the classroom. However, even if the new solution fails initially, the innovator will continue to experiment to find a way around the problems or to make the solution fit while tolerating substantial uncertainty. As such, an innovator educator is quite self sufficient in that process, seeking only very specific help or remedies from others. While generally aware of what other colleagues are doing, innovators are normally focused on what happens within their own classroom; even though they can be willing to instruct or share with others what they have found works with the laptops.

Innovators – Benefits, Loss, Obstacles. The innovator educator sees technology as a specific set of new ways to make things work better for each student, and, as such, the teacher individualizes instruction, using the technology in innovative ways. The teacher sees the computer and all the related technology as a multi-layered, multi-functional pathway to solving a host of problems encountered in the classroom. The innovator educator looks for very detailed benefits through the technology and does not see obstacles except as temporary impediments towards eventual success. Innovators also do not have a negative sense of loss when using the laptops – for them the loss has a positive outcome as incorporating the laptops can mean opening new ways of doing old things or letting go of procedures or content that slowed down what the teachers wanted to accomplish. For example, in the physics classroom, one innovator was able to let go of teaching mathematical equations because he could now use Excel which managed the math functions. The focus shifted from the mechanics to teaching the physics principle.

Innovators – Specificity, visibility. Specificity is the key word for this group of individuals. The term describes how they talk about technology and especially how they speak about computers. For example, if a student struggles with multiplying large numbers, the innovator educator will attempt to find a better website where students can visually grasp what is happening or a website that provides innovative practice in both concept understanding and skill enhancement or will find a software program that can be used on the laptop or will provide some other access beyond the more traditional approach of teacher supplied solutions. The computers are “invisible” in the classroom because the teacher does not see them as computers but as specific functions/solutions to

detailed tasks or problems. Innovators do not talk so much about computers as they talk about what specific activities computers allow them to do.

Innovators – Staff Development, new technology, filter for success. This kind of educator wants specificity in staff development – very precise answers to specific kinds of problems and is quite intolerant of one-size-fits-all approaches in training. They want acknowledgement of the skills they have already acquired. Any new technology that is presented (such as School Pads, clickers, etc.) almost immediately shifts from a general topic to possible specific applications, and the innovator educator will assimilate the new tool fairly quickly if it lives up to the promise. The innovator's filter of success is – will it really do what I need it specifically to do without adding yet more work or prove to be more of a distraction?

Adopter Characteristics

Adopter educators reside somewhat in the middle between innovators and resisters. However, they also have specific characteristics that are not shared by the other two categories. Unlike the overall similarity with the innovators, there was a split between the two adopter participants – one was more inclined towards the innovator end of the spectrum and the other leaned more towards the resister category. However, the core characteristics for this group remain the same for both participants. Adopters view laptops as enhancing what they can accomplish in the classroom but only as long as it does not fundamentally replace what they do.

Adopters – Vision, Technology, Risk Tolerance. Adopters look to the past for vision but will incorporate the future if it doesn't change the present too much. They will

try technology driven solutions but only with some fairly high degree of predictable success and without fundamentally altering the dynamic in their classroom. They can tolerate some degree of uncertainty and are willing to work at making the solution be successful, but only as long as it is not too far outside their comfort zone and the rate of failure is not excessively high. As long as the new application can prove itself fairly quickly as truly beneficial for the classroom learning environment, this educator category will take the leap and, upon success, build the application into their classroom repertoire.

Adopters – Benefits, Loss, Obstacles. Such teachers encounter very real obstacles that require help in solving in order to achieve success. These teachers have the most classroom management problems, especially time issues, and can be easily thwarted by system wide setbacks. They generally want yet more technology to provide solutions to the obstacles they encounter, rather than adapting their own behavior or perspectives. The computers may be used a fair amount, but the applications tend to gather around traditional ways of doing things as opposed to radically different approaches. For example, they might try using the Blackboard discussion board as an augment to a classroom discussion but would not attempt an online blog. They can tolerate a sense of loss but will develop resistance if that loss fundamentally begins to change what happens in their classroom. They feel using laptops adds more work especially in moving through the transition from old to new, so they are less tolerant of the rate of change. Adopters also have a very strong sense of when laptops are appropriate and when they are not. They perceive limits to integration, and applications are more black and white – for

example, computers are good for word processing but not for building critical thinking skills. They embrace some applications but not others.

Adopters – Specificity, visibility. This group of educators has some degree of specificity in how they talk about technology and especially about computers, but this specificity is oriented towards what is mainly known and easiest to assimilate. This group also pays the most attention to what other teachers are doing with or without the laptops. Knowing how other colleagues make use of the computers provides a kind of benchmark or set of examples to frame the adopters' own integration efforts. However, having such benchmarks, while exposing the teachers to other integration options, does not appear to provide sufficient direct stimulus to move adopters towards making changes of their own.

Adopters – Staff Development, new technology, filter for success. In order to move such teachers into areas of more risk and uncertainty, adopter teachers require considerable individual support to move from the known to the unknown and especially to deal with very real obstacles. Such educators will tolerate a one-size-fits-all form of staff development because such training is generally geared towards their skill level. However, the staff development trainer also has to pay attention to which side of the spectrum the adopter stands. The laptops are initially quite visible as a tool, but with proven effectiveness, the focus shifts to integration and routine application. It is no longer about the laptop but about what works. Any new technology that is presented (such as School Pads or clickers) will receive consideration, but the adopter teacher will need assistance to figure out how the tool can have real application and specificity and how the attendant obstacles can be reduced. The adopters' filter of success is – how can this really

be used specifically in my classroom, and what are the steps I need to take for it to augment what I am already doing?

Resister Characteristics

Resisters represent the other end of the spectrum. However, they do not reflect simply a resistance to using computers but have specific characteristics all of their own. These resisters are not want-to-be innovators if only the most appropriate key could be found. What works for innovators and some adopters will not work for resisters. These teachers have specific requirements that are unique. The resister teacher strives for a very strong relationship to his or her students, and they believe this drives their classroom success. They feel it is that human interaction that makes for an optimum learning environment. Any shift towards students seeking answers through technology is a move away from that fundamental relationship.

The only major difference between the two resister participants was that one attempted to find some uses for the laptops but was very easily thwarted by real obstacles, while the other resister never attempted any applications at all and used perceived obstacles as barriers. The resisters believed they had to become educated about the laptop's capabilities in order to make knowledgeable decisions about which tool is the best, while equating the computer as simply a tool among many possibilities. There is inevitably some other step that has to be accomplished before attempting to use the laptops.

Resisters – Vision, Technology, Risk Tolerance. A resister educator seeks answers to problems or refinements in strategies, materials, and activities through ideas

and solutions oriented to the past (traditional in terms of what has worked in the past and could, with some modification, be reapplied to the present). The teacher prefers to take very small steps, and, if absolutely forced to comply, will use technology but in traditional ways (an online worksheet as opposed to a paper worksheet). The chances of success must be extremely (if not impossibly) high, and each step must prove itself useful and a good and appropriate solution before actually attempted. It is not about trying something out and then adapting it until it works, but rather it is about waiting until it is known that this will work properly from the beginning, fully understanding everything involved, and then very carefully applying the strategy or technique. Hence, the resister educator prefers the past/traditional approaches to problem solving as more is known, and the chances of initial success are correspondingly much higher. There is very low risk tolerance because the resisters believe the teacher is fundamental to the learning process and consequently can only undertake applications that are without risk of failure for their students.

Resisters – Benefits, Loss, Obstacles. While the resister teacher understands and acknowledges there are benefits to having student laptops, he or she can not specifically describe what they might be. If the laptop is present in the classroom at all, it is highly visible in that the focus is on the tool rather than on the task. Any obstacle that emerges while attempting to use the laptop will almost immediately lead to the disappearance of the laptop in the future. Resisters view laptops entirely in black and white terms and as separate from themselves. They perceive any incursion of the laptop as a potential loss of successful learning. These teachers tend to have an ambivalent attitude towards most

technology and its possible applications in their classroom. This was particularly clear with the graphic calculator in the mathematics classroom where the resister teacher believed that “the calculator could always give an answer but it is the student who gets the right answer.” Consequently, the tool is good for applications but not for learning.

Resisters – Specificity, visibility. The resister educator has no specific computer vocabulary, views technology as a general topic, and the computer as a tool (or “it”). Using the computers is perceived to some extent as doing all or nothing. Computers take over someone’s life or they are removed totally from that life. There is no middle ground. Integration must wait until the resister becomes an expert about computers, and then the teacher must find the balance with what can be done with and without them. But again, computers are very distinctly separate and different from the resister’s world. The computer is viewed singularly as a tool not as a multi-functional device.

Resisters – Staff Development, new technology, filter for success. The resister educator is tolerant of most staff development as long as it does not require any changes. One-size-fits-all training is mostly confusing, and while shown the benefits of using a new website or technology driven approach, the resister teacher will remain unconvinced it is worth the effort or if it will actually have the benefit being associated with the implementation. Any new technology that is presented (such as School Pads or clickers) is viewed with curiosity, but no real benefits or specific applications are perceived by the resister teacher. Instead, this educator’s filter for success is – what must I learn to really understand this new technology, how can it be used effectively before I actually try it, and will it really do what it says it can do?

Summary

Each group of teacher participants has a unique set of characteristics, partly defined through the literature but also revealed from the findings of this study. The innovators and resisters define each end of a spectrum with the adopters forming a bridge between these two groups. However, there is one more set of characteristics that emerged from the teacher participant classroom observations and are relevant to how teachers cope with student laptops.

Classroom Observations

The researcher completed a classroom observation for each teacher, scheduled between the two interviews. While each observation was described in Chapters 5, 6, and 7, data from the observations have indicated three characteristics that have a bearing on how digital immigrant teachers make technology integration choices.

Table 7

Classroom Characteristics

Characteristic	Innovator	Adopter	Resister
Responsibility for learning	Teacher models and helps, but students responsible, class student centered	Shared between teacher and students, class somewhat student centered	Fundamentally on the teacher, class teacher centered
Placement of attention	From teacher to student	Split between teacher and students	On the teacher
Computers and learning	Computers can directly help learning	Computers can augment learning	Only teachers help students learn

Innovators

Innovator teachers strongly believe that students must take responsibility for their learning, and, as a result, such teachers inevitably shift the placement of attention in the class to students doing the work. At their core is a belief that computers help students become independent learners and can provide many functions and avenues for building success. In Figure 2 below, this process illustrates how innovators teach their students. While there is some initial direct instruction and modeling, the teacher quickly shifts to students working independently or in small groups in order to learn the content. As such, the laptops have a niche where they can help facilitate this work. The equation is teacher + student + (a lot of) other = learning.

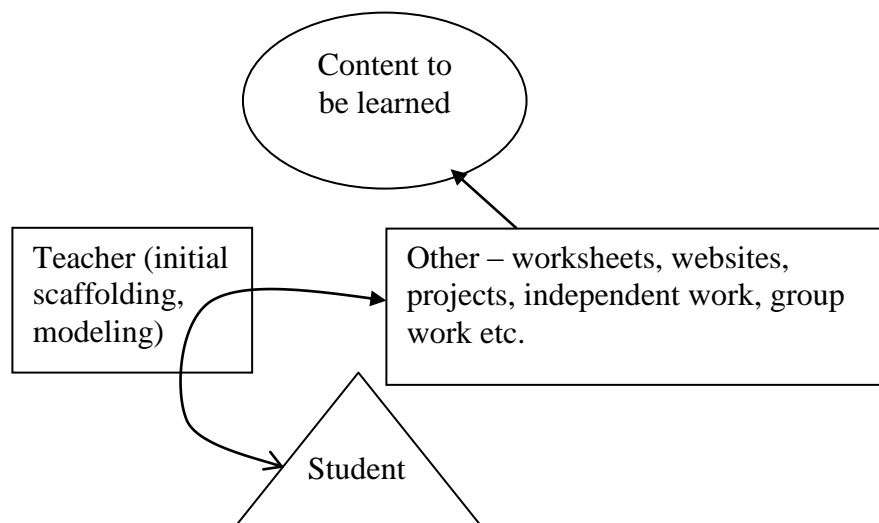


Figure 2. Innovator classroom learning process.

Adopters

Adopter teachers believe that students must take some responsibility for their learning but tend to be split to the degree the responsibility is shared with the teacher in

the classroom. Some teachers shift the attention in the class to students doing the work while other teachers keep the attention placed on them. At the core is a belief that computers can augment student learning, but to some or to a great extent, the teacher remains fundamental to the learning process. Figure 3 below demonstrates how adopters teach their students. Some adopters will have classrooms similar to innovators and as such have a niche in which laptop integration can fit, while others will be more like resisters and not have such a niche available. The duality of this category means that some teachers will integrate the laptops more than others. Their equation is teacher + students + (some) other = learning.

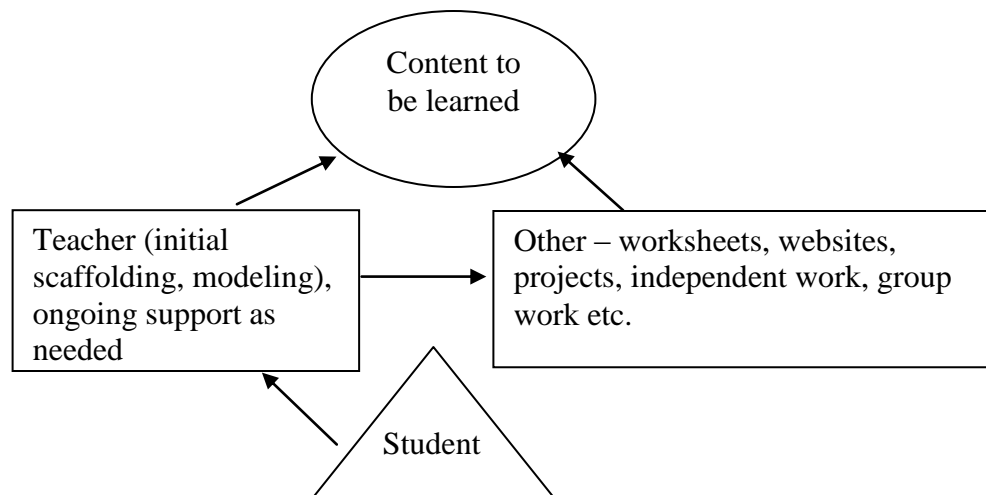


Figure 3. Adopter classroom learning process.

Resisters

Resister teachers strongly believe that they are totally responsible for their students' learning, and, as a result, such teachers inevitably keep the attention in the class on the teacher/student interaction. At the core is a belief that teachers teach students, and

such teachers do not foster independent learning. This is illustrated in Figure 4 below which exemplifies how resisters teach their students. The teacher is always an equal part of teacher + student = learning, and as such will always be the individual directing the learning process.

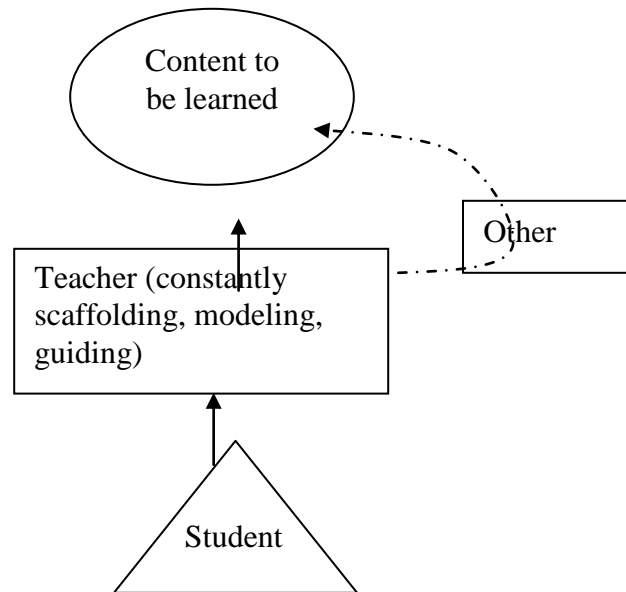


Figure 4. Resister classroom learning process.

Summary

As Figures 2 and 3 reveal, for the innovator teachers and to some extent for some adopter teachers, the classroom learning process has a place where the laptops can fit into instruction. However, for other adopter teachers and, in particular, for resister teachers, such a niche does not exist; all work in the classroom is tied to the teacher. Consequently, there is no place in the instruction process to use the laptops for independent student work. However, for the innovators especially, the study did not reveal whether these teachers already had an instructional niche to which the use of the laptops could easily fit

or whether the teachers created the niche specially to be able to make use of the computers.

A New Conceptual Framework

While the conceptual framework in Chapter 1 assisted in defining the research areas and process of this study, the focus of the framework was based on the literature, and more importantly, did not reflect the perspectives of the participating digital immigrant teachers and how they have coped with Jesse Jackson's laptop program. The seven specific research questions have produced a quantity of data that have led to the four findings discussed in this chapter. However, an overview or new conceptual framework is required to answer the foundation question of this study – How do digital immigrant teachers cope with laptop computers as an education innovation?

Figure 5 below provides an answer to that question. The innovators have coped well in terms of integrating the laptops into their classroom teaching. They have understood the many possible benefits the laptops represent, and the teachers' attitudes help harness the computers in creating an effective learning environment. While obstacles are acknowledged, these teachers find ways to either minimize the impact or simply ignore them.

The adopter teachers have struggled to integrate the laptops. Their biggest challenges are the very real and sometimes insurmountable obstacles the teachers can face. The two participants split with one adopter integrating the computers while the other adopter's belief system stymies his desire to integrate the laptops. However, both teachers firmly believed there were benefits to using the laptops. Finally, the integrating

teacher's attitudes were more similar to the innovators while the other adopter's integration efforts are more equivalent to those of the resisters.

For the resister teachers, it is their beliefs and attitudes that have most impacted their desire to use the computers, in particular, feeling they are not an expert in technology and believing that only the human interaction between teacher and student can produce effective learning. The obstacles each teacher has described, especially the lack of time, have provided additional barriers against integration. However, both teachers acknowledged there are many benefits to having student laptops at Jesse Jackson, although they also felt these benefits are much more applicable in other content areas. In fact, diversity among teachers in using or not using the laptops was viewed as valuable by both teachers. Last, the resisters either did not use the laptops at all, or they attempted very small experiments that were rarely tried more than once.

In addition to the new conceptual framework's illustration of how this study's digital immigrant teachers have coped with Jesse Jackson's laptop program, a list of characteristics for each group of teachers is included. These characteristics have been discussed in considerable detail earlier in the chapter; however, listing them in this new conceptual framework adds supplementary information on the 'why' that underlies the response to the foundation question.

Last, the participants' classroom learning process is included to illustrate how each group of teachers is influenced by whether there is a niche or place in the classroom instructional process for the laptops to be used. This is the case for the innovators and one adopter and not the circumstances for the other adopter and the resisters.

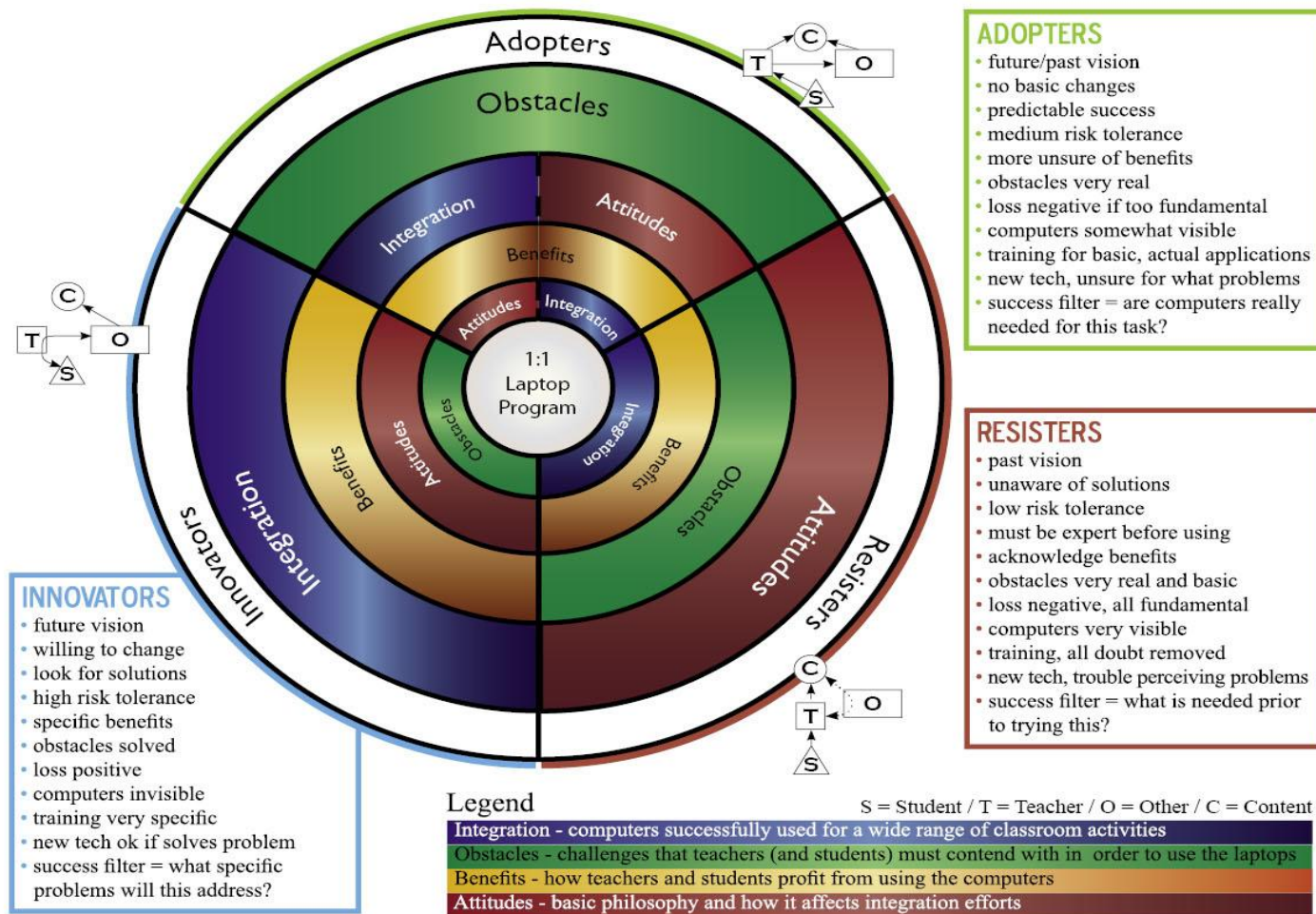


Figure 5: A New Conceptual Framework

A Cautionary Note

Maxwell (1996) recommended caution in looking for uniformity (as exemplified by the new conceptual framework above), as “the goal of dissolving and reconciling all differences in some ultimate unity is illusory” (p. 32). The conceptual framework implies a uniformity through the use of the labels “innovator,” “adopter,” and “resister” with their corresponding sets of characteristics. Such designations indicate a set of characteristics that can be present in full, in part, or not at all for any teacher, whether or not they are digital immigrants.

The sample size of this study was very small and was particular to a group of six teachers in one school with a specific laptop program. The very selection criteria for the research in some ways set up its own mythological uniformity. Maxwell noted, “Methodologically, the sample size and sampling strategies used in qualitative studies are often inadequate to identify and characterize the actual diversity that exists in the setting or population studied, and leads to simplistic generalizations” (p. 35). Moreover, he noted that “Qualitative researchers also frequently neglect the diversity and complexity of the environments within the phenomena they study exists” (p. 35). For this study, however, I went to considerable effort to develop a detailed case profile (the environment in which the six participating teachers worked) and further contextualized the case profile and the teacher responses into the laptop literature as a lens to illuminate both uniformity and diversity.

Maxwell (1996) ultimately advocated for a researcher “to recognize the bias, to be aware of the danger of assuming uniformity in the phenomena studied” (p. 37). I was open to finding much diversity among my teacher participants. However, in the final analysis, what my study revealed was in fact uniformity – at least as it pertained to these teachers in Jesse Jackson high school and to that particular laptop program.

Summary

This chapter has described the four major themes of the study. These include how being a digital immigrant affects integration choices; how the participant characteristics have been refined to reflect the study’s findings; discovering three new characteristics based on the teacher’s classroom learning process; and a new conceptual framework that illustrates how these four themes interplay to provide an answer to the research’s foundation question on how the digital immigrant teacher participants have coped with Jesse Jackson’s laptop program.

9. Conclusions and Recommendations

The purpose of this study has been to examine how digital immigrant teachers have coped with their high school laptop program. Since 1996, ten major laptop studies have evaluated how a laptop program functions in both public and private American schools. Among a number of stakeholders, teachers have been included in this research although they have not been the primary focus. However, these educators are the gateway through which successful integration of computers into instruction must move. In addition, while education laptop programs are still in their infancy, such initiatives continue to decrease in cost, enhancing their attractiveness to school districts around the country. Consequently, building upon the previous laptop research and shifting the primary focus to the involved teachers is vital. Because digital immigrant teachers were born and raised before the age of computers, they presumably have no previous mental model with which to guide their integration efforts into instruction. Consequently, this study has sought to understand how six digital immigrant teachers have coped with Jesse Jackson's high school laptop program. Teacher participants were interviewed and observed in its third year of implementation.

Conclusions

Maxwell (2004) explored the nature of casual explanation in regards to qualitative research. He explained that, “qualitative methods have distinct advantages for identifying the influence of contextual factors that can’t be statistically or experimentally controlled...and for elucidating the role of participants’ beliefs and values in shaping outcomes” (p. 9). Miles and Huberman (1994) further argued that “qualitative analysis, with its close-up look, can identify *mechanisms*, going beyond sheer association. It is unrelentingly *local*, and deals well with the complex network of events and process in a situation” (p. 147). With this approach, the study’s conclusions involve the relationship between digital immigrants and technology; take a fresh look at the stages of technology integration; expand adoption characteristics and patterns; and focus on the connection between teachers and context.

Digital Immigrant Teachers and Technology

One of the major assumptions in this research was that teachers, who were at least 40 years old, would have problems using student laptops because they grew up before computers were invented (Prensky, 2001). However, as discussed in Chapter 8, two of the six participating teacher participants were innovators who had interacted with computers all their lives. Consequently, they had no problems at all in fully integrating the computers into their classroom. Other teachers were challenged by the student laptops to more or lesser degrees. However, while the phrases, “digital immigrant” and “digital natives” are catchy and are appealing for the basic simplicity of dividing the world into

two groups – those who get technology, and those who don't, the study has revealed that this dichotomy is fallacious. Even the innovator teachers believed that they had student digital immigrants in their own classrooms. Noting Maxwell's (1996) call for examining diversity, using the label "digital immigrant" should be applied cautiously and with the understanding considerable diversity can underlie that label.

Stages of Adoption

In Appendix B: Stages of Adoption and Integration, four systems were described involving from four to five stages that teachers progress through towards full integration of computers into instruction. The underlying assumption is that all teachers move through these stages at various speeds and requiring a variety of support. Most staff development, including that focused on technology integration, operate under this assumption, partly because it simplifies the planning and execution of training programs, and partly because of a lack of understanding of what teachers actually require to successfully use the student laptops in their instructional activities.

Alternatively, this study has revealed that innovator, adopter, and resister teachers have very different and distinct clusters of characteristics that would preclude such an assumption. What is necessary, including time, training, and support, for a resister teacher to undertake small integration steps, is entirely different from what an innovator teacher would need. Caution must be exercised, however, with applying these labels to teachers as they imply a level of uniformity that can become its own underlying assumption.

In reshaping the data from the teacher participant interviews to discuss how the teachers had coped, four areas emerged – integration efforts, perceived benefits and obstacles, and the attitudes of teachers. All of these areas played a role for each teacher in their integration choices. However, the ranking of which area had the most influence was different for each adoption category. Innovators integrated the laptops; the adopters attempted integration but were often stymied by concrete obstacles; and the resisters' beliefs prevented them from taking no more than rudimentary steps.

Adoption Characteristics

In the literature on technology integration, Rogers (2003) and Geoghegan (1994) described a set of adoption characteristics. Although I had initially planned to use these characteristics to find the study's teacher participants, they did not prove helpful in that search. However, I returned to the characteristics to determine whether the selected teachers through their responses and classroom observations, actually matched what Rogers and Geoghegan had described. Keeping in mind the very small sample size of the study, the six participating teachers did in fact display a very strong homogeneity to those characteristics.

Moreover, the study revealed three additional characteristics that were present across all three categories and six teachers. Specificity of language, when talking about the computers or on how the computers were being used, differed for each adoption category. The innovators were very specific about what they did with the laptops, while the adopters were less detailed in language; and the resisters generally discussed the

laptop as an 'it.' Lacking the appropriate vocabulary to discuss an innovation such as a school laptop program, would suggest an almost automatic barrier to integration efforts.

The teachers also reacted differently when introduced to new technology related to the laptop computers. The innovators wanted to know exactly what advantage the latest technology could bring to the classroom, while the adopters acknowledged the technology's presence but were more uncertain how the device might prove valuable. The resisters felt coping with the laptops was sufficient challenge and were not open to additional technological opportunities. In addition, each group had a filter by which they made decisions for any laptop technology to be successful in their classrooms. The innovators wanted to know specifically what problems a computer or any other technology would solve; the adopters were less sure that a computer or other technical device was actually needed to help students learn more effectively; and the resisters first considered what needed to happen before they could begin integrating the technology, be it training, time, or already proven effectiveness.

This characteristic of how teachers respond to new technology with the corresponding filter for success is quite important due to the evolutionary nature of computer technology. When the television was introduced into classrooms late in the last century, no other technology was required or enhanced how such machines worked. The computer, in contrast, constantly evolves, not just in programs, process speed, or connections to the wider world, but also in an almost never ending development of related peripherals – digital cameras, LCD projectors, sound systems, video streaming,

clickers, Smart Boards or School Pads – to name just a few. Consequently, understanding how teachers react to this constant parade of new gadgets and what their filter for successful integration is, will help teachers integrate the devices into the classroom and may even have an impact on how teachers cope with the laptop itself.

In addition to the adoption characteristics described above, analysis of the classroom observation revealed the presence (or lack there of) of an instructional niche which had a bearing on the teachers' integration efforts. Both innovators had a niche for independent work which the laptops could facilitate, and the two resisters did not have such a niche readily available. The adopters leaned either towards the innovator or the resister pattern.

While the study observed different examples in how teachers instructed their students, three more characteristics emerged from the classroom observation data. In terms of who takes responsibility for learning, the innovators placed the responsibility firmly on the students which was reinforced with the independent individual and group activities. The resister teachers believed they had the responsibility to ensure their students mastered the course content, and, consequently, they were unwilling to relinquish that duty to a computer. The adopters, again, were apt to lean towards either of the two groups.

For the placement of attention, the resisters kept student focus on the interaction with the teacher while the innovators handed over the placement of attention to the students themselves as self-directed learners with the laptops serving as guides and

resources for their work. The adopters were more likely to shift the placement of attention back and forth between teachers and students depending on the instructional goals of the class. Last, an underlying belief governed each adoption category in the relationship between computers and student learning. The innovator teachers believed that the laptops could directly assist the learning process; while the adopters felt the computers could augment student learning; and the resisters thought only the teachers could help students learn.

Ultimately, the characteristics of specificity of language, reaction to new technology, and filter for success, along with whether an instructional niche for laptop use was present, and lastly, the patterns of who takes responsibility for learning, placement of attention, and beliefs about the role of computers in education, have all enriched the concepts of innovator, adopter, and resister teachers. However, while the study has conveyed a sense of regularity to these concepts, because of the small sample size and the understanding that people cannot be placed into labeled boxes other than as a temporary device to aid understanding, future researchers should not assume these attributes will always match any individual.

Teachers and Context

Schaumburg (2001) who had video taped what happened in classrooms found that what she had observed through videotaping classroom activities may be less dramatic than what is commonly reported on surveys and questionnaires in most laptop studies (in Kerr, 2003, p. 17). However, this study found that teachers are not actors in their own

classrooms; they do not take on a teaching guise that is different from who they are outside the classroom. This became quite evident from the data in the first interview, which correlated exactly with what happened in the subsequent classroom observation, and remained consistent throughout the second interview. There were no inconsistencies between the interview data and the classroom actions for any of the teachers.

Likewise, teachers, participating in a school laptop program, can not be separated from both the context of the program itself or from the circumstances of the school implementing that program. The framework of each context, as well as their interwoven relationships, must be considered in order to more fully understand how digital immigrant teachers cope with a high school laptop program. This understanding has been similarly framed by the background of previous laptop research and the theories that complement their findings.

Meadows (1982) wrote of an old Sufi proverb: “You think because you understand *one* you must understand two, because one and one make two. But you must also understand *and*” (p. 23). In this study, it is the circumstance of understanding *one* (innovator) plus *one* (adopter) plus *one* (resister) as well as the *and* that binds those three together. Wheatley (1999) made a similar point when she explained,

We manage by separating things into parts; we believe that influence occurs as a direct result of force exerted from one person to another; we engage in complex planning for a world that we keep expecting to be

predictable; and we search continually for better methods of objectively measuring and perceiving the world. (p. 7)

Believing that context is very important, this study examined the laptop research literature as well as appropriate adoption, change, and computers and learning theories to provide a foundation for this research. Once the study's data had been assembled, they were compared to the literature to seek out inconsistencies as well as the relationship of this data with that of the literature. Second, a case profile of Jesse Jackson and its laptop program was created through interviews with the program's administrators – otherwise the teacher participant data would have stood in isolation and been unrelated to the school world in which the teachers have taught.

Recommendations

Based on the above conclusions, five recommendations are made that have implications for practice, and eight recommendations are discussed that have relevance for future research. Four of the practice recommendations are focused on assisting schools and teachers in moving towards more integration of the student laptops. The fifth recommendation for practice is concerned with how technology may change in the coming years which might have deeper influences on how teachers cope with a laptop program. The eight recommendations for further research concentrate on investigating younger teachers and career switchers; middle schools; other possible factors influencing integration choices; expanded adoption categories; students as digital immigrants; the common threads joining the laptop research, this study's case profile and the six

participating teachers; different laptop programs and schools; and the evolutionary nature of laptop innovation adoption.

Implications for Practice

1) When constructing a staff development plan for teachers involved with a laptop program, having an awareness of the unique clusters of characteristics of innovators, adopters, and resisters will provide insight into targeted training for each group. A one-size-fits-all approach bores innovators, puzzles resisters, but to a limited degree may meet the needs of adopters – but ultimately that approach to training will have very limited effectiveness.

The teachers at Jesse Jackson high school had taken a variety of training opportunities over the three years of the laptop program. These staff development sessions initially focused on the nuts and bolts of the system and then evolved into specific training on different programs including Blackboard, and finally have begun to assist the teachers towards deeper and more meaningful laptop integration into instruction.

The teachers in each of the three categories had different ideas about the school's training program. The innovators wanted staff development that targeted their appropriate skill level and provided specific directions for enhancing integration efforts. The resisters wanted training that had very limited goals and provided extensive time for applying what was learned. The adopter teachers tended to accept the training as presented, but they either did not want a one-size-fits-all approach or they felt the quantity of training

had not influenced what happened in the classroom.

2) Understanding that integrating laptops into classroom instruction is not a predictable series of stages but rather an individual unique journey for each teacher should lead to differentiated approaches to both staff development as well as expectations for use.

Even if training is differentiated for the three categories of teachers, ultimately each teacher's path towards laptop integration is exclusive to that teacher. Consequently, staff development needs to evolve into a menu of options that supply alternatives which further match what a teacher needs in support.

3) As the innovator teachers in this study have noted, not every teacher or student may intellectually find a match with the machine logic and structure embedded in a computer. Congruent to that perspective, the resister participants consistently have made the point that diversity of teachers using or not using the laptops should not be viewed as either a liability or necessarily a problem to be fixed.

Machinery of any kind comes rooted with its own logic and structure for carrying out its objectives. Schneiderman (2003) provided an example of this logic and approach in the evolution of computers.

The basic notion of the personal computer was tied to the high degree of introversion among information-processing professionals. They usually prefer to be in their own personal work space, and they believe that working alone is the fastest way to make progress, even if they could

sometimes be more productive by cooperating with others. It is not

surprising that most software was designed for individual use... (p. 83)

Consequently, how computers function today may not be compatible with all teachers or all students. Therefore, space must be made for teachers who resist using the laptops but who are nevertheless highly effective in helping their students learn content. Moreover, technology continues to evolve, and as Schneiderman (2003) noted, “If researchers and developers create innovations that empower rather than replace people, they will be more likely to accelerate productive technology evolution. Tools that support doctors in making better diagnoses...are more likely to succeed than systems that replace doctors.” (p. 237)

4) Teachers, as professional educators, require respect for the judgments they make daily to first do no harm and then to help their students move towards mastery of the content. While this does not imply resister teachers should be ignored when encouraging laptop integration, these teachers can have valid reasons for choosing NOT to use the computers in instruction.

This recommendation suggests an approach that fosters respect for teachers as professional educators. All the teacher participants made the point that technology should not be viewed as an end in itself. Computers are not useful for every learning activity and, as the technology is currently constructed, may be more or less valuable in different course content or teaching style. Ultimately, respect is required for the judgments teachers make in determining what is best for their students in the learning process.

5) Computer technology continues to evolve, and, what is possible today may be ancient history by tomorrow. While room must be given to teachers who do not find the current technology to be compatible, this dialogue between the teacher and technology use must be periodically reengaged as the computer and its possibilities evolves.

Schneiderman (2003) made the evolution of technology the premise of his research. He described this evolutionary process as a set of two transformations, the first being a shift in what users want from a computer, and, the second, a move from machine automation to user-centered tools where the goal is to move away from the machine doing the work to the machine helping the user do a better job.

Users of the old computing proudly talked about their gigabytes and megahertz, but users of the new computing brag about how many emails they sent, how many bids they made in online auctions, and how many discussion groups they posted to. The old computing was about mastering technology; the new computing is about supporting human relationships...Teachers no longer cover the subject; they guide learners to discover it. (p. 12-13)

Implications for Research

1) This study has focused on teachers over the age of 40. However, it would be most informative to examine how teachers between the ages of 22 to 40 have coped with a similar laptop program. Equally useful would be to study career

switchers of any age where there is a confluence of computer expertise and low teaching experience.

In order to confine the boundaries of this study's research, the teacher participants were selected partially on being at least 40 years old. In that selection process, a number of teachers were suggested for inclusion because of their level of laptop integration, but these teachers had to be excluded because of their age. Likewise, career switchers were excluded from the study. This would suggest the following question: Do younger teachers or career switchers follow similar patterns of technology adoption, and, if not, how might these teachers differ from the digital immigrant participants of the current study?

2) This study took place at a high school with a large and diverse student population. However, many United States laptop programs occur at the middle school level and extending the parameters of this research to a sixth-eighth grade student laptop program might reveal differences in integration between middle and high school teachers.

Middle school students are certainly different from their high school counterparts, but it is unknown if their teachers are similar or different from high school teachers in adopting technology. The recommended research focus could be further subdivided into teachers older than forty and younger teachers. This approach would suggest the following question: How do middle school teachers (of whatever age) cope with their school's laptop program, and if differently, what are the similarities and/or differences?

3) While the literature and this study's description of the cluster of characteristics of the innovator, adopter, and resister categories as well as classroom attributes have been relevant in suggesting a teacher's ability to cope and therefore their level of integration, other factors may still play a role including the impact of Gardner's (1993) multiple intelligences and Myers-Briggs personality traits (see <http://www.myersbriggs.org/>).

Teachers are complex human beings and, as such, can not be fully characterized by any single unit of measurement. While multiple intelligences and personality traits have their own long history of research, what is not yet known is how these translate into laptop integration adoption. This would suggest the following questions: Do multiple intelligences of either or both teachers and students affect the compatibility of using laptops in the classroom? How would a Myers-Briggs personality assessment illuminate the integration choices teachers might make in instruction?

4) Another recommended approach might be to carry out a study of how teachers cope with a laptop program but expand the categories to include Rogers's (2003) five – innovators, early adopters, early majority, late majority, and resisters – to determine whether this aspect of his theory of diffusion of innovation adoption holds true for a one-to-one school laptop program.

There is extensive research literature on innovation adoption theory as applied initially to the spread of hybrid corn and then extended into other fields of study. A number of alternative approaches to Rogers (2003) have emerged (see Appendix B:

Stages of Adoption and Integration). However, the findings of this study have indicated that, in all of these approaches, perceiving adoption as a series of stages was not the case for the six teacher participants. One area that remains unanswered is on how many categories of adoption may be operating in a laptop program. Two possible questions are suggested: Are there five categories of innovation adoption in regards to a laptop program, and how might the teachers in each of these categories differ from, as well as compliment, each other?

5) The two innovator teachers in this study believed that there were digital immigrants among their students. Therefore, the assumption that today's students are all digital natives may, in fact, be false and needs investigating. A further direction for research is the fluency of students using computers for entertainment value versus using the laptops for academic purposes.

Prensky (2001) defined the current students in American schools to be "native speakers of technology, fluent in the digital language of computers, video games and the Internet" (p. 9). However, the study's innovator teachers did not agree with this definition as they found some of their students hopeless in using the laptops. And while the majority of students were extremely able to use the computers to entertain themselves, almost all of the study's teachers pointed out that harnessing the laptops for academic endeavors was an entirely different scenario – one that many students had great difficulty doing. Therefore, three possible research questions are suggested: Are there truly digital immigrants among the student population? How is this lack of comfort with laptops

expressed by students? What is the relationship for students between access for entertainment and access for academic assignments?

6) A number of common threads moved through the laptop literature to the case profile and to the teacher participants. Such threads are reflective of the current state of schools, teacher computer expertise, laptop development, and program implementation. However, these circumstances will always be in a state of flux, and future research may want to determine how all of these components have evolved over time.

These threads are described in Chapter 4 and include: equity/vision, program implementation, and training, administrative use, email, laptop resources, technical support, printing, and the network/server/security. In addition, the teachers in the literature review and the teachers in this study shared common perspectives on benefits for teachers, students and schools, obstacles, physical classrooms, student misuse, internal equity, classroom roles, and interactions, teacher attitudes, school policies, and laptop attributes. Two possible research questions might be: "How do laptop programs evolve in schools, and what factors change in that evolutionary process?"

7) The teachers, the laptop program, and Jesse Jackson high school are all unique entities. Consequently, the findings and themes of this study cannot be fully generalized to any other digital immigrant teachers or to their laptop program or school. Therefore, research should be considered on schools and laptop programs

that are substantially different from this study's participants and context.

This study differed in its demographics as well as timing from the previous ten evaluative studies which took place from 1996 to 2003 and focused on schools that were primarily white with low free or reduced lunch students. Consequently, there may be rural or inner city schools whose laptop program and context are again quite different from what was used in this study and in the literature. Two possible research questions are suggested: How do other laptop programs, teachers, and schools differ from the current study and correspondingly how do those teachers cope with integrating the laptops?

8) Last, teachers and students start from different places in using technology over time as various new technologies continually move more into mainstream society. Teachers, in the late 1990s, had had little exposure to computers either in school or at home, while several of the teachers in this study have had their own home computers for much of their lives. Additionally, the evolution of technology is not static. It constantly progresses, so consequently, what was available at the time of this study might not be present for future studies. Education laptop computer research must remain an ongoing process, and even what has already been researched must be revisited at regular intervals into the future to take into account the evolutionary process embedded in technology integration efforts.

The study's teachers had personal computer expertise that was considerably different from those teachers studied in earlier research. That research found that despite

the presence of computers in the classroom, teachers usually made little progress in integrating the laptops into instruction. The current study found differing levels of integration, and, while some teachers were resistant to using the computers, this was not the case for a number of the other participants. Consequently, as time moves forward, the point where teachers, students, schools, and technology start will also shift. The possible research question is: How do technology and teacher integration efforts evolve over time?

Final Thoughts

After over 142,000 words, 67 credits of courses, countless hours of laborious transcriptions, and twisting my mind into a pretzel while trying to see the big picture from my data, I have finally come to the end of this study. Contrary to predictions that I would eventually tire of my topic, this area of research has continued to surprise, engage, and encourage me, both as a researcher and as a teacher practitioner in a laptop program.

The purpose of this study was to investigate how six digital immigrant teachers coped with their school's laptop program. The findings point to a variety of integration levels as well as factors involved in integration efforts. However, the conclusions of this study are not static because technology, schools, and teachers continue to evolve. Many questions remain for both practice and research. Ultimately, this research is one step on a long and continuing road, exploring the roles of teachers, computers, and schools in how laptops can be harnessed to engage the next generation of students in academic success

Appendix A: Overview of Laptop Multi-Year Evaluative Studies

Study	Program	Time Period	Purpose	Participants	Instruments
Rockman et al.	Anywhere, Anytime Program, private and public schools	1996-1998	Year 1: explore experiences of schools starting program Year 2: explore and assess implementation Year 3: examine impacts on teaching/learning, constructivist pedagogy, and impact on test scores	Teachers, students, grades 7-11 Laptop and non-laptop students and teachers	Surveys, interviews, observations, simulated activities, test score comparison
Stevenson	Beaufort County, North Carolina	1996-1998	Year 1: changes in attitudes and anticipated effects Year 2: academic outcome measures and laptops Year 3: teacher/student perceptions and standardized test score impacts	Teachers, students, parents, grades 6-8 Laptop and non-laptop students and teachers	Pre-post surveys (year 1) Standardized test score analysis
Stevenson	Liverpool School District, New York	2000-2003	Year 1: effects of program Year 2: longitudinal impacts of program Year 3: identify trends, impact of 3 year participants	Year 1: grade 10 teachers, students, parents Year 2: grade 10-11 Year 3: grade 10-12	Pre-post surveys, observations, interviews, questionnaires
Ross, Lowther, Morrison	Anytime, Anywhere Program, Walled Lake Consolidated Schools, Michigan	2000-2003	Year 1-3: effectiveness of laptops in learning, usage, writing, problem-solving activities	Teachers, students, parents, grades 5-7 Laptop and non-laptop students and teachers	Observations, test scores, surveys, focus groups, interviews, Writing Scoring Guide, simulated activities
Hill, Reeves, Grant, Wang	Athens Academy, private school, Georgia	2000-2003	Shifts in roles, process of learning, cognitive & media literacy skills and implications of laptop environment	Teachers, students Grades 7-12	Surveys, focus groups, usage logs, observations, interviews, test scores, meeting notes
Silvernail	Maine Learning Technology Initiative (MLTI)	2001-2002	How are laptops being used, impacts for teachers and students, obstacles for teachers, students	Teachers, students, administrators, central office, parents	On-line and paper surveys, site visits, observation, document

	Maine		and schools in implementation	Grades 7-8 (and 9)	analysis
Kerr, Pane, Barney	Quaker Valley School District, Pennsylvania	2002-2003	Evaluate implementation and impacts of program, provide conceptual framework and Theory of Change	Teachers, students, administration, parents Grades 3-12	Site visit, artifacts, interviews, focus groups
Urban-Lurain	Freedom to Learn, Michigan	2003	Assess impact of program, evaluate implementation, develop long term evaluation strategy	Students, teachers, administrators, parents	surveys
Mitchell Institute	Piscataquis High School, Maine	2003-2004	Gather and analyze data to inform public debate and info on school experience, changes in learning environment, identify opportunities for change and improvements	Teachers, students, administrators, parents Grades 9-12	Surveys, interviews
Zucker	Henrico County, Virginia	2003-2004	Increase understanding of laptop initiatives, esp. math and science	Teachers, students, administrators, parents Grades 6-12	Site visits, interviews, focus groups, artifacts, surveys

Appendix B: Stages of Adoption and Integration

Stage	Diffusions	Stages of Concern	ACOT	Types of Responses
First	Knowledge Exposed to innovation Gains some understanding	Awareness Little concern or involvement		
		Informational General awareness Interest in learning more Unworried about relationship to innovation		
Second	Persuasion Forms a favorable/unfavorable attitude towards innovation	Personal Uncertain about demands of innovation Feelings of inadequacy Concerned about relationship to school in terms of using the innovation		Dissension Overtly criticizes use of computers, discourages use
				Negation Computers aren't useful in subject area, avoids involvement with computers
Third	Decision Engages in activities that lead to a choice to adopt or reject the innovation			
Fourth	Implementation Puts the laptops to use	Management Attention to processes and tasks of using the laptops Issues are efficiency, organizing, managing, scheduling, time demands	Adoption Great to no technical expertise. Similar issues to first year teaching: discipline, resource management, personal frustration, time Struggles with laptops Focused on problems Doesn't change status quo Continues teacher centered focus Has management issues Has unrealistic expectations Focused on how to use laptops Emphasis on helping students use	Accommodation Considers computers in planning but doesn't make big changes. May alter some activities to make use of laptops

			word processing, managing data, other software programs	Investigation Seeks out new ideas, tries new learning activities making use of the computers Computers routinely used
			Adaption Has increased tolerance for problems Has increased technical competence Technology integrated into status quo of classroom Productivity major theme Concerns remain about balancing time for laptops and testing	
		Consequence Attention to impact of laptops, relevance to students, including student outcomes	Appropriation Understands technology Uses laptops effortlessly New perceptions about learning Have stopped computerizing old ways of teaching	Reflection Considers changes to own practice and program changes to use computers more effectively
Fifth	Confirmation Seeks reinforcement of the laptop decision, may reverse previous decision	Collaboration Coordination/cooperation with others in using the laptops	Invention Experiment with new instructional patterns, ways of relating to students Use interdisciplinary project based on instruction, team teaching, individualized instruction Increased reflection on teaching and questioning old patterns, understanding more deeply changes observed in students	Contribution Collaborative activities associated with using computers in order to help benefit students
		Refocusing Explore more universal benefits from laptops		Evolution Takes active leadership role in evolution of applications for computers in classroom

Appendix C: Phase 1 Interview Questions

Contact _____
Location _____
Date of contact _____

1. Tell me about the decision to turn MH and then TCW into laptop schools.
2. How were you involved in the setting up of the program?
3. What were the problems in setting up the program and how did they get worked out?
4. What training was given to teachers and students prior to rolling out the laptops? How do you think that went?
5. What happened the first day, the first week of the rollout?
6. How did the teachers and students feel about the program at its start?
7. During the first year of implementation, how did things go?
8. What role did you play in implementing the program?
9. At the conclusion of the first year, what benefits and difficulties had emerged?
What did everyone want to see changed?
10. What was done differently in the second year, why?
11. What new resources were provided the students and teachers related to the laptops?
12. At the conclusion of the second year, what benefits and difficulties had emerged?
What did everyone want to see changed?
13. What was done differently in the third year, why?
14. What new resources were provided the students and teachers related to the laptops?
15. How do you feel the first three years of the program have gone? Do you think it is a valuable program? Why (or why not)

Appendix D: Phase 2 Interview Guide

A- How has being a digital immigrant affected their integration efforts?

History of being a teacher, what have used in the past that they use today, old dog learning new tricks, lack of familiarity with computers

1. How did you get started in teaching? What has driven you to teach all these years?
2. How would you describe your greatest skills as a teacher? Your greatest challenges?
3. How long have you taught ____? What challenges have you had in teaching this subject? What are you most proud of?
4. What do you think about computers and how they are changing our world?
5. What role do you think computers should play in education (if any)?
6. What skills do you think students need in terms of computers?
7. As an expert teacher, how do the laptops make you feel?
8. Five years from now, where would you like to be as a teacher?
9. What in your past as both a student and teacher before computers in education has helped you cope with the laptops?
10. What in your past do you think has been a hindrance in working with the laptops?
11. Do you think “old dogs can’t learn new tricks?”
12. Do you think computers will ever replace teachers?

B - What problems do the teachers believe the laptops are supposed to solve?

Vision, specific problems laptops were to solve and how ideas changed

1. How did you feel when you first learned that TCW would become a laptop school?
2. What do you think is the vision for this program? Where did you hear about it?
3. What do you think of the laptop program goals?
4. Regarding the laptop program, what do you think are its priorities?
5. Do you think laptop computers are compatible with traditional education goals and activities?
6. What do you think the school has lost and/or gained because of the laptop investment?

C- What do the teachers believe they have had to stop doing in order to utilize the laptops?

What given up to use the laptops, attitudes, surprises, outcomes, how changed

1. What expectations do you experience from other colleagues, the administrators, students and parents about using the laptops? Please provide an example.
2. What expectations do you have for these individuals in return?
3. How have the laptops affected your pacing guide? Are they a help, a distraction or a liability?

4. You are expected to cover the curriculum in a certain period of time and what role do the laptops play in meeting those expectations?
5. How has homework changed (or not) in meeting your curriculum goals and using the laptops?
6. How has assessment been modified in meeting your curriculum goals through the laptops?
7. Has your curriculum changed over the past three years? How do you think it should change? Does this relate to the laptops?
8. How do the laptops interact with the standardized testing of your curriculum?
9. What gets lost in instructing students using the laptops?
10. Not every teacher uses the laptops, what do you think about that?
11. What do you think laptops should not be used for in instructional practice – ever?

D- What new activities, approaches and strategies do the teachers believe have emerged?
 What do now that didn't do 3 years ago, surprises, how got there, future ideas

1. How do laptops affect your relationship with your students?
2. How have you managed classroom discipline with the infusion of laptops?
3. How do you manage the flow of work, communication and interaction with the students when the laptops are present?
4. Do you think you have a teacher-centered or student-centered classroom or something in between? How would you define those two terms? Has this changed with the laptops?
5. In terms of teaching and learning, how have these traditional roles changed (if at all) with your students?
6. Traditionally, teachers communicate by voice and on paper with their students. How has or might the laptops affect this process?
7. How do you discipline students for misuse of their computer?
8. Visually, what has changed in your classroom because of the laptops and how has that affected your behavior?
9. How have you changed the physical makeup of your classroom to accommodate the laptops?
10. What can you do now that you couldn't do before? What has gone away?
11. What was the first thing you did with the laptops? What led you to the next step?
12. Did you pick something new to do with the laptops and then expand upon that activity? Where did you get your ideas for how to use the laptops?
13. What have you tried that hasn't worked out? Did that dissuade you or provoke you to try again or approach from a different direction?
14. Do you introduce, practice and/or review the curriculum in new ways because of the laptops?
15. How has the Internet been incorporated in your instruction, if at all?
16. When do you think the Internet is not appropriate?
17. What do you think of Blackboard and how might it change what you do to help your students learn?

18. How have Microsoft Word, PowerPoint, and Excel been incorporated into your instruction, if at all? What about the other software programs available to students?
19. Do you use projects? How do laptops interact with the goals of your projects?

E- How has the teachers' use of and attitudes towards the laptops evolved over the three years?

How felt in the beginning and now

1. How do you feel about technology in general?
2. How do you feel about the laptop program and every student having his/her own machine?
3. How has this changed over the past three years?
4. In evaluating the lead up to the start of the laptop program three years ago, how do you feel the teachers and students were prepared? What would you have changed?
5. When the laptop program began, what did you predict would happen in your classroom and in the school? How did things work out or not?
6. How was the first year of the program in terms of challenges and obstacles for you and the school? The second year? The third year?
7. What obstacles do you anticipate will be new this year and how do you think you'll resolve them if possible?
8. Do you think the laptops make students better students? Do the computers help them learn more? How?

F- How have the perceived benefits and obstacles of the laptop program played a part in dealing with the laptops?

What benefits? What obstacles? Inside/outside the classroom How dealt with?

1. What benefits have you observed for your students from using the laptops?
2. What benefits have you experienced as a teacher from the laptops?
3. What benefits have the parents of your students conveyed to you about the laptops?
4. What new use of the laptops has had the greatest benefit in learning for your students?
5. What positive changes have you seen (if any) from your gifted students? At risk students, ESL students? Special Ed students? Average students?
6. Is there technology you think is missing?
7. How would you describe the culture of your school? Is there tolerance for taking risks? Do you feel supported in what you do? How?
8. What are the priorities and expectations given to teachers overall?
9. What other priorities have gone on over the past three years in addition to the laptop program? How have these interacted (or not) with the laptop program?
10. How do you feel about these other priorities?

G- How have the characteristics of the laptop and the program's implementation helped or hindered the teachers' coping?

Durability, network, hinges, classroom management, how program began and been implemented, software, resources

1. Do you think laptop computers are easy to try and use or is their complexity a barrier to usage?
2. Is there a different way you think computers should be used rather than the current laptop program? Labs? Carts? Why?
3. What relative advantage do laptop computers bring that other materials and tools can't provide as well?
4. How has the network functioned? Laptop reliability?
5. What has been done to handle student misuse of the laptops? Do you agree?
6. How have the school/district laptop program policies worked for you (or not)?
7. How has tech support been for you and for your students? Are you getting what you need when you need it?
8. Describe the training opportunities you've had. What has not met your needs? What do you believe you need? What has helped?
9. When students don't have their laptops, how have you coped with this?
10. How do you handle plagiarism and cheating when laptops are involved?
11. What new resources have opened up to you because of the laptop computers?
12. Are there resources you do not wish to use?
13. Are there resources you wish you had but for whatever reason don't have access to?
14. What kinds of help have you gotten in dealing with the laptops? Tell me about one resource that has been especially useful to you.
15. What software do you think is appropriate or not appropriate for your students or curriculum? Is it available?
16. What additional hardware would make your work with the laptops easier?
17. What have you felt has worked in implementing the laptop program and what hasn't?

Appendix E: INFORMED CONSENT FORM

When Laptops Come to School: How Digital Immigrants Cope

RESEARCH PROCEDURES

This research is being conducted to learn how digital immigrant teachers cope with a school wide laptop program. If you agree to participate, you will be asked to participate in a series of interviews and one or more classroom observations over the course of 3-4 months. The interviews will take occur at a time and place convenient to you and the researcher. The observation will occur during an appropriate class time.

RISKS

There are no foreseeable risks for participating in this research and every precaution will be undertaken to protect your privacy and ensure confidentiality.

BENEFITS

There are no direct benefits to you as a participant other than to further research in how laptops are used in public school education and how teachers cope with their presence in the classroom..

CONFIDENTIALITY

The data in this study will be confidential. Your name will be known only to me and an alias will be used in gathering and reporting data. The school will not be named nor the area of the United States in which the school is located.

PARTICIPATION

Your participation is voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate or if you withdraw from the study, there is no penalty or loss of benefits to which you are otherwise entitled. There are no costs to you or any other party. This research has been reviewed according to George Mason University procedures governing your participation in this research.

CONTACT

This research is being conducted by Nancy Foote, a doctoral student at George Mason University under the supervision of Dr. Priscilla Norton. Nancy Foote may be reached at 703-329-0535 and Dr. Norton at 703) 993-2015, for questions or to report a research-related problem. You may contact the George Mason University Office of Research Subject Protections at 703-993-4121 if you have questions or comments regarding your rights as a participant in the research.

CONSENT

I have read this form and agree to participate in this study.

Name

Date of Signature

Appendix F: Contact Summary Form

Interview _____ Teacher _____
Observation _____ Interview/observation cycle _____
Location _____ Date of contact _____
Today's date _____

1. What were the main issues or themes that struck you in this contact?
2. Summarize the information you got (or failed to get) on each of the research questions you had with this contact.

<u>Question</u>	<u>Information</u>
3. <u>Anything else that struck you as salient, interesting, illuminating or important in this contact?</u>	
4. <u>What new (or remaining) questions do you have in considering the next contact with this teacher?</u>	

(Reverse side)

<u>Salient Points</u>	<u>Codes</u>
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Appendix G: Artifact Summary Form

Teacher _____

Interview/observation cycle _____

Location found _____

Today's date _____

Name of document

Event or contact with which the document is associated:

Significance or importance of the document:

Brief summary of the contents

Appendix H - Jesse Jackson Case Profile

Jesse Jackson High School (pseudonym) is nestled in a small bustling city located in the inner suburb of a major metropolitan East coast city. The school district is small, with 13 elementary schools, two middle schools, one high school, and a separate ninth grade school, Susan B. Anthony (SBA) (pseudonym). The high school has approximately 2,000 students. Eighty-six percent of the graduates go on to post-secondary education. Every year, in the graduating class, there are usually two to five National Merit Scholarship and several National Achievement Scholarship semi-finalists. The reading scores for the SAT English have gone up 30 points and the math 28 points from 2005 and at a time when the national SAT scores have been declining. This is particularly impressive as 57% of the test takers are minority students, compared to the national average of 3%. Many teachers serve as readers and consultants for the national Advanced Placement (A) program. In 2006, over 900 AP exams were given with 47% earning qualifying scores – considerably above the national average. Jesse Jackson offers a curriculum of 188 courses, and it is one of the few area schools that teach organic chemistry. Five years of French, German, Latin and Spanish are offered. There are a total of 199 licensed teachers, of which 76% have post-graduate degrees.

One of the reasons in choosing Jesse Jackson High School for this research is that the school has a diverse student body, comprised of African American 43%, Hispanic 25%, White 24%, Asian Pacific 7%, and Native American 1%. More than 88 countries of birth are represented in the district, as well as 69 native languages. Jesse Jackson's free or

reduced price meals ratio is 41%. This diversity is in considerable contrast to the majority of the schools in previously noted evaluative studies where the student body was mostly white, and the free and reduced ratio was on average around 10%.

At the Beginning

In the early 1990's, the school district created a committee to plan for the influx of technology over the following ten years. Under the plan, desktop computers (Mac) were introduced to administrators, teachers, and staff, first at the 9th grade school, then to the middle schools (Mac), and eventually to the high school (PC). One technology resource trainer (TRT) remembers that the staff moved quite reluctantly towards gaining 21st century skills. On more than one occasion, the TRT had to literally show how to move a mouse. No one wanted to use email until the principal declared that if someone did not answer his email, he would summon them to his office to talk about the situation. A number of staff also had children away at college, and learning that they could use email to regularly communicate became another large motivator. Now, of course, the TRT notes that if the server goes down, they all yell, "I can't get email!"

Eventually, the decision was made to expand the number of high school classroom computers to two – a new laptop for the teacher, and the previously given desktop shifted to student use. However, it was soon discovered that the teachers did not like carrying the laptop around, and there was no easy place to put the machine. As the desktop had a large monitor, keyboard, and mouse, the teachers eventually shifted back to the desktop for their own use, and put the laptop away. Two or three computers in an

elementary school work well as the classrooms are oriented towards revolving group work, but, at the high school level, a couple of classroom computers generally become dust catchers as teachers are disinclined to have a few students working unsupervised on the computer while they address the rest of the class.

Around the same time, a computer lab with 24 desktop machines was installed in the library for teacher class use. However, access was limited due to scheduling demands, and often several machines would be unavailable because of repairs. In the years leading up to the laptop program, wireless computer carts were also added to the technology resources of the school. The carts were used primarily by the math department with the software program, Boxer Math. However, the teachers grew quite dissatisfied with the program as it would always return to the program's beginning rather than continuing from where a student had stopped. There was another cart shared by the English as a Second Language department (ESL), which was used quite effectively with the AutoSkills program to help students with literacy problems. Unfortunately, when shared among teachers, the carts proved to be bulky and heavy, and not easily moved through hallways, especially when crowded with students going to classes.

The Decision to Start a Laptop Program

Because Jesse Jackson had been in existence for over forty years, the school board decided in 2004 to rebuild the school next door to the aging building. At that time, the Director of Information Technology Systems (ITS) was concerned about maintaining one computer system, while planning for a whole new system in the new building. As the

rebuilding decision was being made, a hot topic in education was the digital divide. The director explained that while some of Jesse Jackson's students had every technology resource available to them, many others did not have access to the Internet, or even to a computer. So, to solve all these problems, he decided to push for every student to have a laptop computer. This would also save room space as computer labs would not be required, and the laptop would start the move towards the planned technology in the new building. The superintendent was very supportive of this concept. It took about 18 months for the proposal to make its way through the budget cycle, and was passed the first time the school board considered it.

When asked why a laptop program, one principal (they changed between laptop year 2 and 3) said, "It's another tool, and a fairly dramatic and vibrant tool that gives you lots of options. It's not like an overhead projector which has one primary function. It's not like moving from pencils to pens. It is not singularly dimensional – it's got lots of facets to it, and it's just very, very promising." Both the past and current principals believe that, while computers will not replace teachers, the machines can become an excellent tool in educating students. The laptops may not be used every day, or even every week, or by every teacher, but, eventually, laptop programs will become the standard in schools nationwide. A technology resource trainer (TRT) gave this response –

When you see those students that you know have never had a laptop, and see them get it, and smile, and stroke it – I just wonder what their parents say when they take it home. I remember a middle class white parent who

came in and wanted to buy a used laptop. I said that they were only about \$100. And she looked at me, and said, 'That \$100 may not be much to you, but it's a lot for me.' And that set me back. That's the bridging of the digital divide.

As the city in which the school district is located is quite small but extremely dense in population, this significantly promotes a relatively small investment with a high return. Consequently, investing in the city has become very attractive to cable and wireless companies, which has allowed the school district to improve its technology resources. Many of the surrounding counties are much larger, although economically similar, and they do not have the same level or quality of technology infrastructure and resources. For example, in the 1990's, the city's cable company, which very much supported education, provided all the cabling to bring television to every classroom in the district, as well as free internet access. While the current cable company does not provide this service for free, they were contractually required to lay down a fiber backbone that eventually would provide an Internet access speed as fast as any location in the country. A recent study of Jesse Jackson's laptop program by an outside firm noted that this was the only place where teachers seem to be able to just count on the network, and they do not have to have extensive backup plans. That has not been the case in many other school districts entering into a laptop program.

Although the technology plan, initiated in the early 1990s, had not been focused towards establishing a laptop program per se, the goals of the plan could easily

accommodate its inclusion. After board approval, a Request for Proposal was sent out to the computer industry, and proposals were received by Dell, Apple, and Hewlet Packert (HP) among others. The contract was to be a four year lease, for the ninth grade feeder school, Susan B. Anthony. This school has traditionally been the pilot place where things get tried out first. It has only one discrete grade level, 60 teachers, and 750 students – a situation manageable for most start up projects.

Leading Up to Susan B. Anthony's Implementation

In theory, teachers should be given the laptops first, along with a lot of training, then wireless and the portal are introduced, and finally the students are given laptops. However, because of timing and budgetary cycles, the decision to launch the program at SBA was made in March; the laptops were bought in June, and the program was implemented by September. Consequently, the wireless network system came first, followed by the teachers and students getting the laptops more or less simultaneously, then teacher training, and finally the portal. As a result, everyone involved was in catch-up mode throughout the process, although they thought the idea of the program was great. But everyone kept asking, "What are we going to do with these things?"

Because of the short timeframe and teachers having to shift from a MAC to a PC environment, in order to increase buy-in, the teachers were invited to participate in choosing the laptop. The computer companies came to the school, and made presentations to the faculty. Even though the teachers would eventually receive a separate monitor, the computer that became everyone's favorite was the Dell, as it had a 12 inch

screen and double batteries – although the technology staff would have voted for a different computer. The second battery took the place of the CD Rom drive which was also acceptable to the majority of teachers. However, one teacher pointed out that she had expected to run a software program that would require her students to have a disk drive!

At SBA, different groups of teachers were formed to work on set up, distribution, teacher training, student training, and software decisions in the lead up to the opening of school. The technology staff had to create an image (the program structure access and visual representation on the desktop were created on a single laptop, compressed, and then “exploded” into all the student laptops as an image) inside of a month, proof it, install it in the 750 student computers, and have them ready to go by September. Consequently, the initial software package was kept simple, using the Microsoft suite, Type to Learn, A+, and Inspiration. However, as a TRT observed, all of this was happening just as the big PC push on education software programs heated up, and many teachers started advocating for various programs to be included. They were even willing to buy the product themselves, and install and use it on the machines. So the technology staff had to find a way to regulate all of this, work out various needs, and produce the image in record time. In addition, they had to think about systems to handle damage, theft, discipline, loss, kids not bringing the laptops to school, acceptable use, etc. The school had to be wired, but the signal strength proved to be so strong that people around the school were getting free service until the ITS staff found the right network protocol that would only service SBA.

Although it was anticipated that the laptop program would be expanded into Jesse Jackson, this decision somewhat depended on how things went at SBA. A prevailing belief was, “Let them get all the kinks out, and then Jesse Jackson will profit from all their mistakes.” For financial reasons, the school board also considered introducing the laptops one grade at a time at Jesse Jackson – year 1 10th graders, year 2 10th and 11th graders, and year 3 10th through 12th graders. However, at the high school level, teachers often have mixed grade classes, and this would have meant some students having laptops and others not. It would have become an issue, not only for teachers and students, but, most importantly, for the parents, who would have said, “Hey, wait a minute. Just because you’re a tenth grader, you get a laptop in so and so’s class, and my 11th grade student doesn’t?” Ultimately central office decided that the entire student body at Jesse Jackson would get the laptops at the same time the following year. Again, because of the budgetary cycle, this decision ultimately had to be made half way through SBA’s first year, before there was much concrete data available to evaluate how SBA had dealt with the program.

Year One 2003-2004, Susan B. Anthony

Because of the very quick lead up to implementing the laptop program, the Susan B. Anthony TRTs, assisted by Jesse Jackson TRTs, focused first on providing an image on the student laptops, and dealing with the teachers’ laptops at a later date. The teacher laptops literally came right out of the box and into teachers’ hands. There was actually a required course for 45 minutes that taught the teachers how to remove the computer out

of the box and set it up. However, as a TRT explained, the younger teachers were sitting in the back thinking the course was a joke. But other teachers kept asking, “What do you mean the button’s on the side? What do you do when it goes to sleep? What does hibernate mean?” The one-size-fits-all staff training made this a very interesting scenario to deal with. The first few months were further complicated by the lack of time for teacher training prior to implementation. Some teachers began with word processing and taking notes in their classrooms. Others developed PowerPoints, and still others conducted some research online. It depended on the teacher’s prior skills and knowledge. The TRTs eventually sent out surveys to all the teachers to determine what staff development was needed, and the data were used for the twice monthly mandatory training sessions throughout the rest of the year.

Susan B. Anthony had a schedule that provided approximately 20-25 minutes a day for teachers to advise students on various manners. This time slot was co-opted for student laptop training, focused on computer mechanics, and on how to use the software loaded in the image. But the teachers realized very quickly that the students were eons ahead of them. That first year, the technical challenge was student ad hoc servers. The students found out they could remove the second battery from the back of the computer, which would allow them access to the bio switch. Working with the switch, they could reset their own computer to become a server, and, as other student laptops would be much closer to this computer than the very restricting central office server, they would

read off the student's ad hoc server. An administrator exclaimed, "When you're buying a laptop, you don't think of things like this!"

Leading Up to Year 1 Jesse Jackson

After the decision was made for Jesse Jackson to become a laptop school with all three grades receiving the laptops simultaneously, the next decision was which laptop to buy. The biggest problem at SBA was that large screen that had so driven the decision to buy the Dell. The school went through hundreds of replacement screens because a 12 inch screen has nothing structurally to support it. For example, a student might rest his arm on the closed laptop on his desk, or students would pile books on the laptop when leaving class – both of which could crack or break the screen. Another problem was the fairly large size and weight of the Dell laptops. They often broke from falling off desks. It did not help that most student desks were slanted, but, basically, the student could not have both a laptop and a book open on the same surface area. Consequently, at Jesse Jackson, the decision was made to find a machine that was smaller and lighter, and would have a metal frame around the screen. While the screens on the new computers still broke on occasion, the rate of breakage went down 75% just on that factor alone at Jesse Jackson.

The high school's Request for Proposals was sent out to the computer industry during SBA's first year. Among the proposals received, Hewlett Packert (HP) was chosen by the technology staff. Consequently, Susan B. Anthony had Dell laptops, and Jesse Jackson had HP laptops. Both laptops have had problems but have stood up relatively the

same to handling by students. Although the screen was the biggest problem for the Dell computers, it was the hinges that created most of the repair issues for the HP machine. The hinges were made of plastic and not designed for the constant opening or shutting of the laptop, or for a student carrying it around open, or something like a pencil or pieces of paper being inserted as the laptop was closed (as students were accustomed to doing with books and notebooks). However, replacing the right (and not interchangeable) hinge was a far cry from replacing a \$1000 screen, and, thankfully, all the repairs on both the Dell and HP machines were covered under warranty. One administrator expressed the wish that the computer companies wake up and produce a laptop for education so that schools would not have to adapt business computers for student use.

The biggest difference besides the laptops themselves was the support system that each company provided. At SBA, a Dell technician would come to the school, ask for the problems, fix them, and then go away. The downside was that the same person did not come every time, and everyone had to start from scratch again. At Jesse Jackson, there was an in-house technician supplied by the reseller working with HP. That person was employed full time for Jesse Jackson, and worked closely with the student help desk and TRTs, not just in fixing laptops, but in lots of little but important ways in tweaking the program.

During the spring of SBA's first year, both Jesse Jackson and Susan B. Anthony teachers were required to attend a short presentation by Classroom Connect that provided an overview of what a laptop program was, and what the benefits could be, in order to

build interest in the program. At the start of Jesse Jackson's first year, teachers at both schools took a day long workshop with Classroom Connect, to explore what the Internet can provide teachers in their classrooms. A deliberate attempt was made to provide across the board curriculum specialists so that there was something on the Internet for everyone. While initially, the Susan B. Anthony teachers felt that the Jesse Jackson faculty was receiving a lot more assistance for their start-up year, very quickly all staff development and computer resources were standardized between the two schools.

Jesse Jackson High School has always used a PC environment, but the teachers had to be weaned off their desktop computers towards using the HP laptop. The teachers were given docking stations in which to place their laptops. The docking station was the hub to the school server, and connected a flat screen monitor, key board, and mouse for teachers to use if they preferred. Consequently, the teachers had a desktop format with a laptop computer, which they could make use of separately when away from their desks – the best of both worlds. In order to prevent students from being able to hack into electronic teacher grade books and attendance records, teachers only had access to such productivity tools through their docking station and LAN line, although they could use the wireless for the Internet and other purposes. Students only had wireless access for the Internet and student server. The software programs remained in place from the previous years – the Microsoft suite and the electronic teacher productivity programs. The email system was changed from Pegasus to Netscape Mail that year, but this did not present any significant challenges as the two programs were fairly similar.

Jesse Jackson became wireless with all classrooms having Internet access for teachers and students in the summer leading up to implementation. The ITS staff oversaw an outside firm's process of wiring the entire building. In addition, the student network server was established, with teacher and student folders. There was no email for students, and all the USB ports on the student laptops were disabled for security precautions. The TRTs also capitalized on what SBA had for software by extending the site licenses to include Jesse Jackson. But it was hard to get input from Jesse Jackson teachers on what specialty programs they wanted as everything hit at once, as it had for SBA. Once the image was formulated in the summer, no further programs could be added until the following summer, so many promises had to be made to teachers, along with the plea to be patient. The concept of iPrinting was introduced to the teachers in which they could now print to any printer in the school, not just to their own classroom printer. Printing for students, however, was intentionally not planned for. Students were expected to electronically send assignments to their teachers for review and correction. Since teachers were accustomed to correcting paper copies, and had not received training, or were familiar with how to grade directly on the computer, the teachers inevitably printed everything out for grading.

Year One 2004-2005, Jesse Jackson

The students received their laptops eight weeks after the start of school. The ITS staff adopted SBA's Acceptable Use Policy, and required all students and their parents to sign the document prior to getting the laptop. Small groups of students came through

their physical education or social studies classes to obtain the laptops over three weeks. Right after pick up, the students sat through a lecture on acceptable use – and the consequences for inappropriate behavior. In the lecture, the students were also told about the basic information on handling the laptop – how to turn it on and off, proper care, etc. One TRT noted that this was a learning experience for everyone – teachers, students, TRTs, central office, and administrators. When asked to evaluate the three weeks of handing out laptops, the TRTs were in agreement that this was not the way to do it. One explained, “How can a teacher do a lesson with technology when, the first day of class with 20 students, five might have a laptop, and the other 15 do not, and this keeps changing over the three weeks.” Although it was unclear how effective the three week student training had been, the lecture was not repeated in subsequent years. Helping new students learn the computer basics would eventually fall to the teachers.

In addition to getting the laptops into student hands, the ITS staff outsourced the establishment of the student help desk (in the library), policies, tracking systems, and hours of operation. Students could come to the help desk before and after school and at lunch, but not during class time. That first year, students could lose their laptops from a day upwards to several weeks in duration while they were being repaired. Teachers had no way of knowing the truth if a student said they could not do the work because their laptop was in the help desk. Students quickly figured out this was an excellent excuse to get out of school work, and often offered the excuse even when they still had their laptops.

The general philosophy at Jesse Jackson that first year was – here are the machines; we're going to get them out; some of you are going to run with them; others of you are going to become a little more comfortable with the laptops, and see how they can be used. Periodically, throughout the school year, short staff development workshops were given on the mechanics of the whole system – the network, laptops, student network drive, printing, etc. While this light touch kept initial resistance to the laptop program low, the lack of a clear mandated vision on computer integration meant teachers either formulated their own ideas and were self directed in their experimentation, or else they could ignore the whole situation.

As the HP laptops only had one battery, between student personal and academic use, the laptop batteries were usually drained within a couple of hours into the school day. While initially this was not a big problem as the level of use in classrooms was low, in time, dead batteries began to get in the way. Teachers were offered battery towers with 30 additional valence batteries, but few actually opted for them. There was a learning curve with the batteries, both for teachers and TRTs – how easily the batteries could break (or in some cases implode), how to take care of them, how to charge the batteries, and how to maintain security and not lose them to student theft. Many teachers just avoided the whole issue either by not using the laptops or having students use their own power cords. However, the cords have no tracking mechanism; they are expensive to replace, and they often went missing. Some students even came to school with dead laptops because they had forgotten to charge them overnight. Each teacher had to find a

way through these various challenges in order to make their classes work with the technology.

The student laptops were collected over a five day block of time about three weeks before the end of school. A TRT recollected that when they told the teachers about the collection date, a number of teachers said, “But I’m going to use the laptops for review and the final exam! We’ve used them all year, and why are you taking them now? It should be like any textbook, and the students turn them in the last day of class!” Consequently, the ITS staff put together class sets of 25 returned clean laptops, and gave them to the teachers who had asked for them. The first year this was only two, but the number quickly grew in subsequent years. The TRT explained that teachers were beginning to want the laptops from the start to the end of the school year – like any of the other tools available to them – and just as everyone had ultimately hoped for. As a TRT wryly remarked, “It was a case of ‘be careful what you wish for!’”

At the end of the school year, all teachers and students were obligated to complete an online survey about the first year and how it had gone. An online survey was also conducted the end of the second year, but not the third. This data eventually was used by central office to evaluate in-house the laptop program’s first full year of implementation in each school.

In addition to the introduction of the laptop program, the level of change at the school began to ramp upwards in other ways. There was a major push towards getting both Susan B. Anthony and Jesse Jackson fully accredited. State standardized tests had

become mandatory for graduation, and a new evaluation process for staff was being piloted. The building of the new Jesse Jackson had started which led to the construction of temporary classrooms in the football field, and some shuffling of teachers around when part of the existing school was demolished. Teachers were additionally required to give input on the ongoing accreditation process mandated by the regional association of high schools, as well as for the central office push to create a smaller schools vision for the new school.

Concurrently, the state had begun to push online testing into its school districts. The school testing coordinator explained that, although not a primary reason for the laptop program, all students having a computer made online testing easier to implement. Some other schools in the state accomplished online testing with massive labs or classroom sets of computers. SBA had experimented with online testing in their first year by putting together classroom sets for the testing. This was feasible with the small number of laptops involved. The upside of collecting all the laptops early was that because the laptops could be completely cleaned of all the stuff students put on their machines and all the problems fixed, the laptops were less likely to malfunction during testing. But the downside was that the teachers all lost the laptops early in the fourth quarter.

At Jesse Jackson, however, the laptops were not collected because the sheer number of laptops involved made such collection impractical. It would also have meant teachers losing the student laptops well before the fourth quarter. For teachers trying to

use the laptops, given the late start into the second quarter, this was becoming untenable. As an alternative to early collection, starting in the first year, someone went around to every state standardized testing classroom, and literally placed their hands on each laptop, diagnosed its status, put on the new testing patch that the testing company created every year, and made sure the laptop would work for online testing. This, of course, did not prohibit the students from immediately putting stuff back on, but generally, as experience proved, once the student entered the testing program, everything turned out fine.

Because the Dell computer had two batteries, running out of electricity was not an issue for SBA in their online testing. But the HP computers only have one battery, and that produced a major challenge for Jesse Jackson. In order to ultimately solve the uncleaned laptop and battery problems, valence batteries and extra laptops were placed throughout the school, and made readily available for a student whose battery or computer died while taking the tests. The testing coordinator explained that two people were needed in a classroom – one to monitor the test and the students – and one to take a problem laptop or dead battery to the nearest station for replacement. If a serious problem developed, the student was sent to the gym to finish the test. If the wireless went out in a testing classroom, then the whole class was sent to the gym. In addition, because of all the construction noise next to one side of the old building, some classes had to test in the gym in any case. This solution worked very well the first year, and became the routine setup for the subsequent two years of online testing.

Another problem the first year was the server which was not robust enough to handle all the demands put on it. The server kept crashing and locking students out. The testing team did a practice run and, when everyone in the school logged on at the same time, the system crashed. So non-testing teachers and students were not allowed to use their laptops during the actual online testing, and the testing classrooms were staggered when their students could log on.

During the first year, the school did not test geometry online because of the students having nothing electronically with which to practice the virtual compass. The next year, geometry joined the other online tests (except writing which has remained a paper/pencil test). The compass turned out to be more of a teacher anxiety than a student problem, who, with just a little practice, easily mastered the mechanics. Another challenge was that the testing program required students to interact with the program every two minutes or it would shut them out. The testing coordinator solved this problem by training the students “to pet your mouse” while pondering the question, and this would keep the program from locking the student out. Then, there was the famous blue screen that the testing coordinator said would all of a sudden appear on a student laptop. To get rid of the blue screen, the route to the server had to be changed, but, once a patch was created, teachers, and especially students, easily worked their way through the steps.

Lastly, while the students were comfortable with testing online, the testing coordinator said the teachers were scared to death. So they trained, double trained, and retrained. The teachers got sample test questions for practice in the classroom. Some

people wanted to run them by five times in every class, but others were satisfied the first time through. She explained, “The idea of using this machine instead of paper and pencil was so foreign to most of the teachers that it took year one, day one or day two – and then it was ‘I’m never going back!’”

When asked about the differences between online and paper/pencil testing, the testing coordinator felt that paper testing was very cumbersome. The results took months to receive, and security had been a major issue. Every booklet had to be counted, counted again, and then recounted. The 600 booklets in the building were like a time bomb – if one was lost, the whole test became invalid for everyone. Paper/pencil testing was labor intensive for teachers, administrators, and for the state’s Monitoring and Evaluation Department which had to account for everything. And, for the students, the test itself was often harder to take because the students were faced with a page of questions and had to constantly check that what was bubbled on the separate answer sheet was for the correct question.

She has found, however, that online testing is much faster and security considerably simpler. The results are available the following day so students can quickly retest, especially valuable for seniors trying to graduate. Security involves creating tickets, one specifically identified per student. Instead of having to handle 25-30 booklets, answer sheets, and sharpening pencils, teachers only need to manage the test ticket, and once the student is in the testing program, that ticket becomes dead. The students also appear to like the online testing better. They are quite comfortable with the

laptops because they've been using them all year. In addition, teachers have students take lots of online practice tests, so there are no surprises during the test. The computer screen also simplifies what a student faces – just one question at a time and the place to answer is on the same screen. Sometimes, in the English state standardized test, the students have had to deal with split screens (text above, questions and answers below), but that has proven easily solved just through practice.

In evaluating that first year of the laptop program, one TRT believed that while the year had worked out well enough, things could only get better because everyone would learn from the mistakes. “It was a steep, steep learning curve that first year.” As a number of participants had noted, although the intent had been to work from the lessons of SBA’s first year, in reality, this just did not happen. In fact, an administrator observed it began to work in reverse in Jesse Jackson’s first year. Instead of Susan B. Anthony doing something first and Jesse Jackson following on their coat tails, what transpired was Jesse Jackson would figure something out, and Susan B. Anthony would become the recipients.

Year 2 2005-2006, Jesse Jackson

For the second year, the rollout in the fall was in the 5th week – much earlier than the previous eight weeks, and it was accomplished in one day. In order to distribute the laptops quickly, all teachers were asked to send students in alphabetical groups (all last names starting with “m, p, q” for example), when called to the gym. There the paperwork was checked, and the laptops and cords given to the students, who then returned to their

classes. This process worked very well and has been used in subsequent years. The laptop collection at the end of the second year was also completed in a day. There was no student training because, unlike year one when only the previous ninth graders had had laptop experience, all but new students at Jesse Jackson had now had a year of using the laptops. However, students were still given a small card that listed important things to keep in mind in using their laptops, and again any student training fell to the teachers

Parents had been complaining all through year one about the inability of students to print, so a printer was added to the student help desk, and students could print to that machine and pick up their documents during help desk hours. Parents also lobbied for the USB ports to be opened so students could print at home, but central office was disinclined to acquiesce to this complaint as it would open up the laptops and the server to viruses. Additionally, there are a great variety of home printers available and supporting all of them would have proven impossible. Parents pressed for students to have email accounts, and this became available in the second year. Students could unplug their home's telephone cord and insert it into the computer, which would then connect them for free to the school's server. However, it was not until well into the school year that this became available because the telephone company had problems with all the lines required at central office. Students often found the system slow (dial up), cumbersome to use, and sometimes difficult to gain access because of the volume of calls. While supposedly restricted to two 30 minute sessions a day, in reality, students could stay plugged in as long as they wished.

A number of laptop policy and security questions arose in the second year – what to do with lost laptops, broken laptops, misused laptops, etc. An individual at central office oversees the 3000 Susan B. Anthony and Jesse Jackson student email accounts. Other staff members weekly monitor the 3000 student folders on the student network drive. While in year 1 there was not much in student folders, by year two, the amount had grown exponentially, and not all of it was appropriate by any means. Policies had to be worked out for administrators who followed through with students when material like pornography was discovered. Administrators also had to deal with students who had lost their laptops, often through no fault of their own. There is a tracking device implanted in the computer, and when the laptop is reported lost, the police are alerted, and the device activated. A number of laptops have been recovered using this device, and the rate of loss has proven quite low. In some cases, students were given a new laptop which the HP contract allowed for. In other cases, especially in instances where students had misused their laptops on numerous occasions, the students were permanently deprived of the machine.

In year two, teacher and student feedback groups were formed. A TRT noted that these two groups were very helpful for the overall program's evolution. Each group met twice in the year and created a list of what was working, what was not, and made suggestions for change. (See Appendix J: Teacher Feedback Group Reports) Central office listened to what the teachers and students wanted to have happen, and addressed those concerns as much as possible. To further promote use of the student laptops, two of

the district's libraries extended their hours so that students could work off the wireless system from 8:00 am to 8:00 pm – an extension that was also offered in year 3.

As teachers continued to grow more comfortable with the laptops, classroom use increased. Consequently, the battery issue grew as well. In year two, every teacher either had a battery tower themselves, or was willing to share with another teacher.

Unfortunately, unless a teacher was very careful, batteries had a tendency to walk away. Another related problem was that the untraceable power cords inside the battery tower also tended to go missing. When it came time for state standardized testing in June, the remaining batteries had to be reshuffled around. As the batteries themselves tended to wear out from time and usage, by the end of the school year, many teachers had insufficient numbers of working batteries.

During the summer in the lead up to year two, the technical staff cleaned and reimaged all of the student laptops. However, the teachers took their laptops home, and the result was that the two sets of images on the laptops were no longer identical. Many teachers did not even realize that they did not have the same programs that their students had. One TRT felt that it would have helped to train teachers more on the log on/off procedures, and to explain all the protocols involved with the machines. For example, if a student left a classroom with the laptop turned on, and then went to their next class, the laptop would stop working as it was keyed to the previous wireless hub. Instead of the teacher and student thinking that the laptop was broken because it would not work, all the student had to do was turn off and restart the computer. Understanding how such systems

worked might have helped teachers manage the laptop issues in their classroom more easily.

In the second year, the portal was finally determined. Previously, Jesse Jackson had its own site embedded in the district's website, but the technology staff created additional Jesse Jackson websites containing resources, where to find stuff, etc., for teachers and students. However, the websites were difficult to maintain and did not meet the longer term needs for communication, especially within the classroom. Consequently, Blackboard was chosen as the online platform, and the amount of training correspondingly had to increase to bring teachers up to speed.

A central office Instructional Technology Coordinator was hired to oversee all the technology staff development in the entire school system. She felt that while there was much staff training already in place, it was more a matter of filling in the gaps in the program and having everything working together towards the goal of technology integration. Although the school TRTs' roles had originally begun as trainers, the demands of managing the laptop program and keeping track of all its myriad parts meant that their responsibilities substantially shifted away from teacher training. So they welcomed the addition of a former highly respected teacher as the technology integration specialist. One TRT explained that they felt like doctors who have specialties, but, at the same time, there was definitely a sense of teamwork because it was hard for any one person to know it all, and a crisis could come from anywhere.

While the first year staff development had primarily focused on the nuts and bolts of the laptop system, the principal during the second year felt training should begin to have more focus and direction. In addition to mandatory monthly staff development, all teachers were also required to design a lesson using the laptops in some manner each quarter. Some people just took off with integrating the laptops, and others struggled – and continue to wrestle – with integration. In addition, the summer between years two and three had the Summer Technology Institute where nine teachers volunteered to work together and develop content specific lesson plans using the laptops. They not only had to each create a lesson, they also had to demonstrate putting it into practice in their classroom the following year. The teachers were already fairly comfortable using technology; however, this new training was focused on integration as opposed to using the laptops. Although judged to be a valuable experience by both teachers and the trainer, because of staffing fluctuations, it was not repeated during the following summer.

Jesse Jackson's new technology integration specialist's first challenge was arranging the overall staff development plan for the school year and specifically for Blackboard, starting in November. The non-Blackboard training focused on helping teachers understand student email, what software was available on the student laptop, differentiated learning using technology, and higher thinking skills with the laptops. The trainer also conducted specific content training for the English and social studies departments.

The general staff training, unfortunately, was very difficult for the trainer to plan because the attendees treated staff development casually. Teachers generally expressed the opinion that “I’m going to show up because somebody told me I have to be here, and I picked this because it seemed the least odious.” She would ask staff to email if they were going to come, and some emailed back but then did not show up. Others did not email but did show up. The trainer tried to have examples and websites ready in the applicable content areas, but if, for example, a Spanish teacher showed up unannounced, then the trainer had nothing prepared for that teacher.

A Blackboard training program was established with thirty teachers signing up but there was so much interest in the program that additional sessions had to be eventually scheduled. This first wave of teachers took Blackboard training in the late fall. The trainer described the initial group as being quite interested and excited, and some were already familiar with Blackboard and wanted to get started right away. Another characteristic of this group was that they believed that Blackboard would eventually become mandatory, and they would rather learn early in the process with other likeminded people. They did not want to wait and do the training with the resisters among the staff. Although the training was effective and well received, the teachers in that first group said, “This is great, but it’s going to take a lot of time, and I’m going to need a lot more help.” Because of this feedback, the trainer started the half day work sessions and monthly lunch time meetings to continue the training. It also helped to have the trainer on call to iron out problems as they arose in the classroom.

The second wave of Blackboard training in the spring had teachers who were more hesitant, a little suspicious, and were unsure what Blackboard was going to offer them (besides a whole lot more work.) But the training was so well designed that everyone left thinking that the portal was something they could use in some way. In the fall of year 3, the third wave took the training, and this group, as the trainer observed, was quite an odd mix. There were people who were so technophobic that they wanted to know nothing about anything technological. But there were also the procrastinators who had not wanted to sit through all the training until it finally became mandatory (which it did in the third year). This latter subset of teachers were very quick learners and technologically savvy, but they just did not want to do it as opposed to the resisters who did not want to do it at all – ever.

The trainer calculated that about 100 teachers were in the first two waves, but only about 30 made their classes available on Blackboard, and, even then, only a few actually integrated the platform into their every day teaching. These teachers volunteered to have their classes viewable to the school community as examples of what struggling teachers might consider doing in Blackboard. There were some teachers who came to every lunch time session but never actually used the program until it became mandatory the next year. This meant that by the time teachers were required to begin using Blackboard, many of the first two waves had long forgotten what they'd previously learned. The third wave actually was more successful – over half – in moving from training to using Blackboard, partly because it was going to be required by the end of

January. But they still did only what was required for level 1 – make their classes available, put up their syllabus and glossary, and include some information about them. Unfortunately, despite this major push, most of the teachers in all three waves had not begun to integrate Blackboard into actual instruction.

In addition to the introduction of Blackboard as the school portal, there were other ongoing initiatives which teachers had to cope with. Online testing continued although it became much smoother as teachers, students, and administrators built upon what they'd previously learned in year one. Full accreditation from both the state and the regional association were granted. However, No Child Left Behind (NCLB) had kicked in, and the new goal was Annual Yearly Progress (AYP). There was an ongoing push to have every student possible take at least one AP course during high school. The new evaluation process was now the norm for all staff which also required some adjustment. The principal who had been with the school for many years was about to leave, and a new principal had been chosen. The anxiety about the coming move to the new school was beginning to make an appearance as well. At one point in the second year, the outgoing principal was at a meeting to talk about the new evaluation program, and, in exasperation, he started saying, "We've got laptops; we've got accreditation; we've got the evaluation program; we've got a new building; we've got online testing, and we want teachers to teach. We can't do any more. There is just no room for another initiative." But more was yet to come.

Year 3 2006-2007, Jesse Jackson

Because of building the new Jesse Jackson and the necessity of moving from the old building into the new, the summer between years 2 and 3 was three weeks shorter than normal (but the subsequent summer would be three weeks longer). School began the third week in August and finished at the end of May, in 2007. Because of the shortened summer, the technology staff had much less time to clean, fix, and reimage the student laptops. This was further complicated because the new image represented a major departure from the previous years in that adding and deleting programs from any laptop was made much simpler.

For the first time, several teachers were invited to the reimaging meeting to provide further feedback on what teachers wanted and needed in their classrooms. The meeting had to address the site licenses of software, whether a program was actually being used (some programs had not been used at all), where a program should be located on the desktop, and what additional requirements were involved in using the program. An ongoing problem was that in year two teacher laptops had grown out of sync with the student laptops and this problem was going to be seriously magnified in year three. The issue was how to update teacher laptops without taking them away for a long block of time. In addition, many teachers only save their work to their laptops and not to the teacher drives on the server. Consequently, reimaging a teacher's laptop could mean the loss of years of work (which could also happen if a teacher's laptop broke down). This will become an even greater issue when the laptops are handed back in at the end of year

four. One positive development by year three was that much more education software was now available online which meant much less behind-the-scenes work for the technology staff. However, the downside was a lot of that software could not be used because the district blocked students from MP3 access.

The 2006-2007 school year signaled another departure from the normal routines of school. Many holidays and teacher work days were eliminated from the schedule, resulting in a strong increase in stress and tension in the school over the year. In addition, this year marked the arrival of a new principal who brought in a desire to combine literacy with technology. At his previous school he had developed a very effective literacy program but lacked the technology resources. At Jesse Jackson he had the laptop program but no literacy curriculum. This was a major motivation for him to come to Jesse Jackson – the opportunity to marry literacy and computers so that all students, but especially hard-to-reach students, could be successful in high school.

One of the first changes in policy involved Blackboard. The new principal believed that this was no longer an initiative but had to become a way of life for the school. A number of tabs within the program now allowed students to digitally access the library, guidance, and all the related online resources. However, students could not access this information unless teachers made their classes available. Consequently, the new Blackboard policy set two levels of expected use with deadlines for all teachers to move from one level to the next. The deadline for level one (class availability, syllabus, class glossary and staff information) came due at the end of January in year 2. Level 2

involved making announcements, using the discussion board, and providing websites to expand student involvement with the content being taught and would become required at the conclusion of year 2. The two old websites previously developed for staff and students were retired so that Blackboard would become the primary communication platform for the school. The school's technology trainer believed the levels were reasonable and very well paced in terms of everyone's technology skills, making sure that, regardless of the content being taught, there was a fit to Blackboard.

While it was the ninth week in the first year and the fifth week in the second, for year 3, laptops were distributed during the fourth week as soon as registrations and class schedules had stabilized. A new direct connection between the attendance program and Blackboard also meant that class lists could be easily updated from the attendance program. Ultimately, Blackboard became integrated into the entire student information system. However, as teachers had become more and more comfortable in integrating the laptops, having to wait four weeks until the students had their computers continued to be problematic. Pushing teachers to integrate the laptops and then removing them for four weeks so that teachers had to readopt old methods was clearly counterproductive.

The laptops themselves were now in their third year of being used by teenagers. Like any machine that gets used a lot, the rate of repair goes up. The number of new laptops to replace lemons or unrepairable machines made available through the contract with HP had also been dwindling. This would become a real issue by year four. Because of the feedback from both teachers and students about laptop repairs as well as expansion

of staff at the help desk, the length of time to fix a computer shrank to mere hours and no more than one or two days – a clear improvement over the first two years. A computer monitor was mounted in the help desk window so that students could see if their laptop was ready for pickup, and the list of laptops ready for students was also posted in Blackboard (and updated every fifteen minutes). When a student turned in a laptop for repair, a form was given to the student to keep and show the teachers as proof the laptop was at the help desk – and not at home or in their locker.

Although the number of servers had grown to support the network and laptops, several participants had noted the network speed was getting slower and slower. One reason was all the firewalls to block students from inappropriate websites. By year three, proxies had become a big problem in which students went to an appropriate website and used that to gain access to other sites that would normally be blocked by the school server. The network manager said he tried to block 5-10 such host sites a day, but then another fifty would pop up. A TRT described the situation like having fingers in a dike. The upside for all the firewalls was that viruses had decreased as a problem. In the first year, the system was shut down for a week because a teacher had brought in his own laptop and plugged it into the network. However, in years 2 and 3, there was no system downtime because of viruses. Yet, as the technology staff has noted, it continues to get harder and harder to keep them out. Viruses can gain entry when people sign up for listserves, or they could come in through the 500,000 emails the system receives daily. The firewalls blocks about 20-30% but this again has slowed the system down. Every

student and teacher laptop has a virus program which automatically starts when the computer is turned on weekly. But many students did not understand the function of this program and often turned it off before its scan was completed. In addition, the state was now requiring all schools with computers to develop a means of teaching students Internet safety. While not an issue in year 3, TRTs anticipated the push would get stronger in year 4.

One TRT felt that perhaps trying to restrict everything in sight and stay ahead of very enterprising students might not be the best way to handle this issue. Taking such an approach removed responsibility from the students for their behavior and choices. She believed that the staff could keep barricading the walls forever, and the students would keep finding ways around those walls, and then the staff would build more walls, and the process would be endless. She asked, “Would they understand how to set boundaries and be responsible with a computer from the choices we make at school?” In some way she felt, everyone must find a way of connecting appropriate consequences to bad computer behavior. The solution many teachers have tended to rely upon is to remove the laptop from the student but this can create a ripple effect, as then the student will not have the laptop for their other classes that day or even in some circumstances that week. For the other teachers who had planned on that student having a laptop, this could end up punishing the wrong people.

Staff development in year three focused on Blackboard training to get everyone’s skills meeting the requirements of level 1. In the spring, all teachers had a half day

mandatory level 2 training workshop and the option for a half day to help put level 2 requirements into practice. Because of the new principal's push to introduce a literary curriculum to the school, there was also staff development once a month on literacy and its applications, value, and focus for high schools. A Literacy Council was formed to help with the staff development, and examples of literacy were presented by teachers at the training sessions. Another change that many teachers had to cope with was the requirement by the College Board that every AP teacher present their curriculum for approval in order to upgrade the meaning and standards of AP courses on a national level. In addition, the stress over the move to the new building was growing as instructions for packing and room assignments began to filter through the faculty.

At the end of year 2, over twenty teachers had requested a classroom set of laptops for their final exam review and testing. Anticipating that this number would continue to increase to where providing such classroom sets would become impractical, the laptop collection process was conducted the last two days of final exams at the very end of the year. Some teachers felt yet more was being asked of them to collect all the laptops, power cords, and telephone cords, and then make notes of who had turned in what. However, the technical staff went to great lengths to make the process as simple and easy as possible for the teachers. As with any new process, this would be further fine tuned in the fourth year.

Because Jesse Jackson and Susan B. Anthony had a shortened school year but the rest of the district ended in mid June, the collected student laptops were taken to the two

middle schools and used for the first time to conduct the social studies state standardized online testing for the 7th and 8th graders. Both of the middle schools had been extremely leery at attempting to do this. Although none of the students had school experience with laptops, the electronic tests at those grade levels were not mechanically challenging, and the experience ended up being a very positive event for everyone. Now that both middle school teachers and administrators have discovered it is not a disaster to have their students take online tests, the TRTs are sure there will be a push to do this every year and for the rest of the state standardized tests. The only problem as that Jesse Jackson and Susan B. Anthony would be back to a normal schedule the following year and would subsequently be testing at the same time as the middle schools. One solution being considered would be to use SBA's then four year old laptops just for testing which would not subject the machines to much further wear and tear.

The Laptop Future for Susan B. Anthony

The end of the third year at Jesse Jackson was also the completion of the fourth year lease cycle for Susan B. Anthony. The school board debated for some time whether to continue the program and in what manner. The board considered keeping the same laptops for a fifth year which would then bring the renewal date in line with Jesse Jackson. However, the ITS Director pointed out that the Dell computers at SBA were not that sturdy, and the screens were particularly a problem. To replace the screen on a five year old laptop no longer under warranty would cost more than the cost of the laptop itself. The city government's decision to make the city completely wireless helped send a

signal to the school board that SBA should continue its laptop program – and this was within a budget that had to incorporate serious cuts. But the debate went on for so long on in finding consensus that the decision to buy new laptops came very late in the school year.

A meeting was convened at SBA with both Susan B Anthony and Jesse Jackson teachers, administrators, and the technology departments to figure out what kind of laptop SBA teachers wanted for the new cycle. It was also hoped that this time the machine would also be the one eventually chosen at Jesse Jackson at the end of their subsequent fourth year. The consensus was that everyone wanted a machine that had the minimum amount of down time for any reason – breakage, durability, batteries, etc. People were not particularly concerned over which machine would be chosen, but the durability of both the Dell and HP computers, for various reasons, was the predominant concern. The general attitude was that if the laptops were not in the classroom being used, then district had missed the boat – the best machine was the one that would keep the maximum of working laptops available to teachers and students.

Looking Ahead at Year 4 2007-2008 Jesse Jackson

The overall focus will be for Blackboard to become a totally integrated structure for the school, teachers, students, administrators, and parents. While the district had at first considered adding Smart Boards into the new Jesse Jackson building, the cost was simply too great. As a result, they have now shifted towards making available a School Pad at a considerable reduction in cost, and which provides the same functions as a Smart

Board, but also allows the teacher and the screen to be mobile. In addition, the company markets class sets of clickers so that students can individually respond to a PowerPoint set of questions; the system records all the answers; and then it displays them on a table in the slide show. At the last faculty meeting in year 3, the staff were each given a clicker and asked to respond to various questions about staff development for the following year. The responses were quite revealing in that everyone seemed quite tired of endless staff training and wanted only very specific things taught.

In the original plan for the new Jesse Jackson, every classroom was going to have a television electronically connected to the library. However, the new principal instead fought for every class to have a LCD projector with ceiling speakers and a control pad. He explained that it took eight months to get the televisions out of the five year old plan. Every new school these days has the same problem, he said. They have to re-examine their technology infrastructure plan because it is already out of date by the time it is ready to be implemented.

The science department which has been a leader in integrating the laptops in many ways is now planning to do the Earth Science quarterly assessments through Blackboard's testing function. The data will not only tell the teacher how students did on each question but also where the problems lie. However, because creating tests on Blackboard is labor intensive and has a learning curve, the school district has invested in a program called Respondus. It simplifies the production of many kinds of quizzes and can easily be inserted into Blackboard. Some of the staff development planned for year

four will focus on this program so that other departments will start using Blackboard to conduct testing. Taking such online tests also helps students become facile with online testing.

Another initiative started by the principal as a pilot program in the third year, was creating paperless classrooms – Paper Independent Classrooms (PIC), see Appendix I. A small group was set up that met regularly and has grown successful with the program. Now the idea is spreading around the school with the original group acting as mentors. The idea is growing without any pressure being put on the teachers by the administration. While none of the pilot classes have become truly paperless, the initiative marks a major sea change for teachers in terms of the resources they use, and how those are employed to help students learn.

In the third year, the principal began a pilot project with Virtual High School for two students to receive instruction through distant learning courses. In year 4, the priority is to expand this program, training teachers, and offering some online classes through the old study hall blocks. The intention is to 1) eliminate the archaic study halls, 2) allow kids to follow their own interests similarly to what they'll be able to do in college, 3) do this at Jesse Jackson, and 4) be able to conduct the program without adding staff, classrooms, or the requirement for additional skills. In addition, such online classes cost much less and can offer considerable greater content variety.

In partnering the laptops to literacy, the web based software program, Achieve 3000 (also known as TeenBiz), was provided to all teachers in the third year. This new

program has a number of teething pains for use at the high school level, and the reading specialists are working closely with the company to make the program more user-friendly. In the fourth year, another electronic program, Reading 180, will be supplied to students with literacy challenges, especially those in ESL or Special Education. The principal believed that reading lexiles are the key to raising literacy, and both programs work using lexiles. He explained that parents and their students get this system easily – this is my student's lexile score; this is the lexile score of the textbook; and this is what the job is to bring those into balance.

The ultimate goal is the acceptance of concept that schools never close and learning never stops. The city government decided that by the 2007-2008 school year, the entire area would become wireless with free Internet access for students anywhere in the city 24/7. This would mean students could log into Blackboard anywhere they wished – at home, on the bus, in a hospital, on vacation. Because the log in would take them through the school's server, they would have the same protections as when they access the network at school. The former principal commented that the city's intention to go wireless is a message of the level of commitment from within the city's governance structure to technology and, in particular, the laptop program. He feels that some of the staunchest critics of the laptop program have at this point either resigned themselves to the fact the program is going to stay particularly in light of the city's wireless investment, or they have begun to see the longer term benefits. In the fall of 2005, a very important benchmark in the laptop program was the change in name requested by the school board

to the High School Technology Integration Project. This name change shifts the focus from laptops as a tool, and more towards using those tools towards the goal of instructional integration.

Growing Pains and Potential

One administrator so ably put his evaluation of the laptop program like this, “Every step expands the possibilities, expands the work, and expands the problems. But it also expands the potential for success, and provides space for creativity. I think we’re so far ahead of so many other places, but we’ve got so much more to do.” He can hardly wait to see where the school will be in five years, even though he knows it will involve a phenomenal amount of work.

Ultimately, he believes the problem to solve is electricity. The new building will have mounted LCD projectors, but then how does the system get electricity to the projectors because the building was wired for televisions. And as the demand to use the laptops goes up, so does the need for ever more electricity. Internal laptop batteries are fairly cheap but do not last very long, and they do not have much of a warranty so the school ends up replacing them almost every year. Valence batteries (the ones in the battery tower) can last two to three hours, but they cost \$225 each. The school goes through a lot of valence batteries due to theft and breakage, and, once past the two years warranty, the school is stuck again on the electricity question and how to manage it.

The district has been informally considering a conversion to tablet computers when the various leases for the Dell and HP computers lapse. The administrator had just

received a Tablet PC but discovered that it used a different adaptor so none of the current batteries would work – which would mean purchasing yet more batteries along with the tablet computer. He believes that the best answer for schools would be a thin client tablet PC computer. It is at half the price, ten times as sturdy, with no moving parts, and the hard drive is basically a flash drive. The machines are more durable and will run off virtual servers. In addition, the batteries last 10-12 hours so the tablets would eliminate the need for more batteries. Because everything is done on the servers, this would make updating programs, keeping viruses out, and supervising student work and access to the Internet so much easier and cost effective. However, the tablets would also mean the students could not use the computers anywhere except at school unless the citywide wireless system did become established.

The district's Instructional Technology Coordinator believes that a very important key to a laptop program's success is the ongoing support of the principal. Jesse Jackson has been very lucky to have both the former and current principals firmly behind the program. She believes that the program will become more seamless in the next few years. The program and the school will attract teachers who will want to use tools like the student laptops. For her, the lessons learned have been 1) make sure all the stakeholders are on board; 2) make sure there is a professional development plan that is supported and meaningful to teachers in line with what they are already doing; 3) there are tools to maximize using the laptop, like Blackboard and the interactive classroom, and 4) there is

something for every teacher in all content areas and at all skill levels, from novices to the very experienced.

One area she would like to build upon is the support for students, especially those just learning how to use a laptop computer. She believes that while everyone assumes that all the students are fully tech-savvy, this is not the case. Another direction for training is to begin promoting students to become technology resources for the school, the students, and the teachers. Regarding professional development, she notes that teachers are like students – they need training in multiple modalities. Some of the teachers are independent learners and like to figure things out their own way. Others need to come to a workshop, geared to their specific needs, a couple of times or they may need one-on-one assistance in their teaching to make the transition. But what often gets in the way is the manner in which teachers are trained. Teachers are instructed to differentiate for students, provide for different learning styles, and avoid lecturing – as it's the least effective way to get students to learn. But, all too often, those ideas get thrown out the window, and teachers end up sitting through a one-size-fits-all mandatory lecture that can leave them either frustrated or having given up. Her goal is to continue to fine tune the technology staff development plan so that training becomes ever more effective to increasingly larger groups of people.

A consistent theme appeared within many administrator interviews about the complexity of the laptop system and all its component parts. In general, the system can lack fluidity in communication among all the players – central office, satellite offices and

within the schools themselves. Often one hand does not know what the other hands are doing, and they bump into each other. Likewise, Blackboard allows a lot of resources to be made available to teachers and students. However, what a teacher constructs within his or her Blackboard classes can not be easily shared with other teachers. Among such class resources are websites for students to use. One suggested idea is the technology staff to maintain a list of websites that would be useful across a department or across the curriculum. This is currently performed in a very limited fashion, but, for the most part, each teacher has to develop and maintain their own Internet resources.

The former principal believes that if you go to your weakest link – which is not meant negatively but where there is the greatest need – and you can make that work, then the rest should, for the most part, come a little more easily. At the beginning, there was not much discussion with staff about whether they wanted a laptop program or not. It was, “We’re going to be moving in this direction, and as you’ve heard me say in school many times – the train is leaving the station and you need to be on the train.” But with such a major change, it is important to also understand that for some people it is going to take time. “You do not just mandate it, require it, hop right on it, and end up making people hate it. You try to get them to buy in and see what laptops can do for them; you try to get others who’ve had success to talk about these successes with their fellow teachers.” An administrator spoke of a math teacher who had been teaching for 41 years, and probably had a state standardized test pass rate of around 95%. Why should she change so much that has proven effective? She had never had a computer and hated the

idea of using one. But she just said, “Well, teach me. I’m on board here because I don’t know anything, and I want to tell you what you need to teach us!” So she’s taken the training, and she is using the laptops in her classroom.

At the same time, the principal understands that teachers have very busy jobs, so the more you can give them other tools without making it such a burden to learn and the benefits are clear, the better your chances are of those tools being used. If teachers go to a workshop and they’re told they’ve got to do this, and they’ve got to do that...and school opens the day after tomorrow by the way – then things are not going to change. The problem with many of the initiatives of this sort is that the people who are putting these in, paying for them, and evaluating to see if the initiative has been successful – they want the initiative to be implemented immediately, and three months later they want to see some signs of success. The first year of the laptop program marked an opportunity for the teachers to casually play around with the machines and get over the initial shock. The second year things got more serious, and Blackboard was introduced. Year 3 everything went up a notch in focus and now he believes the schools are at a kind of tipping point for the laptop program, where either everything is going to break free and go wild, or it will not.

The current principal had tried unsuccessfully to start a three-phase laptop program at his previous high school in which Phase 1 was an interactive classroom for every teacher. This meant an LCD projector with some means for the teacher to be able to walk around and control the presentation through a wireless system. Phase 2 was to be

a laptop for every student that would fit into the structure in phase 1. The final phase was to provide 24/7 access for students and their families. When the principal came to Jesse Jackson at the start of year 3, he found phases 2 and 3, but not phase 1. Out of almost 200 teachers, there were only 15 classrooms that were interactive. It was not the teachers' fault or the school system's fault – it was a technology issue, and that is why the principal has pushed so hard for every teacher to have a projector and a school pad or other tool in the new school. Then, he believes, there is a convergence operating of hardware, software, wireless, and web based technologies. As the technology spreads into the laptop program, the software resources improve and get more sophisticated, and the Internet supplies ever more complicated and effective resources. At the same time, everything gets faster and more powerful.

One of the ongoing problems he has found in this whole process is the lack of textbooks with electronic versions which particularly gets in the way for paperless classrooms. The principal believes if the laptop program is viewed as an appendage, as something added on and is not integral to all the decisions being made within the school, then holes develop in the system, and things will not work well together. The technology staff and trainers are excellent, but the material will not get retained unless the teachers make use of it, and, without the proper tools in place, this becomes very difficult for everyone. But the principal feels this will change as the holes are filled in.

The ITS Director's biggest complaint is the dichotomy between the technical staff and the people who actually use the technology. Most people (including the director)

approach technology as “You push the button; it comes on; and it does what it’s supposed to do.” They do not care if the server is down unless it interferes in what they want to do. The technology staff members, who are great and come up with really good ideas, somehow have to find a way to take the terminology out of the technology and make it simple – and that’s really hard to do. Another frustration is school systems having to convert computers designed for business into machines that are user friendly for educators and students. He believes that if a computer company would take the risk and design a cheap but effective laptop for schools, not only would the company make a lot of money, but there would be an explosion of laptop programs throughout the United States. His last concern is how to find a way to determine if the laptops are really worth the investment. If the principal’s use of lexiles raises reading scores up several grade levels, and it’s primarily done with Achieve 3000, then the laptops are making good on their promise. When students go home and their parents ask them what happened in school, very soon the students will be able to easily pull up Blackboard and show them exactly what had transpired – this fosters communication and again points to the value of the laptop program. But it will take time and experience to nuance out the finer benefits of every student having their own laptop.

The director believes that people his age (digital immigrants) who run the school systems of America are saying, “I learned with paper and pencil. I still use paper and pencil at work. Why do I need a computer? Why does my kid need a computer? He’s not going to learn any more than I did.” But, twenty years from now, when their children

have finished school and they're living on their personal data assistants (PDAs), their smart phones that do everything, and using the Internet for activities from communication to shopping – that's when things will finally change because computers and other technology will be a standard way of life. And our school, he believes, is helping everyone involved – teachers, students, administrators, and families – move in that direction.

Appendix I – The Paperless Classroom Initiative

The Paperless Classroom Initiative is defined by these six components:

- * Maximize best use of technology for instructional purpose
- * At least 80% of student work submitted electronically
- * At least 80% of teacher material available electronically (rubrics, handouts, notes, tests)
- * Student-teacher communication enhanced through email, discussion boards, blogs, and/or wikis
- * Technology provides students and teachers with medium to represent ideas in multiple ways (simulations, multimedia projects, video, audio, primary resources)
- * Daily use of student laptops

Appendix J – Teacher Feedback Group Reports

The teacher (and student) feedback group met several times in years 2 and 3. The agenda for the first meeting is presented first, followed by the minutes from that meeting. In year 3, the teachers also met to discuss the new laptop options for Susan B. Anthony, which was reaching the end of its four year cycle. These minutes are also presented below.

Teacher Technology Focus Group

Agenda - April 25, 2006

Welcome and Introductions

- Name, subject, years teaching, comfort with technology
- Purpose of this group and this session

What's working?

- In small groups discuss what is going well with the High School Technology Integration Project. Try to consider the following topics as well as any other topics you feel are important.
 - **Software** -- What software are you and your students using effectively? How is this software enhancing instruction? What are the benefits of the software currently available to students and teachers?
 - **Hardware** -- What about the way the laptops are configured has made teaching with the laptops useful and efficient? What other hardware do you have access to that has enhanced your instruction?
 - **Training** – What kind of training have you found most helpful? What training has translated into new classroom practices?
 - **Communication** – How has communication improved with the laptop program? Consider communication with students, parents, colleagues, administration and the Help Desk
 - **Other areas?** What other aspects of teaching and learning have been improved with the laptops?

What do you want to see improved?

- Continue in your small groups by brainstorming ideas you have about improving the High School Technology Integration Project. Use the same categories as above to organize your thoughts.
 - **Software** – What software would you like to see put on the students' laptops? What software that we currently have would you like to see updated or changed in some way?
 - **Hardware** – What ideas do you have about how the laptops are configured that you think will allow you to use the laptops more efficiently for instruction? What other kinds of equipment would help you enhance your instruction?
 - **Training** – What kinds of training would you like to see offered? What times/days for training do you find most beneficial?

- **Communication** – What suggestions do you have for how communication could be improved? Again, please consider communication with students, parents, colleagues, administration and the Help Desk
- **Other areas?** – In what other ways would you like to see the technology initiative improved? What ideas do you have about where this initiative could go in the future?

Teacher Focus Group 4/25/06 Meeting Minutes

Topics	What's working?	What do you want to see improved?
Software	<ul style="list-style-type: none"> - Inspiration - Office suite - Blackboard - Sketchpad - Grammar 3D - Type to Learn - A+ - Explore Learning (site) - Atomic Learning - Data logging software (science) - Professional email for colleges (no sxygrl88) - Blackboard makes students more self-directed and take responsibility - United Streaming 	<ul style="list-style-type: none"> - Dept specific software (on everyone's or no one's) - Graphic tablets - AP exam software - Electronic textbooks (on laptop instead of online) - More teachers using software (better equipped to use it, bring laptops more) - Monitoring software - Access to funds for buying online software - Student email used for instructional/informational purposes (students are using it for chat rooms and plagiarism) - Green Globes (Jesse Jackson) - Photo Story 3 - Real Player - Easier to get new software to students throughout the year. - Teachers should be trained and involved in software selection - Blackboard doesn't meet the needs of all depts.

Hardware	<ul style="list-style-type: none"> - LCD projectors - Science hardware (mini cameras in microscopes) - Grading on computer - Printer access from anywhere - Valance batteries (SBA) - In box submissions work 	<ul style="list-style-type: none"> - Too many laptops down everyday (2-3 per class) - Teacher to teacher file sharing (outbox) - USB ports - Better way to give students notice about laptop repair (print notice) - More hardware (scanners, printers, tablets,) - Batteries (more at Jesse Jackson) - Battery lockers waste time - Kids not bringing laptops - Destruction & abuse of laptops
Training	<ul style="list-style-type: none"> - Glad became dept specific instead of menu-driven - Desire to provide training good - Online training good - Blackboard training - Microsoft training on grading papers 	<ul style="list-style-type: none"> - Needs to be more specific for a skill or a piece of hardware/ software - Some content areas don't need to go to some training sessions – ex. Math teachers going to an hour-long session on plagiarism→ so maybe more options/freedom in choosing what we can go to and what will be useful for us - Differentiated for different levels of comfort with technology!!! – some need more training than others w/ certain programs <ul style="list-style-type: none"> - Blackboard training needs to be - more flexible
Other ideas		<ul style="list-style-type: none"> - Giving students the laptops at the beginning of school. - Students keeping laptops until the end of school.

Teacher Feedback Group: Discussion of New Laptop Lease

4/12/07

Minutes

Purpose-- to gather additional teacher input for the selection of the new laptop lease.

Background: Both schools held teacher focus groups over last 18 months, parent focus groups, student focus groups, Metiri consultants have observed/evaluated technology use at both schools. Current laptop lease at 9th grade school is up for renewal-- this meeting will determine teacher priorities for new laptop hardware.

Major Discussion Points:

1) **Survey Results:** The information technology coordinator went over the results from a teacher, student, and parent survey about laptop hardware. (#1 issue= Batteries, then weight, then screen size, then user input)

2) **Durability:** Protective cases for laptops-- what are options for making it as durable as possible? Example: Concern about hinges breaking at Jesse Jackson. A Susan B. Anthony teacher suggested Panasonic tough books, more expensive, but much more durable. ITS response-- they are looking into options that offer more protection for the laptop, even some protective cases that are a part of the laptop not unlike a book cover.

3) **New ranking of hardware priorities.** 1st= battery life, 2nd= Durability, 3rd= Weight. It is apparent that keeping the laptops in circulation was the most important consideration in the ranking process.

4) **Misuse Consequences/ Alternatives for distribution:** A teacher suggested distributing laptops to students in 9th grade that they would keep until their senior year. She commented that this would make students more responsible about equipment use, and would be fair to students who take good care of their laptops. ITS response-- they are considering this option, but it is logistically difficult to do. They recognize that regardless there will need to be more repercussions for laptop damage (state has new requirements too). The school district will need to write up consequences that would be there if laptops are broken, lost, damaged-- must be in place before next year.

5) **Batteries:** huge issue at Jesse Jackson — interferes with usage. Alternatives to cabinets? ITS response-- ideally manufacturer will provide a longer battery life

with new laptops.... ITS staff is looking at 10 hour batteries with 2 1/2 pounds of weight.

6) **Textbooks and laptops:** teachers wanted more textbooks available online or on CDs on the computers. Said this would make a huge difference in laptop usage and in getting students to bring them to class. The weight wouldn't be an issue if students are carrying just laptops and not books too. ITS said textbook companies are not cooperative in getting books onto laptops. This has been a struggle in many districts with laptops.

7) **Upcoming Dates:** April 30th is last date for new software requests (requests can be made online with the software request form). ITS outlined the schedule for laptop distribution (as early as two weeks after the start of school) and for summer imaging of the new laptops.

8) **Teacher Input:** ITS, is anxious to hear from teachers not just about laptop itself but about usability and other suggestions. They actively consider these and revisit them. ITS reminded teachers that they start from scratch every year, because software available changes every year. Maybe we won't need to lock them down as tightly with new software. More flexibility while maintaining security is the ultimate goal. People talk about USB port.... This port is disabled because there was no software way or operating system way to differentiate the use of that port-- used for legitimate and not for things that cause trouble. Need to experiment to know whether that could be possible. Need to maintain level of protection.

9) **Laptop Orientation:** SBA's TRT suggested setting up training process for parents and kids... Need to be able to have time to create very clear instruction for kids about the laptops (orientation). ITS — This need really came out in student focus groups-- kids don't have clear understanding of what is available, how to use R drive, etc. We have funding to support teacher created instruction, it would be great to have students in the video teaching students about laptops. ITS -- anything we can do in the 9th grade carries over-- less of an introduction in the 10th grade....

10) **New Wireless Access:** ITS talked about Wireless Access from home -- what this means for student computers (each computer will be able to pick up a special secure network throughout the city -- same as access at schools) They should be able to the network from their home with their laptop (in bounds of city). ITS — Student resources such as access to drop-box, server access, everything they can get at school will be available at home. It eliminates divide... they operate the same way from their home or elsewhere in the city as they would here at school.

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CURRICULUM VITAE

Nancy I. Foote graduated from Ottawa University, Kansas, receiving her Bachelor of Arts degree in 1970. Four years later, she received her Masters in Teaching degree from the School for International Training, Vermont. Over the following twenty years, she helped build the organization, Greenpeace, into an international force for environmental change. Eight years ago, she became a high school English as a Second Language teacher and received her Doctor of Philosophy degree from George Mason University, Virginia, in 2008.