Rural Virginia Middle School Teachers' and Students' Perceptions on the Influence of One-to-One Computers in the Classroom

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Abstract

Children of the 21st century are digital learners and have various technologies at their fingertips. As a result, classrooms have evolved and school systems are equipping students and teachers with the technological tools that are believed to meet the needs of 21st century learners. However, researchers say there is still a need to examine students' and teachers' perceptions of, and attitudes about, technology and its use in the classroom (Maninger & Holden, 2009). There has also been a growing interest in knowing if the investment of the technology is having any positive effects in the classroom, what effect technology has on academic progress, and understanding what teachers and students think about the implementation and integration of technology in the classroom as an instructional tool.

The purpose of this study was to examine the perceptions of middle school teachers and students, in a select rural Virginia middle school, on the effect that one-to-one computing had on the frequency and type of instruction that is taking place in the core areas of English, math, science, and social studies. The study also looked at the teachers' and students' perceived effect on the educational performance of individual subgroups. A quantitative analysis was done using an electronic survey, which provided information on the perceived frequency and type of educational activities using one-to-one computers and the perceived effect one-to-one computing had on the educational performance of different subgroups. Questions on the survey were developed by correlating the theoretical ideas of Bloom's taxonomy / Bloom's web 2.0 technology pyramids and then categorizing the questions so the complexity of the questions could be looked at on the range of use chart. The research found, of the students surveyed, 90% of English students, 78% of math students, 75% of science students, and 77% of social studies students found the computers to have a positive effect on their academic performance. Therefore, one major finding of this study was that students' perceptions of the overall effect of one-to-one computers were positive.

Dedication

I dedicate this dissertation to my wonderful family. To my wife Jenny who offered support, encouragement and had the patience to hear about my dissertation over and over and over for the past three years. My daughter Stephanie, whose opinion I greatly value, for being my educational sounding board by allowing me to talk about ideas, concepts and educational theory, and then giving me her opinion of each. Also for the numerous hours she spent reading and editing this study. Finally to my son Andy, whose help kept me grounded in the real world. He helped me balance everyday life and the work on this dissertation. Without all their support and encouragement this life goal of mine would have never been met.

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Chapter 1

Introduction

In 1985 the Apple Classrooms of Tomorrow project was completed (Apple Computer, 1995). This was the first major study on computers in the classroom for use as an instructional tool. In the years since this project, many technological advances that benefit education have been made. Perhaps the most important contribution to education is the development of the laptop computer, followed by the connectivity that now exists in the world. This allows students and educators to almost instantly access the World Wide Web, compose and store information, and share documents so that collaboration with other students is possible.

Although access to the Internet continues to grow, there is still evidence of the socioeconomic and racial digital divide. Only 25% of America's poorest households have access to the internet as compared with 80% of those households earning $75,000 or more. Racial inequalities exist as well, with 40% of African Americans reporting online access compared to 60% of Caucasians (Cooper, 2002). School systems are finding a way to bridge this divide. They are finding a way to introduce technology into the lives of all their students.

In 1998 Virginia began an assessment system called the Standards of Learning (SOL) tests (Virginia Department of Education, 2005). The primary focus of this assessment system was to increase the standards across the state for all students. The SOL's allowed school systems to look at the overall achievement gap by comparing scores on the SOL test that is given at the end of each year, thus comparing the progress of all subgroups. In recent years school systems have developed an interest in the effect that technology is having on the academic progress of the sub-group populations, and what are the perceptions of the teachers and students on the implementation-integration of technology into the classroom as a strategy or instructional tool. Despite the concern about the validity of standardized testing as a measure of the success of one-to-one laptop programs, there is mounting evidence that, when the technology is used effectively, these programs do bring about improvement even in tests which seek to measure only the more basic skills (Suhr, Hernandez, Grimes, & Warschauer, 2010). Dunleavy and Heinecke (2007) proposed the question: "Do ethnic, economic, or gender based subgroups benefit more or less with the introduction of 1:1 computing?"

One of the goals of this study was to focus on the perceptions of the primary stakeholders, teachers and students, at the instructional and educational level. Examining the perceptions of a target audience is a widely used strategy based on the premise that perceptions matter and often influence behaviors (Savery, 2002). Business dictionary.com (2011) defines perception as the process by which people translate sensory impressions into a coherent and unified view of the world around them. Though necessarily based on incomplete and unverified information, perception is equated with reality for most practical purposes and guides human behavior in general.

Statement of the Problem

Despite the money and effort spent to comply with No Child Left Behind (NCLB), few observed effects on teaching and learning with technology have been documented. Researchers have examined two possible factors to explain this: a) students' and teachers' perceptions of, and attitudes about, technology and its use in the classroom; b) how these attitudes translate into practice over time as reflected by teacher integration of technology and student achievement (Maninger & Holden, 2009).

Despite growing interest in and around one-to-one computing, little published research has focused on teaching and learning in these intensive computing environments (Bebell & O'Dwyer, 2010). Additional research needs to be completed to add to the ever increasing body of evidence on one-to-one computing. Research does indicate that technology programs help shrink the achievement gap between the at-risk and non-at-risk students (Neill & Mathews, 2009). Does one-to-one computing have an effect on the sub-group populations of our schools? Dunleavy and Heinecke (2007) have listed that further research needs to be done in the area of at-risk students when it comes to 1:1 computer research.

This study provided knowledge on the effects of one-to-one computing. This was done by looking at the frequency that different instructional strategies were being used, and by finding out the perceptions of the teacher and students on the effect that one-to-one computing was having on the students' performance.

Significance of the Study

This study is significant because it gives administrators the data they need to support important decisions within the educational environment of the school. This study asks students and teachers about their perceptions of the effectiveness of one-to-one computing in an educational setting. The perceptions of these two user groups may be a primary factor in the school board or governing body's decision to adopt or continue with a one-to-one laptop program. Student and teachers perceptions, beliefs, motivations, and attitudes are constantly changing. It is the responsibility of educators, at any level, to measure these variables continuously in order to enhance the learning environment (McCollum, 2009).

Additionally the analysis of the perceptional data, by subgroup, may help to determine how to minimize the digital divide that exists in our schools. Balancing the skills of all students, some of whom may not have access to computers outside of school, will help in narrowing the digital divide. Students at the middle school level (grades 6-8) in rural Virginia school districts that do have one-to-one access to computers share the computers either in fixed or mobile labs. These mobile labs are computers on wheels (COW) that can be moved from room to room. These mobile labs are commonly called COW carts. During the 2011-2012 school year only two rural Virginia middle school districts offered one-to-one or ubiquitous computing to their students (see Appendix A). As technology access and demands in the state and world increase it is the responsibility of each of the school districts to educate all the students on accessing and analyzing information from the World Wide Web. The development of the World Wide Web increased the use of one-to-one computing by providing students and teachers immediate access to vast information. Overnight the basic problem in gathering data changed. John Naisbitt claimed that we are drowning in information but starved for knowledge (Naisbitt, 1984).

Finally, the data will help determine what professional development needs to take place within the school. Professional development may range from teaching the teachers how to use the computer to assess information themselves to how to use the computer as a teaching tool within the classroom.

Purpose of the Study

The purpose of this study was to examine the perceptions of middle school teachers and students, in a select rural Virginia middle school, on the effect that one-to-one computing had on the frequency and type of instruction that is taking place in the core areas of English math, science, and social studies. The study also looked at the teachers' and students' perceived effect on the educational performance of individual subgroups.

By surveying teachers and students the following research questions were explored:

Research Question 1: What are the perceptions of middle school students on the frequency and type of use of one-to-one computing in the classroom?

Research Question 2: What are the perceptions of middle school teachers on the frequency and type of use of one-to-one computing in the classroom?

Research Question 3: What are the perceptions of middle school students, by ethnicity, special education status, and gender that one-to-one computing is having on overall student performance in each of the core classrooms (English, math, science, social studies)?

Research Question 4: What are the perceptions of teachers on the effect that one-to-one computing is having on the academic performance of students by ethnicity, special education status, and gender?

Theoretical Framework

A theoretical framework is a set of terms and relationships within which the problem is formulated and solved. Bloom's taxonomy would be such a framework. Educators are familiar with Bloom's Taxonomy (1956) since it has been and continues to be used in the educational field to develop lesson plans. The original Bloom's Taxonomy (1956) pyramid, shown in Figure 1, provides the different stages that learners undergo to achieve basic knowledge, obtain understanding, implement knowledge through actual applications, think and analyze critically, synthesize information, and evaluate newfound knowledge (Devitre, 2008).

Figure 1. Bloom's taxonomic pyramid.

Lorin Anderson, a former student of Bloom, revisited the cognitive domain in the learning taxonomy in the mid-nineties and made changes that included two significant contributions: the use of verbs instead of nouns, and the rearrangement of two domains (Clark, 2010), moving creating to the top of the pyramid. We now have a new, but still time tested taxonomy, which informs everyone involved in the education of children about what the children should be doing. A comparison of the original Bloom's and Anderson's changes is Table 1.

Table 1

Bloom's Modification Table According to Anderson

Bloom's Original Domains	Anderson's Changes
Evaluation	Creating
Synthesis	Evaluating
Analysis	Analyzing
Application	Applying
Comprehension	Understanding
Knowledge	Remembering

Based on the table above, the first tier, Knowledge, was replaced with Remembering. This was followed by the second tier, Comprehension, which was replaced with Understanding. The third tier, Application, was replaced with Applying. The fourth tier, Analyzing. The fifth tier, Synthesis, was moved to the sixth tier and replaced with Creating. Finally, the sixth tier from the original domain, Evaluation, was moved down to the fifth tier (in the new domain) and replaced with Evaluating (Clark, 2010). With the idea of Bloom's altered Taxonomy and the integration of technology into today's society, Penney has taken the verbs used in Anderson's modification of the original Bloom's taxonomy and created a new Web 2.0 technology pyramid (see Figure 2) (Penney, 2010). This image's newfound status is related to the relationship and relevance that is shown between Bloom's Taxonomy (1956) and web 2.0 technologies.

Figure 2. Bloom's digital taxonomy pyramid.

The Bloom's digital taxonomy pyramid illustrates the relationship between Bloom's Taxonomy and web 2.0 technologies. The web 2.0 pyramid provides a useful theoretical framework to analyze student technology use for learning, especially for learning different subjects in school. This is the case in one-to-one computing classrooms where students work on, play, and learn from their own computers. It is impossible to study the effects of technology in isolation of the context (Lei & Zhao, 2008). This new generation is growing up digital (Tapscott, 1998). Students of this generation are technology-savvy and reliant upon technology as an essential and preferred component of every aspect of their lives (NetDay, 2004, p.6). To this new generation, there is no difference between play and learning. They have been learning from playing and have been playing while learning (Lei & Zhao, 2008). It is the job of the educator to create a technological learning atmosphere where the students think they are at play. The new

Blooms Taxonomy (1956) and Web 2.0 Technology pyramid are great resources to (a) support teachers in identifying effective and meaningful web-based applications for content mastery, integration, and enhancement, (b) develop lessons and activities that relate to students' real world experiences and different learning styles, and (c) provide students with opportunities to create and implement newfound experiences.

Conceptual Framework

A conceptual framework is used in research to outline possible courses of action or to present a preferred approach to an idea or thought. Figure 3 is a visual representation of such framework (Virginia Department of Education, 2008-2009). This framework can be used by both the teachers and the students. By looking at the X, Y, and Z axis the importance of the instructional strategies in the classroom is clear. The X axis measures the didactic level of teaching, which ranges from inclined to teach or lecture others too much to the constructivist. A constructivist argues that humans generate knowledge and meaning from an interaction between their experiences and their ideas. The Y axis measures the complexity of the teaching from basic skills like memorization to higher order thinking skills, which would be problem solving or creating. The Z axis measures the instruction from an artificial standpoint, from worksheets to real world context, which allows students to put information they have gained into a real world setting, application of knowledge.

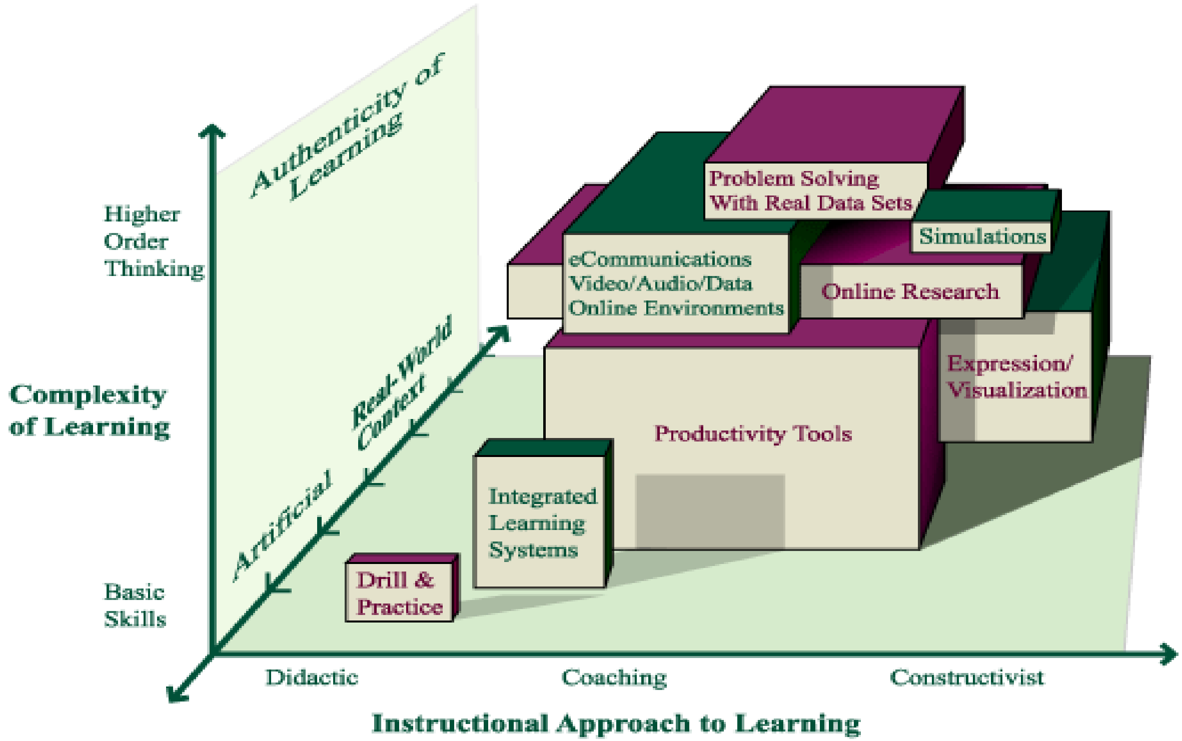

Figure 3. Range of use chart.

The range of use chart is being used for the introduction of technology into a one-to-one computing classroom. The data representation is in box form looking at the three dimensional aspect of where the individual instructional strategy or student assignment would fall into the graph. Drill and practice fall into the lowest of all three of the categories as a basic skill, artificial learning, and didactic, in comparison to problem solving using real data sets. This falls into higher order thinking skills, falling into real world context, and leaning more towards the constructivist end of the scale. This conceptual model will be used as a base for developing the research questions.

Limitations

Several limiting factors may have affected the outcome of this study. Sample size of teachers was not ideal. Even though 100% of the teachers participated in the study this was only a total of 16 teachers.

Data in this study are not generalized to the entire population. This study was restricted to a specific geographic location and population. A rural Virginia middle school was analyzed.

Therefore, the conclusions drawn from data must be either localized to the individual school or compared to other similar-sized rural schools. However, more and more schools are considering one-to-one computing initiatives (Lei, Conway, & Zhao, 2007).

The information collected from this study were data collected from the second year of the one-to-one computing program. Two years may not be a long enough period of time for teachers to realize the true impact of one-to-one computing in their classrooms.

The researcher was the key implementing agent for the one-to-one computing program being used in this study, which had the potential for possible bias. Over the past two years this researcher was able to design core classes that allowed students to have one-to-one computer access while in the classroom. The personal involvement in the creation of collaborative classes that allowed students access to computers in the core areas of English, math, science, and social studies may have influenced analysis of the related phenomena. This should not influence the statistical data collected in the proposed study.

Definition of Terms

For constructivist teaching to take place, Piaget believed that knowledge needs to be acquired as the result of a life-long constructive process, in which we try to organize, structure, and restructure our experiences in light of existing schemes of thought, and thereby gradually modify and expand these schemes (Bodner, 1986). In short we learn by our experiences.

Didactic teaching is where the educator assumes complete control in setting tasks, prescribing procedures and evaluating results. This kind of teaching suits particular purposes in terms of exposition of knowledge and practice of skills, but it limits the scope of the child to benefit metacognitively from the experience (Fisher, 1998).

For the purpose of this study the phrase Middle School is used when referring to grades six through eight (Virginia Department of Education, 2012).

Net books are defined as laptops computers that are smaller than ten inches across (Manzo, 2009).

One-to-one computing is defined as every student and teacher having a computer assigned to them. The computer will have access to the internet 100% of the time that the student is working (Lei & Zhao, 2008). By definition, 1:1 computing refers to the level at which access to technology is available to students and teachers, it says nothing about actual educational practices (O’Dwyer, Russell, & Bebell, 2004).

Ubiquitous computing is defined as learning environments in which all student have access to a variety of digital devices and services, including computers connected to the internet and mobile computing devices. Ubiquitous computing includes the idea that both teachers and students are active participants in the learning process, who critically analyze information, create new knowledge in a variety of ways, (both collaboratively and individually), communicate what they have learned, and choose which tools are appropriate for a particular task. One might think of ubiquitous as each student having full time access to a computer. In this study ubiquitous computing and one-to-one computing will be used interchangeably (Research Center for Educational Technology, 2006).

Summary Chapter One

The research study is organized into five chapters: Chapter one, the introduction, gives an overview of the problem, lists the research question, and states the limitations of the study. Chapter two, the review of literature provides a current review of literature for the topic. Chapter three, methodology, establishes the framework of the study and outlines the data collection procedures. Chapter four, the results, reports the data collected. Chapter five, summary and findings, shows the analysis of the data followed by the implications and recommendation for further study.

Chapter 2

Literature Search and Review Process

Searches for the review of literature focused on narrowing the technology topic down to the specific interest of this study. Searches were carried out through the Virginia Tech (VT) web site and began with a general search on technology in middle schools. This resulted in over 400,000 journals and articles. To ensure that the research was going to meet the needs of the review, the Virginia Tech librarian was consulted. She suggested only searching within educational databases. This narrowed the selection from all data bases to the four primary data bases for education: ERIC, Teacher Reference Center, Women's Study International, and Education Research Complete. From there, a multi word search was conducted using: technology, at-risk, and middle school. The search was further limited by choosing to do a Boolean/phrase search. Boolean searches allow you to combine words and phrases using the words "AND" and "OR" to limit, widen, or define your search. The results were also limited by choosing journals that had been scholarly or peer reviewed and published between January of 2003 and January of 2010. This reduced the number of articles from over 400,000 to 33. By reading the titles and abstracts of these articles, the most relevant articles on how technology has affected middle school students were selected. These articles became the base papers. By exploring many of the references from these articles, further articles of interest were identified.

Introduction

The United States has experienced a steady increase in computer technology in schools since No Child Left Behind act (NCLB). One of the technology goals of NCLB is to improve academic achievement through the use of technology in elementary and secondary schools (U.S. Department of Education, 2001). Since NCLB, research of one–to-one computing has noted several positive effects such as increased technology use, increased technology literacy, and improved writing (Apple Computer, 2005). A study of the Berkeley wireless learning Initiative (Bebell & Kay, 2010) has found significant impacts from a one-to-one laptop program in the form of unprecedented improvement in math, English and science results. Remembering that laptop computers are not technological tools; rather they are cognitive tools that are integrated into the teaching and learning processes of the school (Bain, 2007).

Before the effects of one-to-one computing can be looked at, it is necessary to look at the major issues facing the educational world when it comes to technology in the classroom. These issues include the financial implication on the school systems and the decisions surrounding the distribution of technology, the decisions on which students will have access to technology, and how will the technology be implemented into the classroom? With today's educational budget shortfalls, tough decisions have to be made regarding the purchase of technology. Should ubiquitous computing take place or are mobile labs best? Once this is decided, a decision must be made on how the computers are distributed in the school, which students benefit the most from access to the computers, and who will be responsible for the implementation of using the computers in the classroom? If this foothold for change is to be expanded, critics must take on the big question about scalable and sustainable change. Doing so requires a new vision for education (Fullan, 2007) and technology that includes the capacities and functionalities that laptop computers and 1:1 computing afford (Kolderie & McDonald, 2009).

This review of literature provides a synthesis of multiple one-to-one computing research studies on the financial implications of technology, the distribution of technology, access to technology, and who is the implementing agent of the technology.

Financial Implications

After two decades of investments in educational technology, both the quantity and quality of technology access in public schools have increased dramatically (Fox, 2005). The decreasing cost of computers and wireless networks has made laptop programs more affordable than ever. However, despite the money and effort, few observed effects on teaching and learning using ubiquitous computing have been documented. The decreasing costs, combined with the increasing availability of wireless connectivity are making one-to-one initiatives more feasible to implement on a broad scale. States such as Maine and Texas have invested in statewide initiatives to fund access to laptops for secondary students. Large districts like Henrico County in Virginia and Cobb County in Georgia are providing laptops and digital content to all middle and high school students (Apple Computer, 2005). The number of schools supporting laptop programs will continue to grow despite the fact that technical support, teacher professional development, maintenance, repair, software, and other lifecycle costs create a significant price tag for these programs, and that evidence of their effectiveness is mixed (Zucker & Light, 2009).

Regardless of the reported effect size and individual study outcomes, it seems highly likely that some form of one-to-one computing will be the norm for the majority of American classrooms at some point in the near future (Bebell & Kay, 2010).

With the equation of technology equals money, some school districts have gone to smaller technological tools that allow for many of the same opportunities as the laptop computer. Some school systems have gone to the use of net books. Net books are not simply a solution for districts looking to ramp up their one-to-one computing programs. Net books allow students to access computer programs, connect to the Web, and take part in communication and collaborative projects. Net books along with computers do help the students with access to the web by helping bring about change. However, not all laptop programs bring about change and improvement. There are cases of schools abandoning their laptop programs due to the problems they have experienced and the costs involved (Holcomb, 2009).

When making the decision to use laptop computers or net books, it is critical to look at what the technology will be used for and what is trying to be accomplished (Manzo, 2009). Technology for the sake of technology is never the goal of a school. Nor is a goal of a school to invest the funds to provide and support computers for their students and staff if the technology is not used in a wide range of educational activities (Bebell & Kay, 2010).

Distribution Ratio

Technological and economic changes have put a premium on developing students' information literacy and research skills. Previous attempts to deploy educational technology toward these ends have proved disappointing because K-12 teachers have difficulty integrating shared computers into instruction. Research suggests that the potential of new education technologies is far from being realized in our schools due to logistical, administrative and pedagogical obstacles making it difficult for teachers to effectively deploy shared computers (Cuban, 2001). Technology, effectively and thoughtfully deployed, can improve how schools work, how teachers teach, and how students learn. Priority must be given to programs, projects, or strategies that leverage digital information or communications technology (U.S. Department of Education, 2010).

The most recent national data showed that the availability of instructional computers and Internet access in schools increased steadily over the past decade, with the student to computer ratio reaching about four-to-one and nearly all classrooms (94%) connected to the Internet (NCES, 2008). As connectivity to the Internet increased, teachers reported greater access to up-to-date instructional content in the form of online and computer-based resources, as well as content that is available to them in a wider variety of modes (Zucker & McGhee, 2005).

Russell, Bebell, and Higgins (2004) compared teaching and learning in classrooms with mobile carts and permanent one-to-one laptops. They reported that in one-to-one classrooms, technology was used more frequently, student motivation and engagement were higher, and students were more likely to use computers as a primary writing tool. Russell, Bebell, and Higgins (2004) then compared the advantage for different student to computer ratios in classrooms. The one-to-one classrooms provided several advantages over the two-to-one and four-to-one classrooms. In the one-to-one classrooms, students used computers more across the curriculum and have been observed to exhibit increased curiosity, excitement and collaboration in the classroom. They have also shown decreased absenteeism and behavior issues as learning becomes more self-directed (DiGiorgio, 2003; Lunt, 2004). Across multiple empirical articles the authors generally reported that the increased resources provided in one-to-one settings indeed resulted in an increased frequency and variety of technology use by student and teachers (Bebell & O'Dwyer, 2010).

In 2002, after the NCLB technology goal, the state of Maine initiated one of the country's largest state wide initiatives, the Maine Learning Technology Initiative. This initiative was to provide all seventh and eighth grade students and their teachers with laptop computers, providing professional development for the teachers to integrate the use of the computers into instruction. In 2004 the Maine Education Policy and Research Institute stated that after two years Maine's' middle schools successfully implemented the one-to-one program. Teachers and principals reported considerable anecdotal evidence that the laptops had a very positive impact on student attendance, behavior, and achievement, although concrete evidence is still sparse. Teachers reported that all types of students are more engaged in their leaning and more motivated to learn, particularly at-risk and special needs children. As can be clearly seen in the Maine one-to-one laptop program (Silvernail & Gritter, 2007) the variation evident in the results indicates that it is the way the laptops are used in learning that brings about the improvements in achievement.

Even after this degree of success in Maine additional research needs to be conducted in the coming years to document and understand the long-term impacts of the laptop initiative on teachers and teaching, students and learning and on schools (Silvernail & Lane, 2004).

Recently, one-to-one computing has emerged as a technology-rich educational reform where access to technology is not shared, but where all teachers and students have ubiquitous access to laptop computers (Bebell & O'Dwyer, 2010). Numerous schools and districts have piloted one-to-one programs, in which each student has access to a laptop computer connected wirelessly to the internet throughout the school day (Warschauer, 2007). The increased access to computers and information is one reason some policymakers support one-to-one programs as a means to eliminate the digital divide (Zucker & King, 2009). Digital divide is a term coined for the disparity between the "haves" and the "have-nots" in the technology revolution. Many have feared grave consequences for those unable to access the power of the Internet: however, recent reports suggest that this divide is narrowing rather than expanding (National Telecommunications and Information Administration, 2000).

Aside from state project evaluations, independent research on one-to-one computing is still scarce (Penuel, 2006). There is little research-based evidence to answer some very important questions related to one-to-one computing: What is happening academically and non–academically when each child has a networked computer? How are students using technology in this ubiquitous computing environment? Is one-to-one computing making any difference in teaching, learning, and the school culture (Lei & Zhao, 2008)? According to Silvernail and Buffington (2009), providing teachers and students abundant access to laptop technology is only the first step towards using the technology as an effective instruction and learning tool. Quite possibly, one-to-one initiatives represent an unattained scale and disturbance in the equilibrium of classrooms and schools, (Dwyer, 2000).

Access

While it is important to ensure equal access among student subgroups to technology, it is even more important to determine if equal access equates to equal opportunity for academic success across student populations by race, class, and gender (Dunleavy & Heinecke, 2007). The U.S. Department of Education has made a call for greater equity between high and low poverty schools. To give every student a fair chance to succeed, and give principals and teachers the resources to support student success, the Department of Education calls on school districts and states to take the steps to ensure equity, by such means as moving toward comparability in resources between high and low poverty schools (U.S. Department of Education, 2010). The unequal patterns of technological access and use in society get reproduced in schools as teachers make use of limited computer resources to benefit the most able or privileged students (Schofield & Davidson, 2004).

The technological, economic and social transformations of the digital era pose three important literacy and learning challenges that can be summarized as past/future, home/school, and rich/poor. Past/future refers to the gap between required literacy and learning skills that focus on the mastery of written texts and the broader set of digital literacy, thinking, communication and productivity skills required for 21st century life (North Central Regional Educational Laboratory & the Metri Group, 2003). Home/school refers to the gap between the media-rich and autonomous literacy experiences that many children enjoy at home and often more restrictive literacy practices they engage in at school (Gee, 2003, 2004). Many of the low socioeconomic students (SES) are less prepared to take advantage of the full capability of the laptops due to students' limited literacy skills and lack of computer experience. These finding support (Neuman & Celano, 2006) that the playing field may have to be unleveled-where superior rather than equal educational resources are provided to low-income students in order to overcome many of the disadvantages they face (Warschauer, 2008). Research needs to be done that looks at the effect of the technology on the entire student body in the school, including the at-risk population. Having a robust access ratio of one computer to one student would seemingly provide an optimal setting for the study of how educational technology can impact teaching and learning (Bebell & O'Dwyer, 2010).

Implementing Agent

Once the students have access to the laptop computers school systems need to look at who is implementing the technology, how the computers are being used, and with what frequency are the laptops being used in the classroom. Holcomb (2009) suggests that it is therefore critical for schools to understand that simply providing each student with a laptop is not enough. How teachers choose to use the laptops is very important. It is impossible to overstate the power of individual teachers in the success or failure of one-to-one computing and that teachers nearly always control how and when students access and use technology during the school day (Bebell & O'Dwyer, 2010).

Past research studies have shown that attitude towards technology influences the success of technology integration in the learning environments. Teachers and students with positive attitudes feel comfortable and are more at ease with the technology (Samuel & Saitun Abu Bakar, 2006). Studies have also shown that computers can potentially make classroom a collaborative environment but only when the teachers have already adopted a constructivist framework towards instruction or are willing to adopt this perspective into their own practices (Windschilt & Sahl, 2002). A teacher who is a constructivist believes that students should be engaged in active learning. The teacher's role is to assist the students in what they are doing. The use of one-to-one computing in the classrooms makes this engaging and creative atmosphere possible. The next generation of teachers who effectively use the new tools for learning can only be possible if the teachers themselves create effective use of technology in their lessons. It is essential for the educators to use the laptops in their everyday teaching-learning environment (Resta, 2002).

Teachers must find ways to teach using technology, which provide complex cognitive engagement that in turn allows students to invest themselves in the learning process (Warschauer, 2007). Faculty members need not only to learn how to use technology at a basic level but also to learn how to integrate that technology into their classroom. In addition, newer teachers from digital native generations must be taught how their skills can be used to integrate technology into the classroom to provide complex cognitive engagement for their students (Mundy, Kupczynski & Kee, 2012).

According to the International Society of Technology in Educations (ISTE) June 2008 policy brief, studies have shown statistically significant positive effects of education technology on student reading, literacy, and mathematical achievements, however, many teachers in school lack the proficiency needed to take advantage of the new technologies and bring them into the daily classroom learning experience. Even when given the same professional learning, teachers, integrated technology into their teaching to different degrees and in different ways. These variations that are found to exist within one-to-one laptop schools are often due to variation in teacher practice (Drayton, 2010). According to Bebell and O'Dwyer (2010) the quality of the implementation of one-to-one laptop initiatives can be predicted from the quality and depth of the professional leaning that teachers receive. A recent study of technology implementation (Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010) found that, where teachers share their understanding of the use of technology in learning and were supportive, there was a greater degree of implementation.

It is evident that teachers are on the implementation front lines of the one-to-one initiative. Multiple studies have reported the positive impacts of the one-to-one initiatives. Teachers reported that students enjoyed using multimedia, searching the internet and writing papers on the computer (Suhr, Hernandez, Grimes, & Warschauer, 2010). Laptops may have a small effect in increasing scores, but they have benefits in the areas of literary response, analysis and writing strategies (Suhr, Hernandez, Grimes, & Warschauer, 2010). No matter how good the curriculum or teaching aids, at the end of the day it is the teacher who makes the difference.

Present

Although computers have been around for the last twenty-five years, it has only been in the last ten years that students have had their own personnel computers. Until then, most students used the school's computer, at least when the school computer lab was available or when they had permission to get up from their desks and use the computers in the back of the classroom (Rockman, 2007). This one computer to a classroom design needs to be something of the past. Researchers have long argued that for technology to make a powerful difference in student learning, students must be able to use computers more than once or twice a week in a lab at school (Kozma, 1991).

Whether it is called a laptop program, one-to-one computing, ubiquitous computing, or 24/7 access, schools and school districts around the country are exploring the benefits and challenges of what happens when every student has a laptop computer (Rockman, 2007). One-to-one computer programs have evolved and expanded to the point where they have influenced the nature of schooling and redefined how computers can be used in the classroom. Using the computers in the classroom often gives students a sense of pride and ownership of the work they are doing (Rockman, 2007). In at least some cases, the implementation of a laptop program has drawn parents and students to schools in areas where enrollment was previously declining, which leads to a higher level of attendance. Motivation and engagement also can mean fewer disciplinary problems and ultimately, lower dropout rates (Rockman, 2007). In some instances schools are experimenting classroom by classroom with introducing laptop computers into instruction (Apple Computers, 2005). Research is revealing that it is the way the laptops are used in learning that makes the difference (Holcomb, 2009).

A study done by Warschauer (2007) concludes that one-to-one wireless laptops offer important affordances for promoting information literacy and research skills. However the socioeconomic contest, visions, values, and beliefs all play a critical role in shaping how laptop programs are implemented and what benefits are thus achieved (Warschauer, 2007).

Dozens of research studies have been published on laptop use over the last several years, and many of these studies suggest positive outcomes (Penuel, 2005). Students in laptop schools have access to a much greater variety of information than other students do. Education technology is actually spread through a broad spectrum of different technologies including, problem solving, processes, controls, invention and expression (Lyle, 2009). Warschauer (2007) stated that this access to tools for gathering and analyzing information brought about five important changes in instruction: more just-in-time learning, more individualized learning, greater ease of conducting research, more empirical investigation, more opportunities for in-depth learning.

Most states have made progress in enacting supportive technology policies, including the adoption of technology standards that identify what teachers and students should know and be able to do (Hightower, 2009). However, technology alone is not the solution driving the change that must occur in schools today. To have a chance in realizing the goal of meeting the educational needs of all students, technology must be used as a cognitive tool in combination with practices necessary for scalable and sustainable change (Weston & Bain, 2010).

With inclusion becoming the norm for class makeup, an increasing number of students with disabilities are being served in the general education setting (National Center for Education Statistics, 2008). The percentage of students with disabilities who are served in a general education setting for 80% or more of the school day has also increased from 45% to 52% (NCES 2007). Harris and Smith (2004) studied the use of laptops by seventh grade students with disabilities and found that the laptops helped the students with disabilities to improve their engagement in learning, increase their motivation and ability to work independently, and improved their class participation and interaction with others. Conway (2005) also supported the use of laptops by students with a disability by reporting the positive impacts of one-to-one laptop programs on students with reading or writing difficulties.

Future

With the onset of one-to-one technology, many school systems have come up with two primary goals of one-to-one computing:

- Academic achievement: improving academic achievement through use of technology
- Enhanced teaching: By transforming the quality of instruction with the use of technology (Apple Computer, 2005).

In order to check to see if these goals are being met, implementation studies with surveys, interviews, or case studies have been used to describe how one-to-one programs unfold and how program stakeholders such as parents, teachers, administrators, and students perceive them (Apple Computer, 2005).

Despite the money and effort spent to comply with NCLB, few observed effects on teaching and learning have been documented. Case studies of teachers in laptop programs have shown that teachers' beliefs about students, the potential role of technology in learning, and the availability of high-quality content influence the degree to which they use laptops with students (Windschitl & Sahl, 2002). Researchers have examined two possible factors to explain this: a) students' and teachers' perceptions of, and attitudes about technology and its use in the classroom; b) how these attitudes translate into practice over time as reflected by teacher integration of technology and student achievement (Maninger & Holden, 2009).

Personal laptop computers engage students; encourage independence; support differentiated instruction; and make assessment, communication and other common teaching tasks more efficient (Zucker & King, 2009). For example, an instructor can have all the students during a class simultaneously visit specific web sites related to a current topic, visit the library without leaving class, design and also present electronic multimedia presentations. The web is full of interactive and interesting sites that quickly and efficiently demonstrate key classroom concepts. Web sites can be used to introduce topics, generate discussion and solidify points. Thousands of up-to-date resources are available on the internet, and students using laptops have constant access to word processors, spreadsheets, and other powerful learning tools (Zucker &

King, 2009). The concept of achievement through technology has changed from creating nice looking work products to creating a student-centered classroom that provides opportunities for an interesting experience and a variety of sensory and conceptual ideas (Batane, 2002).

Laptop programs seek to achieve a more natural integration of technology into instruction. Studies have shown that students who design and present electronic multimedia presentations tend to remember longer and understand better the concepts that they presented (Lehrer, 1993). Due to the development and diffusion of information and communication technologies, society has witnessed the greatest change in the means of communication and production of knowledge since the invention of the printing press (Warschauer, 1999). Participation in the one-to-one programs was associated with increased student and teacher technology use, increases in student achievement (Bebell & O'Dwyer, 2010).

When technology enables, empowers, and accelerates a profession's core transactions, the distinctions between computers and professional practice evaporate (Weston & Bain, 2010). Innovative teaching is the best source for sustainable and scalable achievement gains (Weston & Bain, 2010). If technological tools are considered as cognitive tools, and cognitive tools are seamlessly integrated and necessary for core educational transactions, then in using cognitive tools in conjunction with proven research-based practices in teaching and learning, it is speculated that classrooms will be differentiated in genuine ways for all students. Additionally, it is speculated that students, parents and teachers would use cognitive tools every day to collaborate about what to do next in their collective pursuit for learning (Weston & Bain, 2010).

Research often follows practice, rather than leading it (Zucker & Light, 2009). As perhaps true for all educational reforms there is more interest in the reform than there is research-based facts to support the idea of the reform (Bebell & Kay, 2010).

The mixed reactions and the controversy on one-to-one computing program, to a great extent, arise from the lack of empirical evidence on the effectiveness of one-to-one computing on student learning. Aside from project evaluations, independent research on one-to-one computing is still scarce (Penuel, 2006). Barak, Lipson, and Lerman (2006) indicated that using technology for active learning keeps students focused, engaged, and motivated. Pantazic (2002) indicated that technology-enabled learning is becoming an integral part of the learning process because the power of technology leverages information to eliminate the one-size fits all approach and customized content to meet individual needs and learning styles. The integration of technology into the course design and assignments is the critical point for using technology to improve learning (Sherer & Shea, 2002). Despite growing interest in and excitement about one-to-one computing, relatively little research focuses on teaching and learning in these intensive computing environments (Schacter, 1995).

Summary Chapter Two

Before the effects of one-to-one computing can be looked at, it is necessary to look at how the computers are distributed in the school and who has access to them. Research suggests that the potential of new educational technologies is far from being realized in our schools because logistical, administrative and pedagogical obstacles make it difficult for teachers to effectively deploy shared computers (Cuban, 2001). Research needs to be done that includes looking at the effect of the technology on the entire student body in the school including the at-risk population.

Unequal patterns of technological access and use in society get reproduced in school, as teachers make use of limited computer resources to benefit the most able or privileged students (Schofield & Davidson, 2004). The standard rich/poor, that has been going on in the education system for years is still present. Rich/poor refer to the ever present inequity between the literacy and learning achievement of students of high and low socioeconomic status (SES) (Schofield & Davidson, 2004). Relatively few studies, if any, have focused on one-to-one laptop programs that look at the instructional or educational perceptions of the teachers in the classroom (Constant, 2011).

Current research on one-to-one initiatives mainly focuses on the implementation process and whether it works, without sufficient data to picture how students use their own laptops. Further research is needed to provide a deep understanding of learning practices in classrooms with one-to-one laptops (Bebell, 2005; Roschelle, 2003). As Dunleavy and Heinecke (2007) point out the general consensus from reviews of the research to date is that additional detailed information is needed from classrooms in order to describe the teacher and student practices and outcomes, and to identify the contributions the access level makes to technology-supported teaching and learning. Researchers say there is a need to examine students’ and teachers’ perceptions of, and attitudes about, technology and its use in the classroom (Maninger & Holden, 2009).

Chapter 3

The purpose of this study was to examine the perceptions of middle school teachers and students, in a select rural Virginia middle school, on the effect that one-to-one computing had on the frequency and type of instruction that is taking place in the core areas of English math, science, and social studies. The study also looked at the teachers' and students' perceived effect on the educational performance of individual subgroups.

By surveying teachers and students the following research questions will be explored:

Research Question 1: What are the perceptions of middle school students on the frequency and type of use of one-to-one computing in the classroom?

Research Question 2: What are the perceptions of middle school teachers on the frequency and type of use of one-to-one computing in the classroom?

Research Question 3: What are the perceptions of middle school students, by ethnicity, special education status, and gender that one-to-one computing is having on overall student performance in each of the core classrooms (English, math, science, social studies)?

Research Question 4: What are the perceptions of teachers on the effect that one-to-one computing is having on the academic performance of students by ethnicity, special education status, and gender?

This chapter contains the methodology that was used for this study. First, an explanation of the research design is presented. This is followed by an explanation of the survey instrument, including the validity testing that was done on the instrument created. The participant section, role of the researcher, procedures and analysis sections complete the chapter.

Research Design

The purpose of this study was to examine the perceptions of middle school teachers and students, in a select rural Virginia middle school, on the effect that one-to-one computing had on the frequency and type of instruction that was taking place in the core areas of English math, science, and social studies. The study also looked at the teachers' and students' perceived effect on the educational performance of individual subgroups.

Quantitative data were gathered on the perceptions of teachers and students on the frequency and type of upper level teaching strategies that were being applied in the classroom.

Additionally, data were gathered on the perceptions of teachers and students on the effect that one-to-one computer access was having on the overall student performance in the classroom.

Methodology

The methodology chosen for the research in this study was a quantitative research design using a case study approach. Support for the case study approach used in this study includes the limited number of rural Virginia middle schools that currently have one-to-one computing. Only two of ninety-eight school divisions that the Virginia Department of Education considered rural have one-to-one computing (see Appendix A). To determine if a rural county had one-to-one computing each of the rural middle schools was contacted by phone. (see Appendix B for phone interview script). A second supporting fact for a case study is that of the two counties, county A is the only rural Virginia County that has offered one-to-one computing for more than one year. The year of the study was the first year that county B offered one-to-one computing.

The research design for this study was the descriptive or survey research design. This type of design attempts to describe and explain conditions of the present by using many subjects and questionnaires to fully describe a phenomenon. Survey research design is one of the most popular for dissertation research (Carroll, 2010). Descriptive statistics is the discipline of quantitatively describing the main features of a collection of data. Together with simple graphic analysis, they form the basis of virtually every quantitative analysis of data (Trochim, 2006). If the data were simply presented as raw data it would be hard to visualize what the data were showing, especially if there were a lot of data. Descriptive statistics therefore allow researchers to present the data in a more meaningful way which allows clearer interpretation of the data.

To further understand the data, a frequency distribution analysis was run. A frequency analysis is a descriptive statistical method that shows the number of occurrences of each response chosen by the respondents (PASW 2010). A frequency distribution summarizes and compresses data by grouping the data into classes and recording how many data points fall into each class. The frequency distribution is the foundation of descriptive statistics, and should be constructed for virtually all data sets (Texas State Auditor's Office, 1995).

The data analysis software that this researcher used for this study is PASW Statistics Grad Pack 17.0. PASW stands for Predictive Analytics Software. PASW was used for the analysis of this study due to the ability of the program to analyze data collected from surveys.

PASW can perform a variety of data analyses and presentation functions, including statistical analysis and graphical presentation of data. Among its features are modules for statistical data analysis. These include: descriptive statistics, such as frequencies, mean, standard deviation, charts and lists. The program PASW Statistics is particularly well-suited for survey research (PASW, 2010).

Instrument

This study used a survey design where two different user groups, the teachers and the students, completed surveys. In order to maintain measureable and consistent results, a four point Likert scale was used. Values were assigned for each reporting category (never, rarely, sometimes, and often). Two separate instruments were developed for this study.

The first was a nine question survey (see Appendix C) that was developed for the individual core teacher. The second was a nineteen questions survey (see Appendix D) that was developed for the students. The questions from both of the surveys are directly related to the levels of taxonomy on the Web 2.0 chart (see Figure 2) along with the multi-dimensional range of use chart (see Figure 3). The higher up on the range of use chart, the higher order of thinking that is taking place. The farther back signifies the introduction of a real world context. The farther right on the chart tends to bring about free thinking; this is the place where true innovation takes place. Jonassen (2008) maintains that when technology enables, empowers, and accelerates the core culture true innovation can occur.

Instrument Validation

An examination of the survey instrument was done at three separate levels looking at the content validity of the instruments that had been created. The first level was a panel of doctoral students from Virginia Tech. This panel included five members of K-12 administration from various counties around the Commonwealth of Virginia, one assistant superintendent of instruction and a professor from Virginia Tech. Each of these doctoral students was given a survey and asked to make comments directly on the survey. Once all the members had returned their survey, a brief discussion took place allowing questions to be asked and answered. After analysis of their comments was completed, alterations were done to the survey.

The second step was to have three instructional technology resource teachers (ITRT) look at the survey. They were given a copy of the survey along with the range of use chart. They were asked to compare the questions to the information on the chart to make sure the questions were in correlation with the chart.

The final step was a little different for the two surveys. The teacher survey was shown to a group of four teachers to see if they understood what questions were being asked and if they understood the response options. The student survey was examined in a similar fashion, but by a group of sixth grade students. A class was chosen from the remaining sixth grade classes that did not have one-to-one computers. This was done so no student would see the survey before the actual day it was to be given. This researcher was able to go into that class and give each student a copy of the survey and have them read the questions and answers for clarity and understanding. Several comments were made about the wording of some of the responses and the answer choices. Again after analysis of the comments by the students a few alterations were made, resulting in the final product.

Data Treatment

The data were collected using a Google Form survey. There were no identifying marks on the survey. No names or students identification numbers were used for the survey. The survey was an anonymous survey. Only the researcher has access to the data collected.

Participants

The participants of the study were chosen from a single rural Virginia county middle school. The students and teachers in this study were chosen by selective sampling. The teachers chosen for the study were teachers who were currently teaching classes in the areas of English, math, science, social studies or were special education teachers teaching in a core collaborative setting. The teachers must have had full time one-to-one computer access or one-to-one net book computer access in their classrooms. The computers in each of the classrooms must have had the capability of connecting to the internet at all times. The computers were kept in the teachers' classroom and the students were not allowed to take the computers home. Each of the teachers was responsible for planning, teaching, and monitoring the success of all learners in the classroom. Of the 60 core and special education teachers in county A, 16 teachers met the correct criteria, representing 25% of the teachers. The student participants were chosen using select criteria. Each student had to be enrolled in a core classroom (English, math, science or social studies) that had one-to-one computers or one-to-one net book computers stationed in that classroom. County A total student population was 1042 with 409 students meeting the criterion for the study.

Confidentiality

The names of the students who participated in the survey, along with their parent's names and addresses, were given to the researcher by the school division. All mailing information that was supplied has been kept confidential and secure. All electronic mailing information has been stored in a password protected file. All of the information supplied by the school has been used only by this researcher. No student names or identification numbers have been used for any purpose during this research study. The Google Form survey program assigned students numbers as they responded to the survey. This was done only for the organization of the responses by the survey program. The numbers are not linked to the students in any way.

Procedures

After approval from the dissertation committee was given, an application was submitted to Virginia Tech's IRB committee for approval of the research study. This researcher applied for a waiver of written consent from the parents and students in regards to the study. This study presented no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context (e.g., calling someone at home and asking everyday questions, mall survey, mail survey, internet survey, etc.). The IRB committee approved the waiver along with the submitted documentation. Effective April 2, 2012, the Virginia Tech IRB Chair approved the new protocol (see Appendix E). This approval provided permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents (see Appendix F & G).

Once IRB approval was given, permission from the school district and the participating middle school was obtained (see Appendix H). Teachers were given an informed consent document (see Appendix F) which they read and signed. The day of the survey teachers were sent an electronic link to the survey by email. The researcher had coordinated with the principal to find the best time for the teachers to complete the survey. Teacher participation in the survey was completely voluntary.

With the approval of the waiver no signed permission was necessary from the parents. A parent information letter was sent home (see Appendix G) explaining the nature and purpose of the study, an explanation of all procedures, risks, benefits, and confidentiality, along with refusal or withdrawal procedures. Along with the letter of information an opt-out form was sent. The researcher wanted the parents to be informed about the survey and allow them the respect to refuse their child's participation. After the information letters were mailed, nine days were provided for the opt-out letters to be returned. The letters were to be returned by mail, or brought in and given to the child's English teacher. Only two parents sent in the letter to opt out of the study.

The survey took place at the school. The selection of a day to give the survey was coordinated with the principal and teachers. The day and time were selected that allowed the students sufficient time to complete the survey. In order for the students not to have difficulty with typing in the survey website, an electronic link was established on the school's website. This allowed the students access to the survey only for the date selected. The survey was removed from the site at the end of the day. Any student who was absent the day of the survey did not participate in the survey.

Students also had the right to choose not to participate in the survey. The day of the survey eight students decided not to participate. Arrangements had been made with the teachers and librarian to send the students whose parents did not want them participating, and students who decided not to participate in the survey, to the library and allow the students to independently read a book or browse a magazine. This was not discussed with the students ahead of time as not to influence their decision to participate in the survey.

Analysis

Once all the data had been collected from the students, a Google document summary sheet along with each individual response was printed. The information was also stored in a secure file on the researcher's computer. The information was then placed into an excel document and uploaded into the computer program PASW for analysis. Analysis of the data was done using descriptive statistics, which allowed the mean of the groups of data to be determined.

This, along with a frequency distribution analysis, allowed further understanding of the data that had been collected. A graphical representation of the frequencies of the data allowed for a quick visualization. Analysis of the data was also done by translating the means of each sub question into the four categories of: never, rarely, sometimes, and often. This was done by using the scale of 1-1.5 never, 1.51-2.5 rarely, 2.51-3.5 sometimes, and 3.51-4 often.

An ANOVA was run to determine if there was a statistical difference in the perceptions of different subgroups of students on the effect that one-to-one computing was having on their academic performance. A significance factor of $p < .05$ was used. If a significant difference was determined an ad-hoc, or more specifically a Tukey, was run to determine if there were significant differences between the subgroups. Not all subgroups could be analyzed due to the low number of students within that subgroup.

Summary Chapter Three

Before beginning the study the certificate on Training of Human Subjects Protection (see Appendix I) was received. When designing this study every effort was made to protect the confidentiality and safety of the participants. The methodology, the research design, the instrument, and the analysis for this research study were determined by the type of information that was needed in order to best answer the research questions of this study.

Chapter 4

Introduction

The purpose of this study was to examine the perceptions of middle school teachers and students, in a select rural Virginia middle school, on the effect that one-to-one computing had on the frequency and type of instruction that is taking place in the core areas of English math, science, and social studies. The study also looked at the teachers' and students' perceived effect on the educational performance of individual subgroups.

By surveying teachers and students the following research questions were explored:

Research Question 1: What are the perceptions of middle school students on the frequency and type of use of one-to-one computing in the classroom?

Research Question 2: What are the perceptions of middle school teachers on the frequency and type of use of one-to-one computing in the classroom?

Research Question 3: What are the perceptions of middle school students, by ethnicity, special education status, and gender that one-to-one computing is having on overall student performance in each of the core classrooms (English, math, science, social studies)?

Research Question 4: What are the perceptions of teachers on the effect that one-to-one computing is having on the academic performance of students by ethnicity, special education status, and gender?

This chapter presents the data from the study along with an analysis of the data as they apply to each of the research questions. First the demographic data collected is presented. This is followed by survey responses, frequency distribution tables and graphs along with analysis of the data as they apply to each of the research questions.

Data collection was done using a google.doc survey format. Each survey was given a survey number that was not connected to the participants in any way. This provided respondent confidentiality. The information was then placed into Microsoft Excel format. The spreadsheets of data were then uploaded into Predictive Analytics Software (PASW) Statistics Grad Pack 17.0 for all analyses. The graphs were created using Microsoft Excel.

Demographics for Teacher Respondents

Teacher response rate and gender. Of the sixteen teachers that met the criteria for the survey, all sixteen teachers completed the survey providing a 100% participation rate. Of the sixteen teachers, 19% were male and 81% were female as shown in Table 2.

Table 2

Teacher Survey Demographics by Gender

Total Possible Surveys	Surveys Completed	Percent of Surveys Completed	Male #	Male %	Female #	Female %
16	16	100	3	19	13	81

Teacher subject and gender. The teaching assignment and gender of the sixteen participating teachers varied among the four core areas, as shown in Table 3. The largest percent of teachers in all of the four core areas were females. In English, 17% of the teachers were male, 83% female. In math, 100% of the teachers were female. Science and social studies had the same percentages with 33% male and 67% female.

Table 3

Teacher Demographics by Subject and Gender

	Gender			
	Male		Female	
Subject	#	%	#	%
English	1	17	5	83
Math	0	0	4	100
Science	1	33	2	67
Social Studies	1	33	2	67

Teacher subject and experience. The years of teaching experience varied amongst the four core areas as shown in Table 4. The years of experience were broken down into three categories, 0 – 5 years, 6 – 10 years, and 11-15 years. Of the surveyed teachers 50% had 0 – 5 years experience. Followed by 44% of the teachers with 6 – 10 years experience and only 6% of the teachers had 11-15 years experience.

Table 4

Teacher Demographics by Subject and Experience

Subject	0 – 5		6 – 10		11 – 15	
	#	%	#	%	#	%
English	4	66	2	33	0	0
Math	2	50	2	33	0	0
Science	1	33	1	33	1	33
Social Studies	1	33	2	66	0	0

Note: "Years of Teaching Experience" spans the 0 – 5, 6 – 10 and 11 – 15 columns.

Demographics for Student Respondents

Student response rate and gender. The original student population meeting the criteria for participation in the survey was 409 students. Of the possible 409 surveys only 379 surveys were taken with only 369 surveys being completed. This gave a completion rate of 90.22%. Ten of the survey respondents did not include gender or race and were eliminated from the data collection. The thirty students who did not participate in the survey did not do so because: parent request of none participation, student refusal to take the survey the day of the survey, or student absenteeism the day of the survey. Gender breakdown of the student participants was 50% male and 50% female as shown in Table 5.

Table 5

Student Survey Demographics by Gender

Total Possible Surveys	Surveys Completed	Percent of Surveys Completed	Male		Female	
			#	%	#	%
409	369	90.22	186	50	183	50

Student gender by subject. Students participating in the survey may have had more than one class with one-to-one computing. The highest participation was in English, were 72% of the students surveyed had one-to-one computing. Of the students in English 51% were male and

49% female. The lowest participation rate was in social studies, were 22% of the students surveyed had one-to-one computing, with 60% male and 40% female. Math and science rounded out the four core areas with math having only 26% of the students surveyed having one-to-one computing, with 63% males and 37% female, and science having 35% of the students surveyed having one-to-one computing with 58% male and 42% female as shown in Table 6.

Table 6

Student Who Have One-to-One Computing in Their Classrooms

	Total		Gender			
			Male		Female	
Subject	N	%	N	%	N	%
English	272	72	138	51	134	49
Math	98	26	62	63	36	37
Science	134	35	78	58	56	42
SS	82	22	49	60	33	40

Student ethnicity and gender. Several of the questions are specific to the ethnic and gender breakdown of the students surveyed. The student breakdown by ethnicity and gender are shown in Table 7. Of the ethnicities available only four categories were selected: African American, Hispanic, White, and other. Of the selected subgroups White had the highest percentage of students surveyed with 70% of the males and 60% of the females, followed by African Americans with 16% male and 19% female, other ethnicities with 8% male and 19% female, and the lowest population surveyed was Hispanic with 5% male and 1% female.

Table 7

Student Demographics Ethnicity/Gender

	Gender			
	Male		Female	
Ethnicity	#	%	#	%
African American	31	17	36	20
Hispanic	9	5	2	1
White	131	70	111	61
Other	15	8	34	18

Student demographics by ethnicity and students with individual education plans. Some of the data collected are broken down by ethnicity and look at the students who also have a current individual education plan (IEP). This information is presented in Table 8. Of the students who completed the survey, 118 of the 369 students were students with an IEP. This is 32% of the students who completed surveys. Of those students, 64 students or 54% of the 118 students were male and 54 students or 46% were female. Of the male gender Whites had 69% followed by African Americans with 17%, students who selected other with 9% and Hispanics with 5%. Of the females, Whites had 59%, African Americans had 19%, students who selected other had 18%, and Hispanics had 4%.

Table 8

Student Demographics Ethnicity/Students with Current Individual Education Plans (IEP)

	Gender			
	Male		Female	
Ethnicity	#	%	#	%
African American	11	17	10	19
Hispanic	3	5	2	4
White	44	69	32	59
Other	6	9	10	18

Data Presentation

Survey codes. The following codes will be used throughout the presentation of the data: never, rarely is equal to 1 – 2 times a month, sometimes is equal to 3 – 4 times a month, often is equal to 5 or more times a month.

Descriptive statistics were used to determine a mean score. A mean score was calculated for each activity within a question and the overall perception rating was determined using the mean along with the following scale:

1.00 – 1.50 Never

1.51 – 2.50 Rarely

2.51 – 3.50 Sometimes

3.51 – 4.00 Often

Each grouping of data is divided by the subject that the question referenced. Included are the mean score along with the corresponding scale score. This is followed by a frequency graph of the mean scores.

Research question 1: What are the perceptions of middle school students on the frequency of activities and teaching techniques used in a core classroom containing one-to-one computing?

The following data are from the results from the individual student survey questions. The same questions were asked for each of the subjects. Questions two, six, ten and fourteen of the student survey ask the students their perception of how often do the following ten activities occur in your English, math, science and social studies classroom? These data are presented first. Followed by questions three, seven, eleven and fifteen that ask the students their perception of how often different teaching techniques are used in their English, math, science and social studies class. The third set of questions– four, eight, twelve and sixteen asks the students their perceptions on the effect that one-to-one computing is having on their educational performance in the core classrooms of English, math, science, and social studies. The data that are presented include the frequency and percent of the responses, followed by a frequency distribution graph.

Question two of the student survey asks the students to give their perception of the frequency that different activities involving one-to-one computing take place in an English classroom. The student’s responses are shown in Table 9. The data show that 40% of the students selected that lecture never takes place while 11% selected often. Discussion was reported by 39% of the students to happen often, while 14% says it never happens. Drill and practice happens often with 40%. In-class research rarely with 52% or never with 17% happens. In-class reading has a high percent of 30% for never and a low 18% for sometimes. In-class writing shows a high of 38% for sometimes. Problem solving, analysis, and email all have high percents in the never category with problem solving having 43%, analysis with 44%, and email with 30%. Creating has a high of 41% in the sometimes category.

Table 9

Student's Perceptions of the Frequency of Different Types of Activities in an English Classroom

Type of Activity	Never		Rarely 1-2 times		Sometimes 3-4 times		Often 5 or more	
	#	%	#	%	#	%	#	%
Lecture and note taking	118	40	87	29	57	19	34	11
Discussion and note taking	43	14	48	16	87	29	117	39
Drill and practice	47	16	65	22	59	20	120	40
In-class research	51	17	154	52	67	22	24	8
In-class reading	89	30	85	28	53	18	67	22
In-class writing w/computers	50	17	114	38	72	24	57	19
Problem solving w/computers	127	43	125	42	31	10	13	4
Analysis of data w/computers	130	44	120	40	32	11	10	3
Creating product w/computers	100	33	123	41	56	19	20	7
Email, blog wiki	90	30	70	23	28	9	103	34

Figure 4 is a visual representation of the student responses to question two of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by activity.

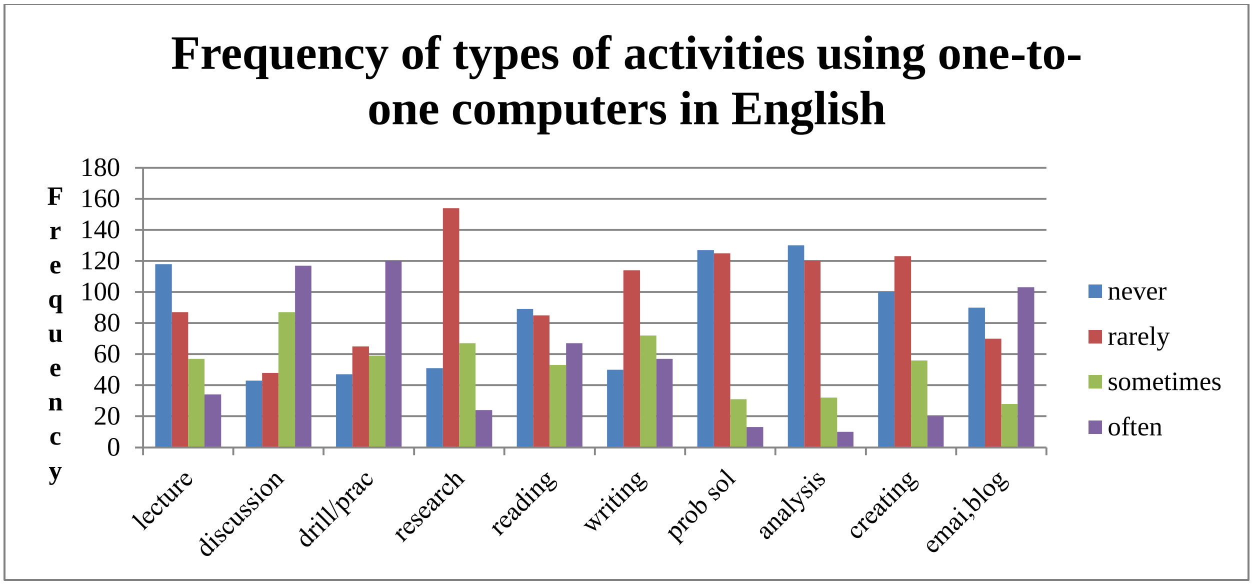

Figure 4. Student's perceptions of the frequency of different types of activities in an English classroom.

The data that were analyzed to answer research question one were the data gathered from the responses to survey question two, three, six, seven, ten, eleven, fourteen and fifteen of the student survey. Question two asks the students to give their perception of the frequency that ten different activities take place in an English classroom. The mean score of three of the activities matched the individual response with the highest percentage. Eight of the activities had a mean score that fell into the rarely category with the remaining two activities falling into the never category.

The data in Table 10 show mean scores of the frequency with the resulting scale score as it relates to the most frequent individual response. Lecture, with a mean score of 2.02 or a scale score of rarely, did not match the most frequent individual response which was 40% for never. Discussion, with a mean score of 2.94 or a scale score of sometimes, did not match the most frequent individual response which was 69% for often. Drill and practice using the computers, with a mean score of 2.87 or a scale score of sometimes, did not match the most frequent individual response which was 40% for often. In-class research using computers, with a mean score of 2.22 or a scale score of rarely, did match the most frequent individual response. In-class reading using computers, with a mean score of 2.33 or a scale score of rarely, did match the most frequent individual response. In-class writing using computers, with a mean score of 2.46 or a scale score of rarely, did match the most frequent individual response. Problem solving using computers, with a mean score of 1.76 or a scale score of rarely, did not match the most frequent individual response which was 43% for never. Analysis of data using computers, with a mean score of 1.73 or a scale score of rarely, did not match the most frequent individual response which was 44% for never. Creating product using computers, with a mean score of 1.99 or a scale score of rarely, did match the most frequent individual response. Email – blog – Wiki, with a mean score of 2.49 or a scale score of rarely, did not match the most frequent individual response which was 40% for never.

Table 10

The Mean Score of the Frequency ff Different Types ff Activities in an English Class as it Relates to the Most Frequent Individual Response

	Mean Score		Most Frequent Individual Response	
Type of Activity	Scale Score	Mean	Highest Percentage	Scale Score
Lecture and note taking	Rarely	2.02	40	Never
Discussion and note taking	Sometimes	2.94	69	Often
Drill and practice	Sometimes	2.87	40	Often
In-class research	Rarely	2.22	52	Rarely
In-class reading w/computers	Rarely	2.33	30	Never
In-class writing w/computers	Rarely	2.46	38	Rarely
Problem solving w/computers	Rarely	1.76	43	Never
Analysis of data w/computers	Rarely	1.73	44	Never
Creating product w/computers	Rarely	1.99	41	Rarely
Email, blog, wiki	Rarely	2.49	40	Never

Figure 5 is a visual representation of the means represented in Table 10. The vertical scale has been adjusted to the match the scale scores. This allows for a more understandable representation of the data. The scale scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

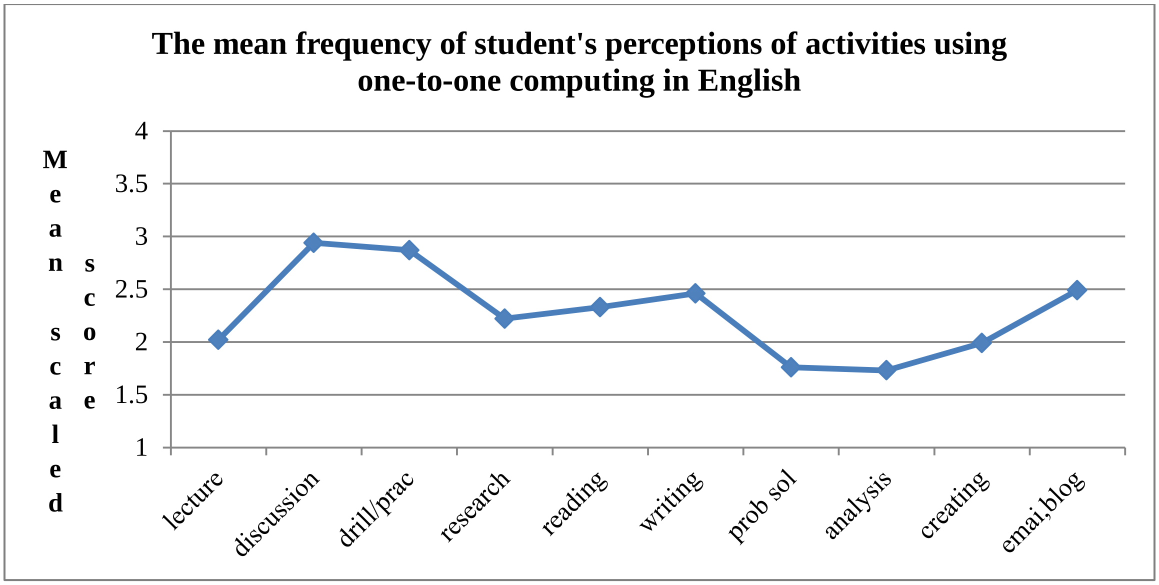

Figure 5. Frequency distribution of the means on student perceptions of activities in an English class.

Question six of the student survey asks the students to give their perception of the frequency that different activities involving one-to-one computing take place in a math classroom. The data from Table 11 show a pattern. The categories of lecture, discussion and drill and practice have an even spread of data across the four categories. Lecture has a high percent with 36% for never, discussion with a high percent of 29% for never, and drill and practice with a high percent of 29% in the sometimes category. Of the ten categories drill and practice is the only category that did not have a high percent in the never category. The remaining categories have a high percent for never and a low percent of often. In-class research has a high of 57% and a low of 5%. In-class reading has a high of 72% and a low of 3%. In-class writing has a high of 67% and a low of 2%. Problem solving has a high of 40% and a low of 8%. Analysis has a high of 56% and a low of 5%. Creating has a high of 54% and a low of 3%. Email has the largest difference between never and often with a high of 80% and a low of 3%.

Table 11

Student's Perceptions of the Frequency of Different Types of Activities in a Math Classroom

Type of Activity	Never		Rarely 1-2 times		Sometimes 3-4 times		Often 5 or more	
	#	%	#	%	#	%	#	%
Lecture and note taking	46	36	34	26	27	21	22	17
Discussion and note taking	37	29	24	19	30	23	36	28
Drill and practice	22	17	33	26	37	29	36	28
In-class research	74	57	32	25	12	9	7	5
In-class Reading	93	72	25	19	3	2	4	3
In-class writing w/computers	87	67	29	23	5	4	3	2
Problem solving w/computers	51	40	49	38	18	14	10	8
Analysis of data w/computers	72	56	46	36	5	4	6	5
Creating product w/computers	70	54	45	35	6	5	4	3
Email, blog wiki	103	80	14	11	4	3	4	3

Figure 6 is a visual representation of the student responses to question six of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by activity.

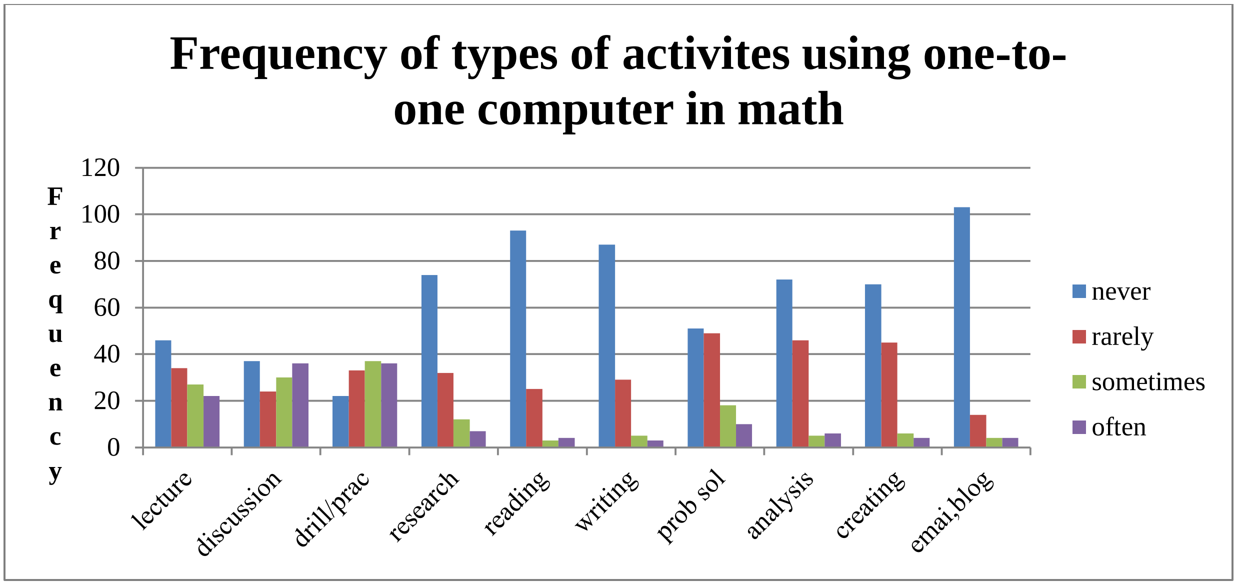

Figure 6. Student's perceptions of the frequency of different types of activities in a math classroom.

Question six asks the students to give their perception of the frequency that ten different activities take place in a math classroom. The mean score of four of the activities matched the individual response with the highest percentage. Five of the activities had a mean score that fell into the rarely category, three of the activities had a mean score that fell into the never category, and two of the activities had a mean score that fell into the sometimes category.

The data in Table 12 show mean scores of the frequency with the resulting scale score as it relates to the most frequent individual response. Lecture, with a mean score of 2.19 or a scale score of rarely, did not match the most frequent individual response which was 36% for never.

Discussion, with a mean score of 2.51 or a scale score of sometimes, did not match the most frequent individual response which was 29% for never. Drill and practice using the computers, with a mean score of 2.68 or a scale score of sometimes, did match the most frequent individual response. In-class research using computers, with a mean score of 1.62 or a scale score of rarely, did not match the most frequent individual response which was 57% for never. In-class reading using computers, with a mean score of 1.34 or a scale score of never, did match the most frequent individual response. In-class writing using computers, with a mean score of 1.39 or a scale score of never, did match the most frequent individual response. Problem solving using computers, with a mean score of 1.90 or a scale score of rarely, did not match the most frequent individual response which was 40% for never. Analysis of data using computers, with a mean score of 1.57 or a scale score of rarely, did not match the most frequent individual response which was 56% for never. Creating product using computers, with a mean score of 1.55 or a scale score of rarely, did not match the most frequent individual response which was 54% for never. Email – blog – Wiki, with a mean score of 1.27 or a scale score of never, did match the most frequent individual response.

Table 12

The Mean Score of the Frequency of Different Types of Activities in a Math Class as it Relates to the Most Frequent Individual Response

	Mean Score		Most Frequent Individual Response	
Type of Activity	Scale Score	Mean	Highest Percentage	Scale Score
Lecture and note taking	Rarely	2.19	36	Never
Discussion and note taking	Sometimes	2.51	29	Never
Drill and practice	Sometimes	2.68	29	Sometimes
In-class research	Rarely	1.62	57	Never
In-class reading w/computers	Never	1.34	72	Never
In-class writing w/computers	Never	1.39	67	Never
Problem solving w/computers	Rarely	1.90	40	Never
Analysis of data w/computers	Rarely	1.57	56	Never
Creating product w/computers	Rarely	1.55	54	Never
Email, blog, wiki	Never	1.27	80	Never

Figure 7 is a visual representation of the means represented in Table 12. The vertical scale has been adjusted to the match the scale scores. This allows for a more understandable representation of the data. The scale scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

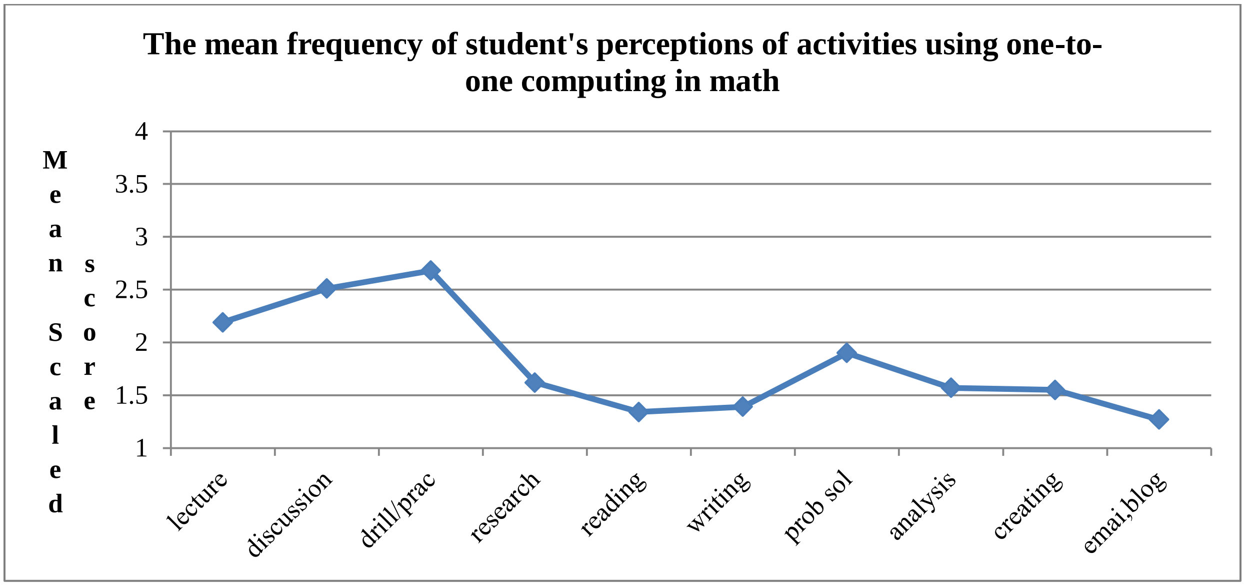

Figure 7. Student's perceptions of the mean frequency of different types of activities in a math classroom.

Question ten of the student survey asks the students to give their perception of the frequency that different activities involving one-to-one computing take place in a science classroom. The data in Table 13 show no pattern, the data are evenly spread among the four scale scores. Discussion is the only category in this set that has a high percent of often with 29%. Lecture, drill and practice, in-class research, problem solving and analysis all have a high in the rarely category, but different lows. Lecture has a high of 28% in rarely with a low of 22% in the often category. Drill and practice has a high of 32% and a low of 16% in never. In-class research also has a low of 14% in the never, with a high of 39%. Problem solving and analysis both have highs in rarely, and lows in sometimes, with problem solving having a high of 48% and a low of 10%. Analysis has a high of 39% and a low of 12%. In-class reading has a high in the never category with 44% and a low in often category of 11%. In-class writing, creating, and email all have highs in the never category and lows in the sometimes category. Writing has a high of 52% and a low of 9%, creating has a high of 42% and a low of 10%, while email again has the largest difference with a high of 70% and a low of 2%.

Table 13

Student's Perceptions of the Frequency of Different Types of Activities in a Science Classroom

Type of Activity	Never		Rarely 1-2 times		Sometimes 3-4 times		Often 5 or more	
	#	%	#	%	#	%	#	%
Lecture and note taking	36	24	42	28	36	24	32	22
Discussion and note taking	29	20	38	26	36	24	43	29
Drill and practice	24	16	48	32	38	26	29	20
In-class research	21	14	57	39	36	24	34	23
In-class reading	65	44	47	32	18	12	17	11
In-class writing w/computers	77	52	42	28	13	9	14	10
Problem solving w/computers	42	28	71	48	15	10	19	13
Analysis of data w/computers	54	37	57	39	18	12	18	12
Creating product w/computers	62	42	52	35	15	10	15	10
Email, blog wiki	103	70	23	16	4	2	9	6

Figure 8 is a visual representation of the student responses to question ten of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by activity.

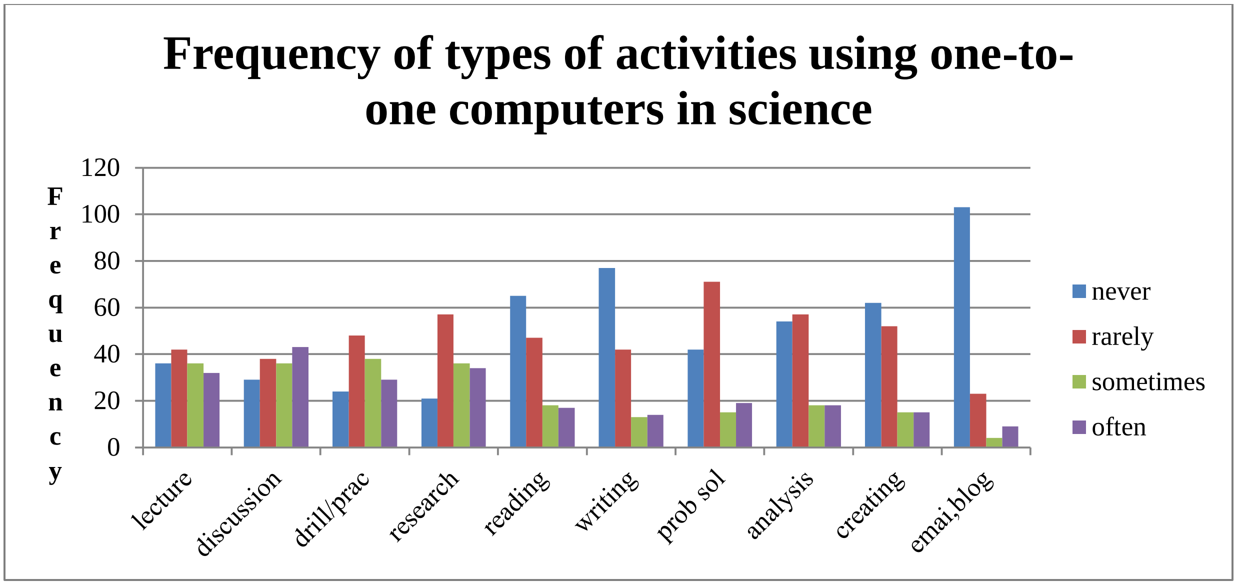

Figure 8. Student's perceptions of the frequency of different types of activities in a science classroom.

Question ten asks the students to give their perception of the frequency that ten different activities involving one-to-one computing take place in a science classroom. The mean score of four of the activities matched the individual response with the highest percentage. Six of the activities had a mean score that fell into the rarely category, three of the activities had a mean score that fell into the sometimes category, and one of the activities had a mean score that fell into the never category.

The data in Table 14 show mean scores of the frequency with the resulting scale score as it relates to the most frequent individual response. Lecture, with a mean score of 2.44 or a scale score of rarely, did match the most frequent individual response. Discussion, with a mean score of 2.64 or a scale score of sometimes, did not match the most frequent individual response which was 29% for often. Drill and practice using the computers, with a mean score of 2.52 or a scale score of sometimes, did not match the most frequent individual response which was 32% for rarely. In-class research using computers, with a mean score of 2.56 or a scale score of sometimes, did not match the most frequent individual response which was 39% for rarely.

In-class reading using computers, with a mean score of 1.91 or a scale score of rarely, did not match the most frequent individual response which was 44% for never. In-class writing using computers, with a mean score of 1.75 or a scale score of rarely, did not match the most frequent individual response which was 52% for never. Problem solving using computers, with a mean score of 2.07 or a scale score of rarely, did match the most frequent individual response. Analysis of data using computers, with a mean score of 2.00 or a scale score of rarely, did match the most frequent individual response. Creating product using computers, with a mean score of 1.88 or a scale score of rarely, did not match the most frequent individual response which was 42% for never. Email – blog – Wiki, with a mean score of 1.42 or a scale score of never, did match the most frequent individual response.

Table 14

The Mean Score of the Frequency of Different Types of Activities in a Science Class as it Relates to the Most Frequent Individual Response

	Mean Score		Most Frequent Individual Response	
Type of Activity	Scale Score	Mean	Highest Percentage	Scale Score
Lecture and note taking	Rarely	2.44	28	Rarely
Discussion and note taking	Sometimes	2.64	29	Often
Drill and practice	Sometimes	2.52	32	Rarely
In-class research	Sometimes	2.56	39	Rarely
In-class reading w/computers	Rarely	1.91	44	Never
In-class writing w/computers	Rarely	1.75	52	Never
Problem solving w/computers	Rarely	2.07	48	Rarely
Analysis of data w/computers	Rarely	2.00	39	Rarely
Creating product w/computers	Rarely	1.88	42	Never
Email, blog, wiki	Never	1.42	70	Never

Figure 9 is a visual representation of the means represented in Table 14. The vertical scale has been adjusted to the match the scale scores. This allows for a more understandable representation of the data. The scale scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

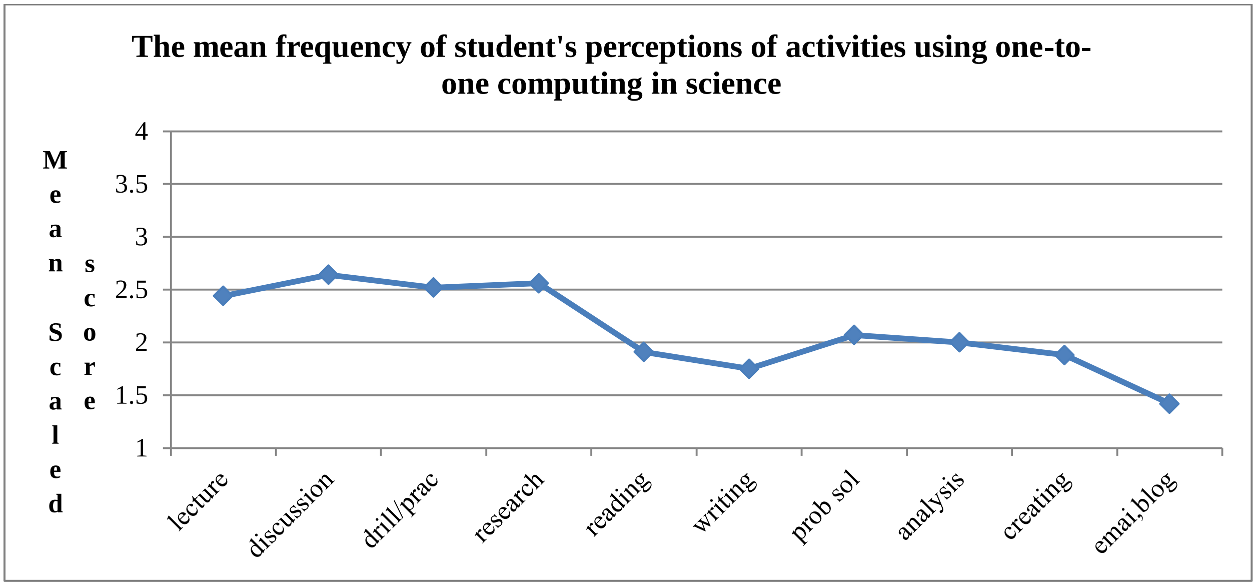

Figure 9. Student's perceptions of the mean frequency of different types of activities in a science classroom.

Question fourteen of the student survey asks the students to give their perception of the frequency that different activities take place in a social studies classroom. The data in Table 15 show that five of the ten categories have a high percent in the never category and a low percent in the often category. In-class reading has a high of 64% and a low of 5%, writing has a high of 59% with a low of 6%, problem solving has a high of 56% and a low of 5%, creating has a high of 62% and a low of 5%. Email has the highest percentile difference with a high of 81 in the never category and a low of 1% in the sometimes category. Lecture also has a high in the never category with 33% and a low of 19% in the rarely category. Discussion has a high of 30% in sometimes and 19% as a low in rarely. Both drill and practice and research have highs in rarely and low in often. Drill and practice has a high of 32% and a low of 15%, research has a high of 38% and a low of 8%.

Table 15

Student's Perceptions of the Frequency of Different Types of Activities in a Social Studies Classroom

Type of Activity	Never		Rarely 1-2 times		Sometimes 3-4 times		Often 5 or more	
	#	%	#	%	#	%	#	%
Lecture and note taking	36	33	20	19	25	23	26	24
Discussion and note taking	29	27	20	19	32	30	25	23
Drill and practice	30	28	34	32	28	26	16	15
In-class research	30	28	41	38	26	24	9	8
In-class reading	64	59	24	22	13	12	5	5
In-class writing w/computers	59	55	33	31	6	6	6	6
Problem solving w/computers	56	52	30	28	13	12	6	6
Analysis of data w/computers	56	52	34	32	7	7	5	5
Creating product w/computers	62	57	25	23	14	13	5	5
Email, blog wiki	81	75	13	12	1	1	6	6

Figure 10 is a visual representation of the student responses to question fourteen of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by activity.

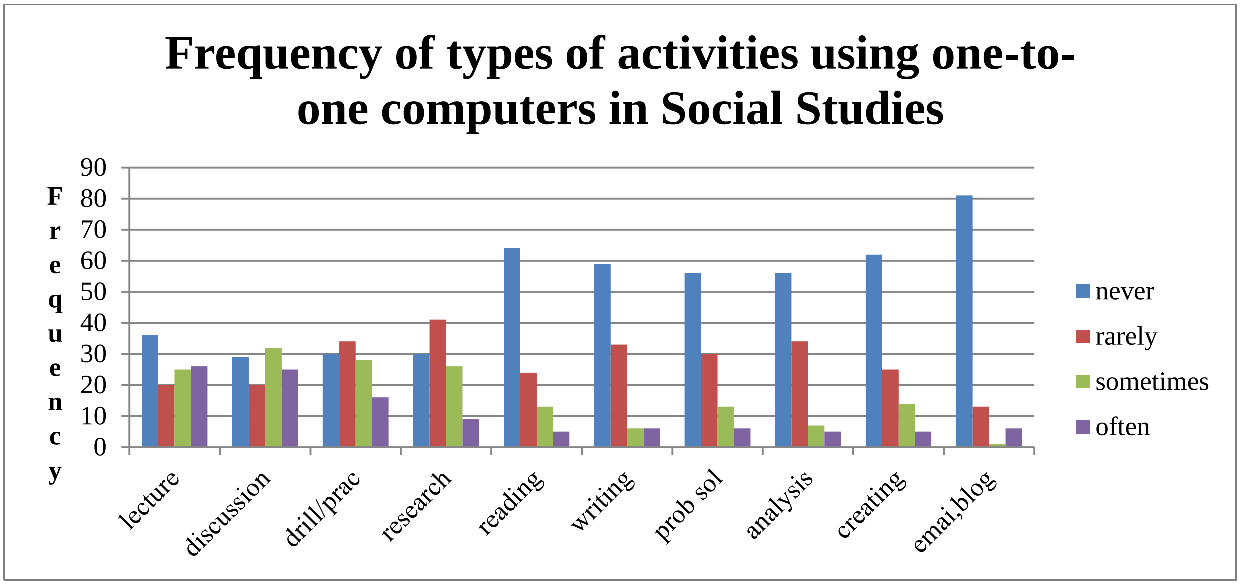

Figure 10. Student's perceptions of the frequency of different types of activities in a social studies classroom.

Question fourteen asks the students to give their perception of the frequency that ten different activities take place in a social studies classroom. The mean score of three of the activities matched the individual response with the highest percentage. Nine of the activities had a mean score that fell into the rarely category, the remaining activity had a mean that fell into the never category.

The data in Table 16 show mean scores of the frequency with the resulting scale score as it relates to the most frequent individual response. Lecture, with a mean score of 2.38 or a scale score of rarely, did not match the most frequent individual response which was 33% for never. Discussion, with a mean score of 2.50 or a scale score of rarely, did not match the most frequent individual response which was 30% for sometimes. Drill and practice using the computers, with a mean score of 2.28 or a scale score of rarely, did match the most frequent individual response.

In-class research using computers, with a mean score of 2.13 or a scale score of rarely, did match the most frequent individual response. In-class reading using computers, with a mean score of 1.61 or a scale score of rarely, did not match the most frequent individual response which was 59% for never. In-class writing using computers, with a mean score of 1.61 or a scale score of rarely, did not match the most frequent individual response which was 55% for never. Problem solving using computers, with a mean score of 1.70 or a scale score of rarely, did not match the most frequent individual response which was 52% for never. Analysis of data using computers, with a mean score of 1.62 or a scale score of rarely, did not match the most frequent individual response which was 52% for never. Creating product using computers, with a mean score of 1.64 or a scale score of rarely, did not match the most frequent individual response which was 57% for never. Email – blog – Wiki, with a mean score of 1.33 or a scale score of never, did match the most frequent individual response.

Table 16

The Mean Score of the Frequency of Different Types of Activities in a Social Studies Class as it Relates to the Most Frequent Individual Response

	Mean Score		Most Frequent Individual Response	
Type of Activity	Scale Score	Mean	Highest Percentage	Scale Score
Lecture and note taking	Rarely	2.38	33	Never
Discussion and note taking	Rarely	2.50	30	Sometimes
Drill and practice	Rarely	2.28	32	Rarely
In-class research	Rarely	2.13	38	Rarely
In-class reading w/computers	Rarely	1.61	59	Never
In-class writing w/computers	Rarely	1.61	55	Never
Problem solving w/computers	Rarely	1.70	52	Never
Analysis of data w/computers	Rarely	1.62	52	Never
Creating product w/computers	Rarely	1.64	57	Never
Email, blog, wiki	Never	1.33	75	Never

Figure 11 is a visual representation of the means represented in Table 16. The vertical scale has been adjusted to the match the scale scores. This allows for a more understandable representation of the data. The scale scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

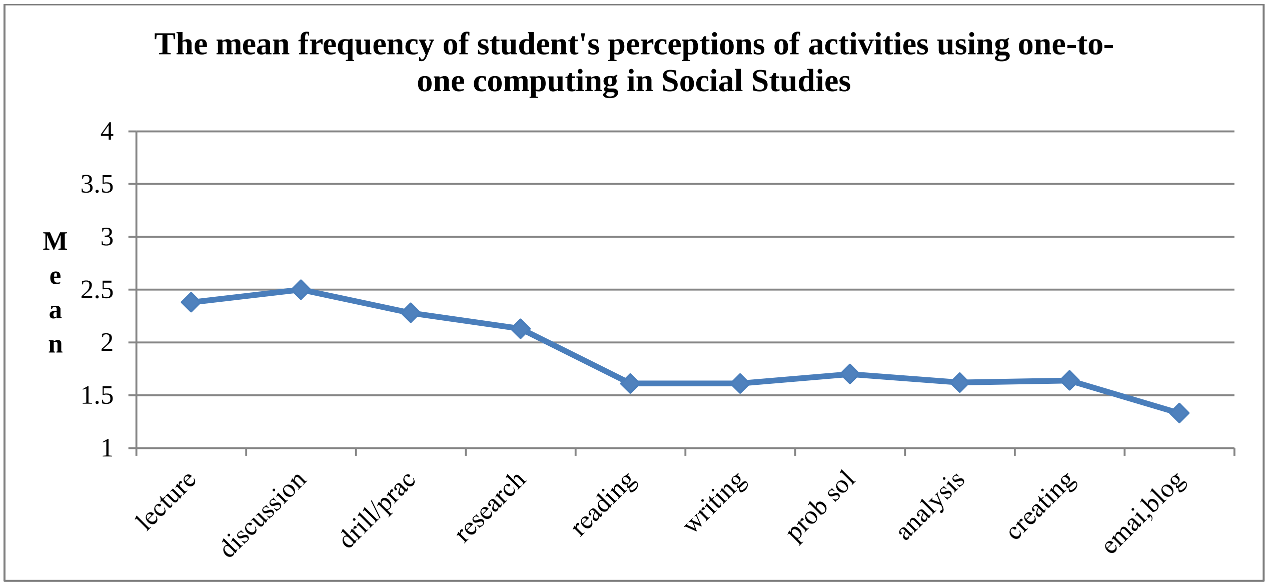

Figure 11. Student's perceptions of the mean frequency of different types of activities using in a social studies classroom.

Question three of the student survey asks the students to give their perception of the frequency that different teaching techniques involving one-to-one computing take place in an English classroom. The data in Table 17 has distinct patterns. Five of the six categories have a low percent for often, three categories with a high percent of never, and four having a high percent in rarely. Demonstrate has a high of 40% in never with a low of 6% in often. Going past basic skill has two 30% highs in never and rarely. Communication has a high percent of 40% in never and 20% low in rarely. Research, analysis and expression all have highs percent in rarely and a low in often. Research has a high of 46% and a low of 12%, analysis has a high of 42% and a low of 3%, with expression having a high of 45% and a low of 10%.

Table 17

Student's Perceptions of the Frequency of Different Teaching Techniques Using One-to-One Computing in an English Classroom

Type of Activity	Never		Rarely 1-2 times		Sometimes 3-4 times		Often 5 or more	
	#	%	#	%	#	%	#	%
Demonstrate or apply real world concepts	118	40	110	38	42	14	17	6
Going past the basic skill level	87	30	86	30	62	21	56	19
Electronic communication	117	40	57	20	46	16	70	24
Online research	47	16	134	46	72	25	36	12
Data analysis	121	41	123	42	32	11	9	3
Student expression	77	26	131	45	54	19	30	10

Figure 12 is a visual representation of the student responses to question three of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by teaching strategy.

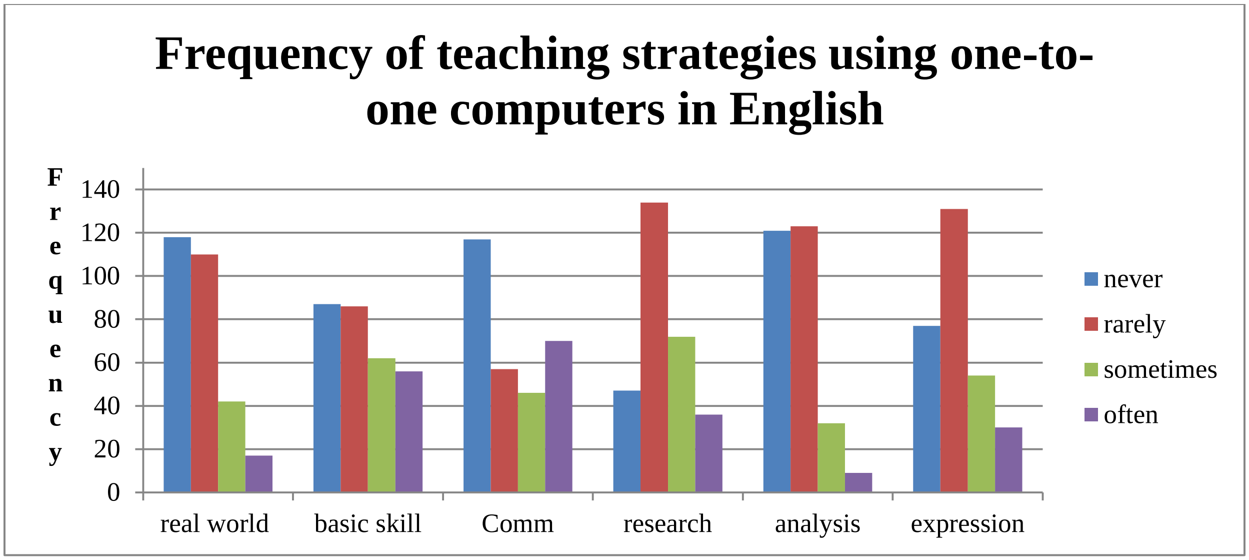

Figure 12. Student's perceptions of the frequency of different teaching techniques using one-to-one computing in an English classroom.

Question three of the student survey asks the students to give their perception of the frequency that six different teaching techniques involving one-to-one computing take place in an English classroom. The mean score of four of the teaching techniques matched the individual response with the highest percentage. All six of the teaching techniques had a mean score that fell into the rarely category.

The data in Table 18 show mean scores of the frequency with the resulting scale score as it relates to the most frequent individual response. Demonstrate or apply real world concepts using a computer with a mean score of 1.85 or a scale score of rarely, did not match the most frequent individual response which was 40% for never. Going past the basic skill level using a computer with a mean score of 2.30 or a scale score of rarely, did match the most frequent individual response. Electronic communication using a computer with a mean score of 2.24 or a scale score of rarely, did not match the most frequent individual response which was 40% for never. Online research using a computer with a mean score of 2.34 or a scale score of rarely, did match the most frequent individual response. Data analysis using a computer with a mean score of 1.75 or a scale score of rarely, did match the most frequent individual response. Student expression using a computer with a mean score of 2.13 or a scale score of rarely, did match the most frequent individual response.

Table 18

The Mean Score of the Frequency Of Different Teaching Techniques Using Computers in an English Class as it Relates to the Most Frequent Individual Response

	Mean Score		Most Frequent Individual Response	
Type of Activity	Scale Score	Mean	Highest Percentage	Scale Score
Demonstrate or apply real world concepts	Rarely	1.85	40	Never
Going past the basic skill level	Rarely	2.30	30	Rarely
Electronic communication	Rarely	2.24	40	Never
Online research	Rarely	2.34	46	Rarely
Data analysis	Rarely	1.75	42	Rarely
Student expression	Rarely	2.13	45	Rarely

Figure 13 is a visual representation of the means represented in Table 18. The vertical scale has been adjusted to the match the scale scores. This allows for a more understandable representation of the data. The scale scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

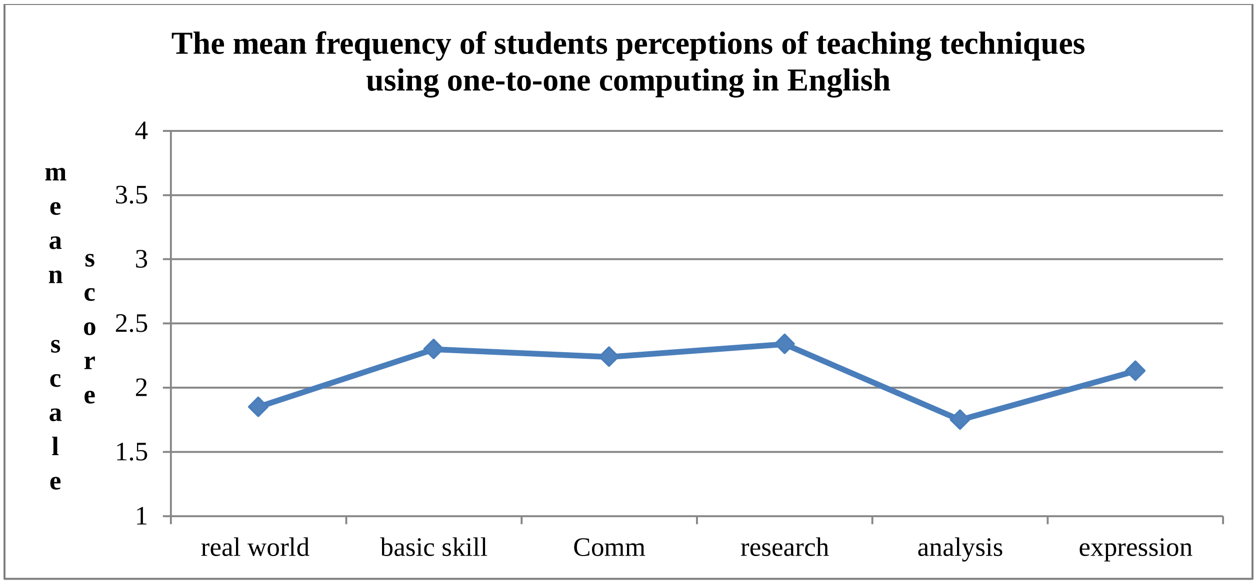

Figure 13. Student's perceptions of the mean frequency of different teaching techniques using one-to-one computing in an English classroom.

Question seven of the student survey asks the students to give their perception of the frequency that different teaching techniques involving one-to-one computing take place in a math classroom. The data in Table 19 shows a pattern for the dispersal of the data. Five of the techniques have a high percent in the never category with five of the techniques also having a low percent in the often category. Demonstrate has a high of 61% in never with 5% in the often category. Going past basic skill has a high of 41% in the rarely category and a low of 9% in the often category. Communication has a high of 77% in the never category with 1% low in the sometimes category. Research, analysis, and expression all have highs with never and low with often. Research has a high of 61% and a low of 5%, analysis has a high of 62% and a low of 4%, expression has a high of 55% and a low of 3%.

Table 19

Student's Perceptions of the Frequency of Different Teaching Techniques Using One-to-One Computing in a Math Classroom

Type of Activity	Never		Rarely 1-2 times		Sometimes 3-4 times		Often 5 or more	
	#	%	#	%	#	%	#	%
Demonstrate or apply real world concepts	78	61	32	25	11	9	6	5
Going past the basic skill level	40	32	52	41	22	17	12	9
Electronic communication	98	77	23	18	1	1	4	3
Online research	78	61	35	28	6	5	6	5
Data analysis	79	62	34	27	7	6	5	4
Student expression	70	55	39	31	12	9	4	3

Figure 14 is a visual representation of the student responses to question seven of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by teaching strategy.

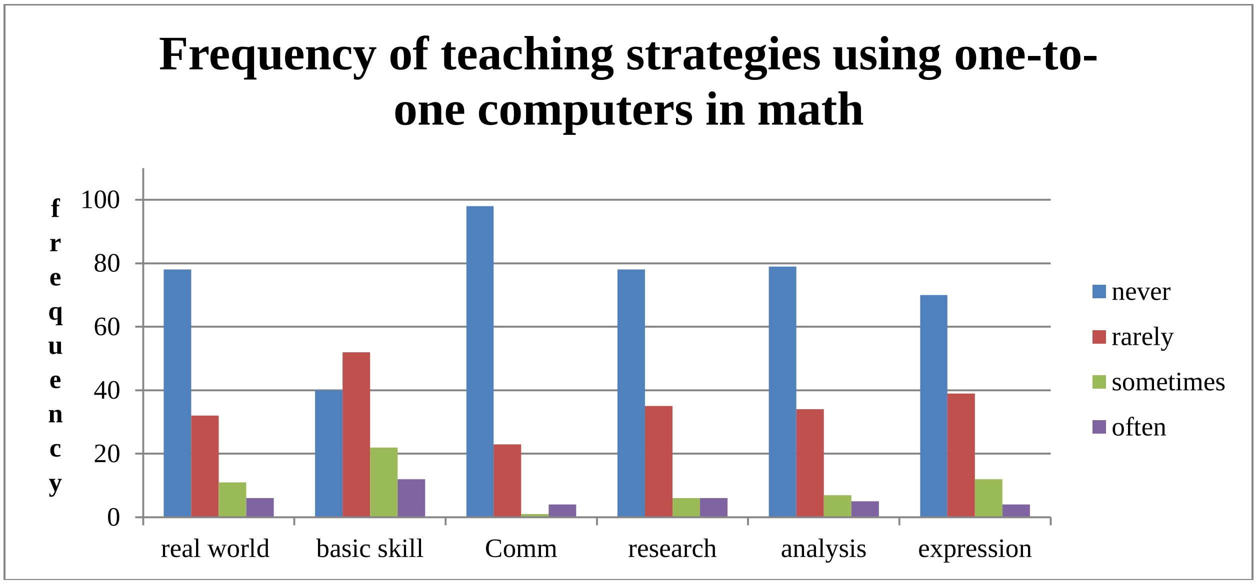

Figure 14. Student's perceptions of the frequency of different teaching techniques using one-to-one computing in a math classroom.

Question seven of the student survey asks the students to give their perception of the frequency that six different teaching techniques involving one-to-one computing take place in a math classroom. The mean score of three of the teaching techniques matched individual response with the highest percentage. Four of the teaching techniques had a mean score that fell into the rarely category while the remaining two techniques fell into never category.

The data in Table 20 show mean scores of the frequency with the resulting scale score as it relates to the most frequent individual response. Demonstrate or apply real world concepts using a computer with a mean score of 1.57 or a scale score of rarely, did not match the most frequent individual response which was 61% for never. Going past the basic skill level using a computer with a mean score of 2.05 or a scale score of rarely, did match the most frequent individual response. Electronic communication using a computer with a mean score of 1.29 or a scale score of rarely, did match the most frequent individual response. Online research using a computer with a mean score of 1.52 or a scale score of rarely, did not match the most frequent individual response which was 61% for never. Data analysis using a computer with a mean score of 1.50 or a scale score of never, did match the most frequent individual response. Student expression using a computer with a mean score of 1.60 or a scale score of rarely, did not match the most frequent individual response which was 55% for never.

Table 20

The Mean Score of the Frequency of Different Teaching Techniques Using Computers in a Math Class as it Relates to the Most Frequent Individual Response

	Score		Most Frequent Individual Response	
Type of Activity	Scale Score	Mean	Highest Percentage	Scale Score
Demonstrate or apply real world concepts	Rarely	1.57	61	Never
Going past the basic skill level	Rarely	2.05	41	Rarely
Electronic communication	Never	1.29	77	Never
Online research	Rarely	1.52	61	Never
Data analysis	Never	1.50	62	Never
Student expression	Rarely	1.60	55	Never

Figure 15 is a visual representation of the means represented in Table 20. The vertical scale has been adjusted to the match the scale scores. This allows for a more understandable representation of the data. The scale scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

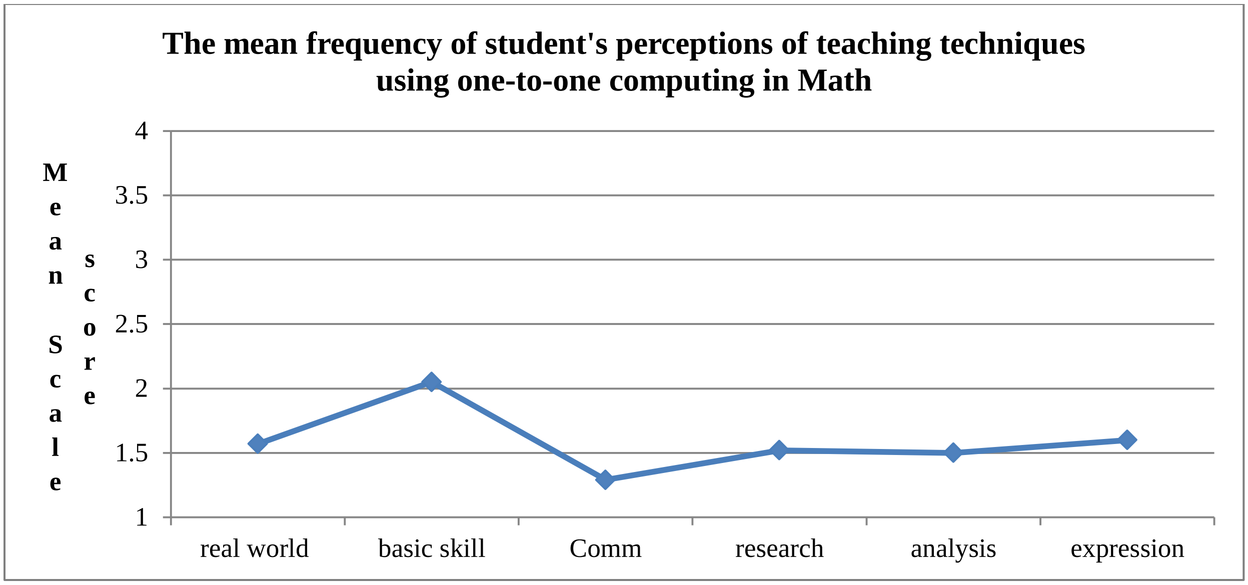

Figure 15. Frequency distribution of the means on student perceptions of teaching techniques in a math class.

Question eleven of the student survey asks the students to give their perception of the frequency that different teaching techniques involving one-to-one computing take place in a science classroom. The data in Table 21 show a pattern with three of the high percent categories never and three rarely. Demonstrate has a high percent of 39% in the never category with a low of 14% in the often category. Going past basic skill has a high of 35% in the rarely category and a low of 13% in the often category. Communication has a high of 67% in the never category with a low of 3% in the sometimes category. Research and analysis both have high percent in the rarely category with research having 38% and analysis having 40%. Expression has a high percent in the never category with 42% and a low of 9% in the often category.

Table 21

Student's Perceptions of the Frequency of Different Teaching Techniques Using One-to-One Computing in a Science Classroom

Type of Activity	Never		Rarely 1-2 times		Sometimes 3-4 times		Often 5 or more	
	#	%	#	%	#	%	#	%
Demonstrate or apply real world concepts	58	39	46	31	24	16	21	14
Going past the basic skill level	51	34	52	35	23	15	20	13
Electronic communication	100	67	31	21	4	3	10	7
Online research	28	19	56	38	31	21	32	22
Data analysis	42	29	60	40	27	18	17	11
Student expression	63	42	41	28	27	18	14	9

Figure 16 is a visual representation of the student responses to question eleven of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by teaching strategy.

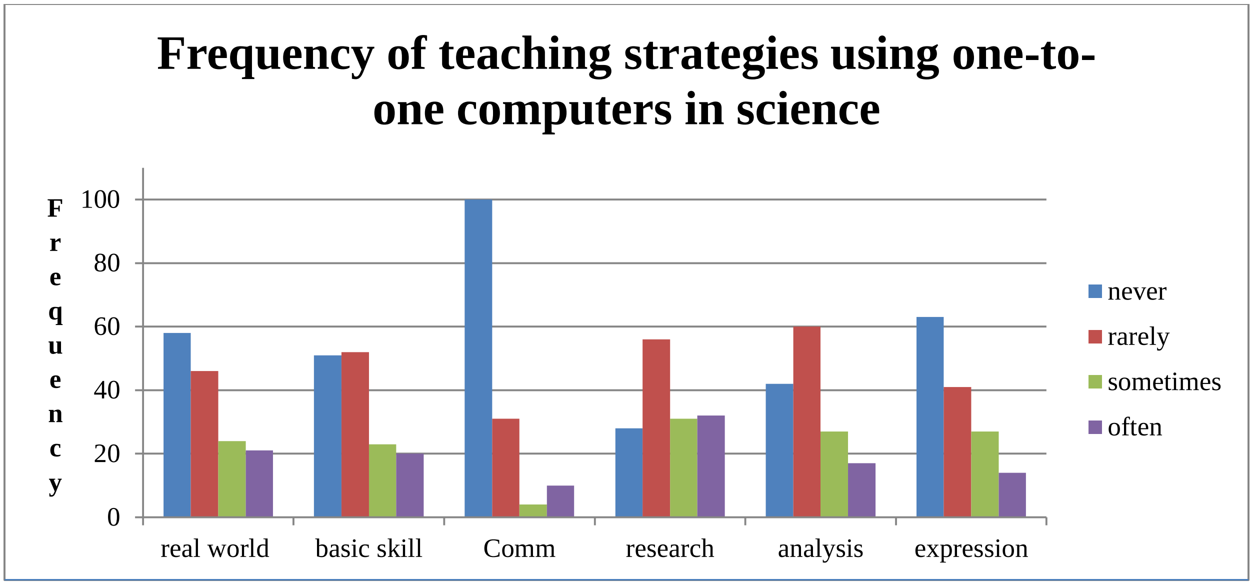

Figure 16. Student's perceptions of the frequency of different teaching techniques using one-to-one computing in a science classroom.

Question eleven of the student survey asks the students to give their perception of the frequency that six different teaching techniques involving one-to-one computing take place in a science classroom. The mean score of four of the teaching techniques matched individual response with the highest percentage. Five of the teaching techniques had a mean score that fell into the rarely category while the remaining technique fell into never category.

The data in Table 22 show mean scores of the frequency with the resulting scale score as it relates to the most frequent individual response. Demonstrate or apply real world concepts using a computer with a mean score of 2.05 or a scale score of rarely, did not match the most frequent individual response which was 39% for never. Going past the basic skill level using a computer with a mean score of 2.08 or a scale score of rarely, did match the most frequent individual response. Electronic communication using a computer with a mean score of 1.48 or a scale score of never, did match the most frequent individual response. Online research using a computer with a mean score of 2.46 or a scale score of rarely, did match the most frequent individual response. Data analysis using a computer with a mean score of 2.13 or a scale score of rarely, did match the most frequent individual response. Student expression using a computer with a mean score of 1.94 or a scale score of rarely, did not match the most frequent individual response which was 42% for never.

Table 22

The Mean Score of the Frequency of Different Teaching Techniques Using Computers in a Science Class as it Relates to the Most Frequent Individual Response

	Mean Score		Most Frequent Individual Response	
Type of Activity	Scale Score	Mean	Highest Percentage	Scale Score
Demonstrate or apply real world concepts	Rarely	2.05	39	Never
Going past the basic skill level	Rarely	2.08	35	Rarely
Electronic communication	Never	1.48	67	Never
Online research	Rarely	2.46	38	Rarely
Data analysis	Rarely	2.13	40	Rarely
Student expression	Rarely	1.94	42	Never

Figure 17 is a visual representation of the means represented in Table 22. The vertical scale has been adjusted to the match the scale scores. This allows for a more understandable representation of the data. The scale scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

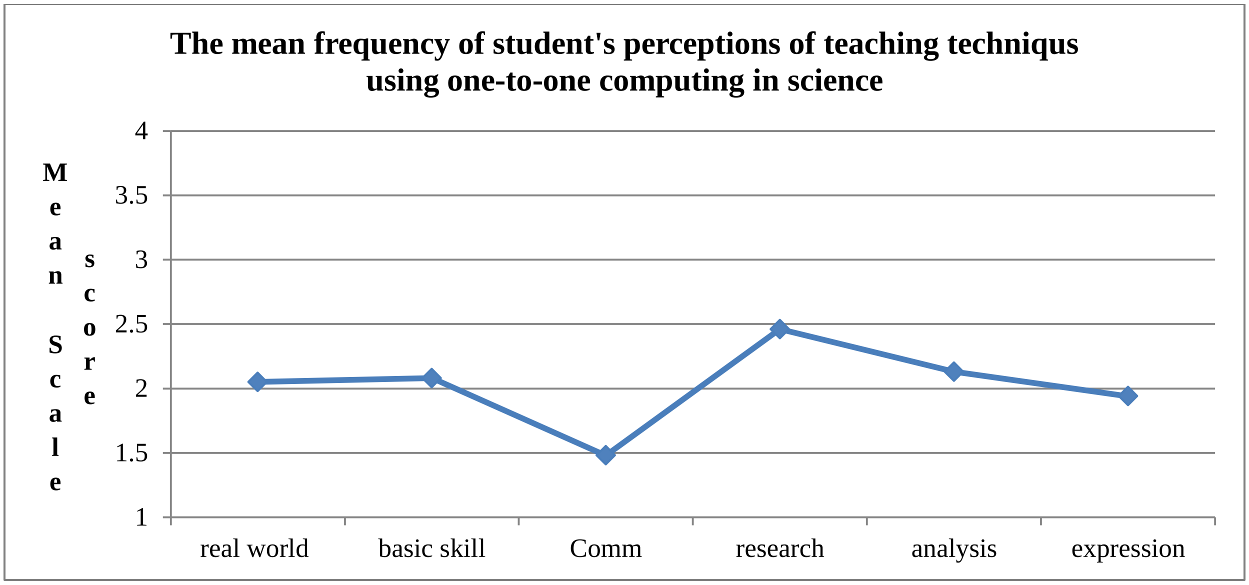

Figure 17. Frequency distribution of the means on student perceptions of teaching techniques in a science class.

Question fifteen of the student survey asks the students to give their perception of the frequency that different teaching techniques involving one-to-one computing take place in a social studies classroom. The data in Table 23 show a pattern of data dispersal with five techniques having high percentiles in the never category and four of the techniques having low percentiles in the often category. Demonstrate, going past basic skill and analysis all had high percent in the never category with low percents in the often category. Demonstrate has a high of 47% and a low of 7%, going past basic skill has a high of 50% and a low of 6%, analysis has a high of 58% and a low of 6%. Communication and expression have a high percent in the never category with a low in the sometimes category. Communication has a high of 79% and a low of 3%, expression has a high of 60% and a low of 4%. Research is the only technique that did not have a high category of never, but instead has a high category of rarely with 35% and a low of 8% in the often category.

Table 23

Student's Perceptions of the Frequency of Different Teaching Techniques Using One-to-One Computing in a Social Studies Classroom

Type of Activity	Never		Rarely 1-2 times		Sometimes 3-4 times		Often 5 or more	
	#	%	#	%	#	%	#	%
Demonstrate or apply real world concepts	46	47	33	33	11	11	7	7
Going past the basic skill level	49	50	38	38	6	6	6	6
Electronic communication	78	79	10	10	3	3	5	5
Online research	26	26	35	35	29	29	8	8
Data analysis	57	58	26	26	9	9	6	6
Student expression	59	60	25	25	4	4	7	7

Figure 18 is a visual representation of the student responses to question fifteen of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by teaching strategy.

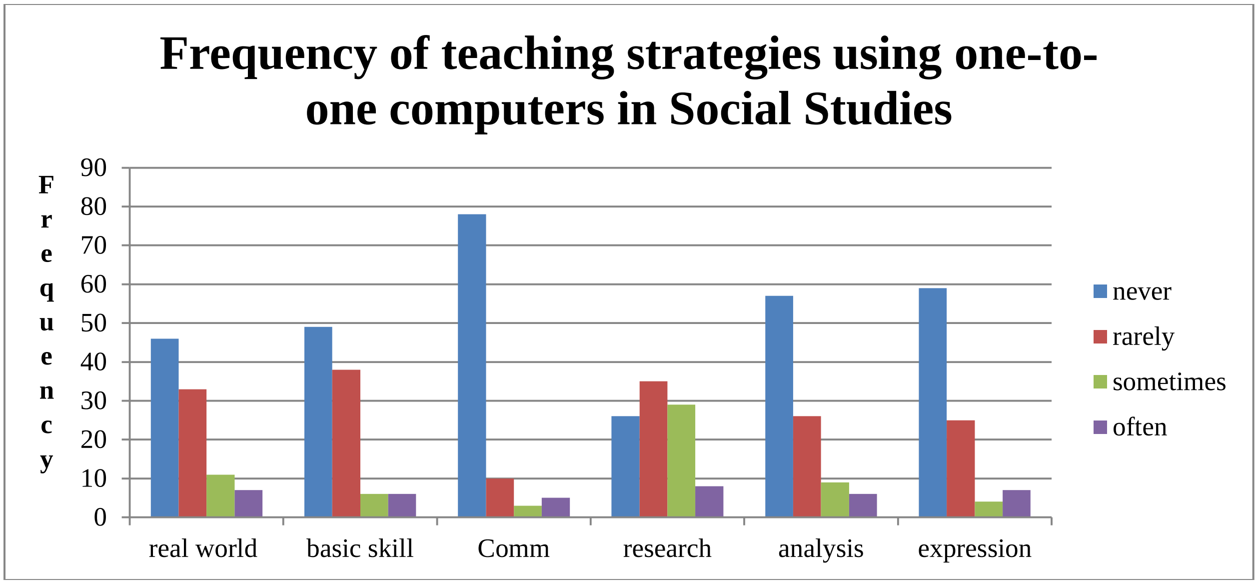

Figure 18. Student's perceptions of the frequency of different teaching techniques using one-to-one computing in a social studies classroom.

Question fifteen of the student survey asks the students to give their perception of the frequency that six different teaching techniques involving one-to-one computing take place in a social studies classroom. The mean score of two of the teaching techniques matched individual response with the highest percentage. Five of the teaching techniques had a mean score that fell into the rarely category while the remaining technique fell into never category.

The data in Table 24 show mean scores of the frequency with the resulting scale score as it relates to the most frequent individual response. Demonstrate or apply real world concepts using a computer with a mean score of 1.78 or a scale score of rarely, did not match the most frequent individual response which was 47% for never. Going past the basic skill level using a computer with a mean score of 1.69 or a scale score of rarely, did not match the most frequent individual response which was 50% for never. Electronic communication using a computer with a mean score of 1.32 or a scale score of never, did match the most frequent individual response. Online research using a computer with a mean score of 2.19 or a scale score of rarely, did match the most frequent individual response. Data analysis using a computer with a mean score of 1.63 or a scale score of rarely, did not match the most frequent individual response which was 58% for never. Student expression using a computer with a mean score of 1.57 or a scale score of rarely, did not match the most frequent individual response which was 60% for never.

Table 24

The Mean Score of the Frequency of Different Teaching Techniques Using Computers in a Social Studies Class as it Relates to the Most Frequent Individual Response.

	Mean Score		Most Frequent Individual Response	
Type of Activity	Scale Score	Mean	Highest Percentage	Scale Score
Demonstrate or apply real world concepts	Rarely	1.78	47	Never
Going past the basic skill level	Rarely	1.69	50	Never
Electronic communication	Never	1.32	79	Never
Online research	Rarely	2.19	35	Rarely
Data analysis	Rarely	1.63	58	Never
Student expression	Rarely	1.57	60	Never

Figure 19 is a visual representation of the means represented in Table 24. The vertical scale has been adjusted to the match the scale scores. This allows for a more understandable representation of the data. The scale scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

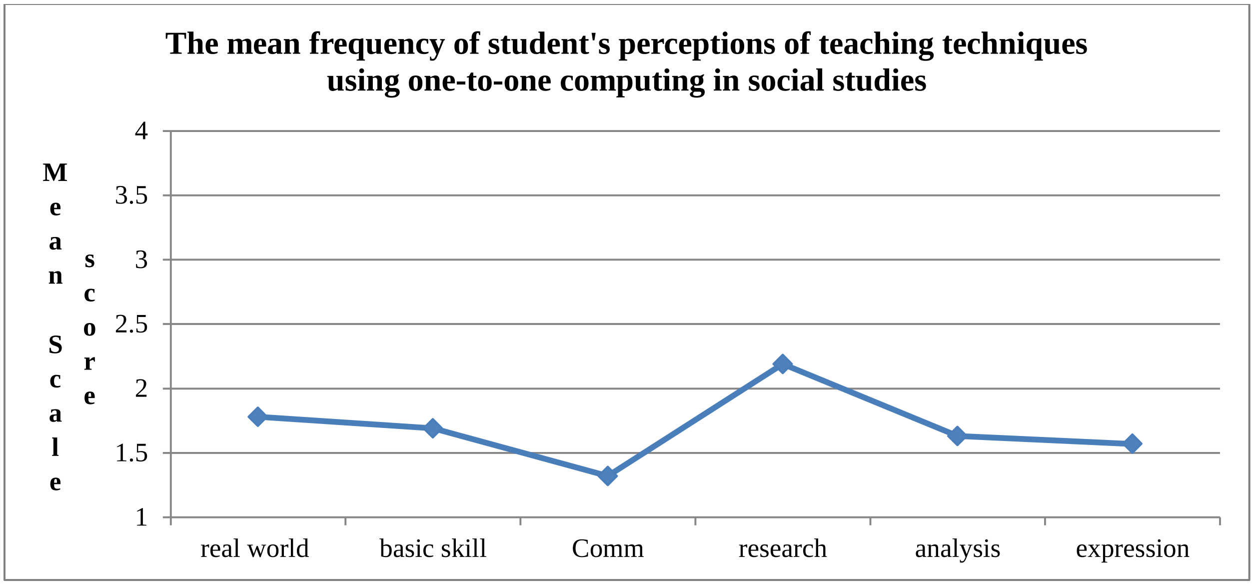

Figure 19. Frequency distribution of the means on student perceptions of teaching techniques in a social studies class.

Summary for research question 1. The data for research question one is presented in a variety of methods. Descriptive statistics allowed the data to be presented in tabular and graphical form. The presentation and explanation of the data allowed for analysis of the data to be done. The analysis shows the students perception of how frequently the computers were being used for different activities along with the perceptions of what type of instructional strategies were being used that allowed the students to use the computers.

Research question 2: **What are the perceptions of middle school teachers on the frequency and type of use of one-to-one computing in the classroom?**

The following data are the result from the individual survey questions. The data for the teachers are not divided by any demographic information but reflect the perceptions of the total population of the teachers surveyed. The data includes the frequency and percent of the responses, followed by a frequency distribution graph.

Question three of the teacher survey asked the teachers to rate the frequency on ten different activities on how often they incorporated those activities in their classroom? The data in Table 25 show that 31% of participants lecture sometimes and 31% of participants lecture often, with 2% of participants never lecturing in their classroom. When looking at how often discussion is used in the classroom, 38% of the participants reported using discussion sometimes in their classroom and 38% of participants reported using discussion often, with 13% never and 13% rarely using it in their classroom. The data show that 38% of participants reported using drill and practice assignments with computers often and 0% reported never using it in their classroom. Half of participants reported rarely using in-class research with computers and 6% reported using in-class research with computers often in their classroom. Reading in-class using the computers was reported by 44% of participants to never take place in the classroom, while 6% reported using in-class reading with computers sometimes in their classroom. Writing with the computers was reported by 38% of participants to never happen, while 13% reported using in-class writing with computers often in their classroom. The data show that 44% of participants reported rarely using problem solving with computers, while 6% reported using problem solving with computers often in their classroom. Using the computers for analysis of data was reported by 69% of participants to never happen in the classroom. Individual or group creation of a product was reported by 38% of participants to never happen, while 13% reported that they often create products with computers, and only 19% reported that they rarely create products with computers in their classroom.

Table 25

Teacher Perceptions of the Frequency of Different Types of Activities

Type of Activity	Never		Rarely		Sometimes		Often	
	#	%	#	%	#	%	#	%
Lecture and note taking	2	13	4	25	5	31	5	31
Discussion and note taking	2	13	2	13	6	38	6	38
Drill and practice assignments w/computers	0	0	5	31	5	31	6	38
In-class research w/computers	4	25	8	50	3	19	1	6
In-class reading w/computers	7	44	2	13	1	6	6	38
In-class writing w/computers	6	38	4	25	4	25	2	13
Problem solving w/computers	5	31	7	44	3	19	1	6
Analysis of data w/computers	11	69	4	25	1	6	0	0
Creating product w/computers	3	19	6	38	5	31	2	13
Email, blog wiki	6	38	3	19	3	19	4	25

Figure 20 is a visual representation of the teacher responses to question three of the teacher’s survey. The vertical scale has been adjusted to the total number of respondents possible, allowing for a more understandable representation of the data.

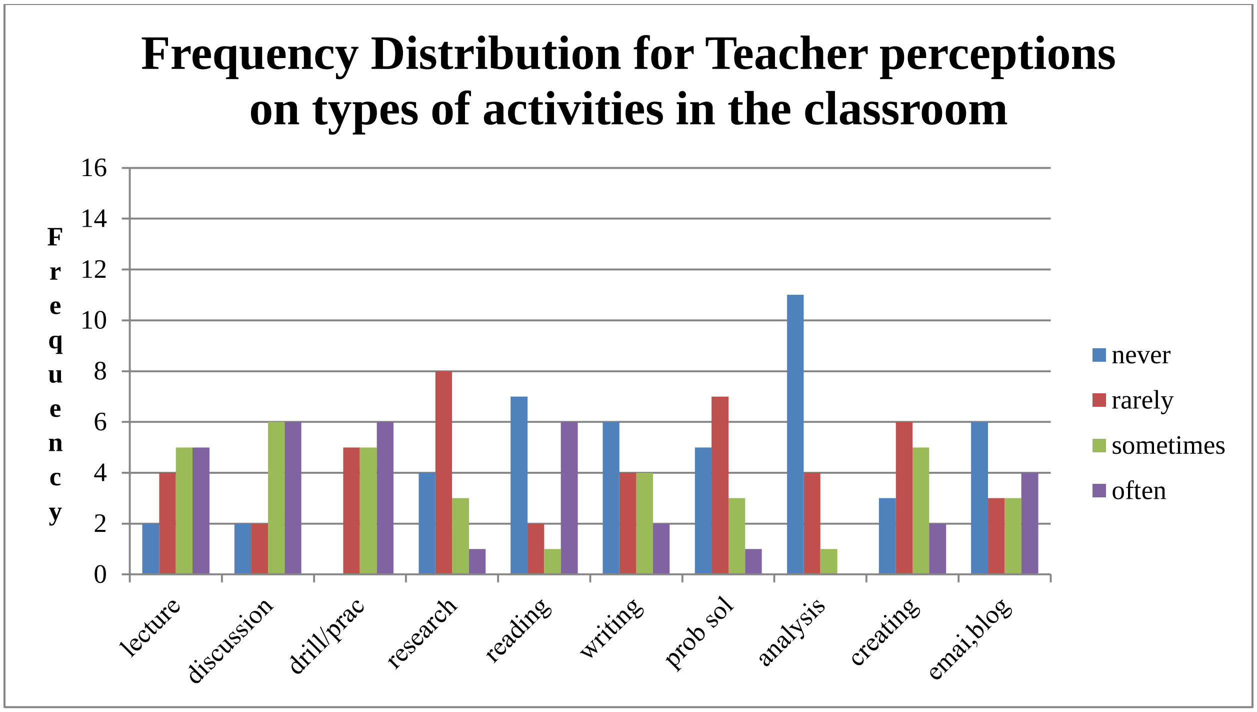

Figure 20. Frequency distribution graph of teacher perceptions of the effect of having one-to-one computing in the classroom.

The data that were analyzed to answer research question one were the data gathered from the responses to survey question two, three, six, seven, ten, eleven, fourteen and fifteen of the student survey. Question three asks the teachers to give their perception of the frequency that ten different activities involving one-to-one computing take place in a classroom. The mean score of six of the activities matched the individual response with the highest percentage. Six of the activities had a mean score that fell into the rarely category, three of the activities fell into the sometimes category and the remaining activity fell into the never category.

The data in Table 26 show mean scores of the frequency with the resulting scale score as it relates to the most frequent individual response. Lecture, with a mean score of 2.81 or a scale score of sometimes, did match the most frequent individual response. Discussion, with a mean score of 3.00 or a scale score of sometimes, did match the most frequent individual response. Drill and practice using the computers, with a mean score of 3.06 or a scale score of sometimes, did not match the most frequent individual response which was 38% for often. In-class research using computers, with a mean score of 2.06 or a scale score of rarely, did match the most frequent individual response. In-class reading using computers, with a mean score of 2.38 or a scale score of rarely, did not match the most frequent individual response which was 44% for never. In-class writing using computers, with a mean score of 2.13 or a scale score of rarely, did not match the most frequent individual response which was 38% for never. Problem solving using computers, with a mean score of 2.00 or a scale score of rarely, did match the most frequent individual response. Analysis of data using computers, with a mean score of 1.38 or a scale score of never, did match the most frequent individual response. Creating product using computers, with a mean score of 2.38 or a scale score of rarely, did match the most frequent individual response. Email – blog – Wiki, with a mean score of 2.31or a scale score of rarely, did not match the most frequent individual response which was 38% for never.

Table 26

The Mean Score of the Frequency of Different Activities Using Computers in Class as it Relates to the Most Frequent Individual Response Teachers

	Mean Score		Most Frequent Individual Response	
Type of Activity	Scale Score	Mean	Highest Percentage	Scale Score
Lecture and note taking	Sometimes	2.81	31	Sometimes
Discussion and note taking	Sometimes	3.00	38	Sometimes
Drill and practice	Sometimes	3.06	38	Often
In-class research	Rarely	2.06	50	Rarely
In-class reading w/computers	Rarely	2.38	44	Never
In-class writing w/computers	Rarely	2.13	38	Never
Problem solving w/computers	Rarely	2.00	44	Rarely
Analysis of data w/computers	Never	1.38	69	Never
Creating product w/computers	Rarely	2.38	38	Rarely
Email, blog, wiki	Rarely	2.31	38	Never

Figure 21 is a visual representation of the means represented in Table 26. The vertical scale has been adjusted to the match the scale scores. This allows for a more understandable representation of the data. The scale scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

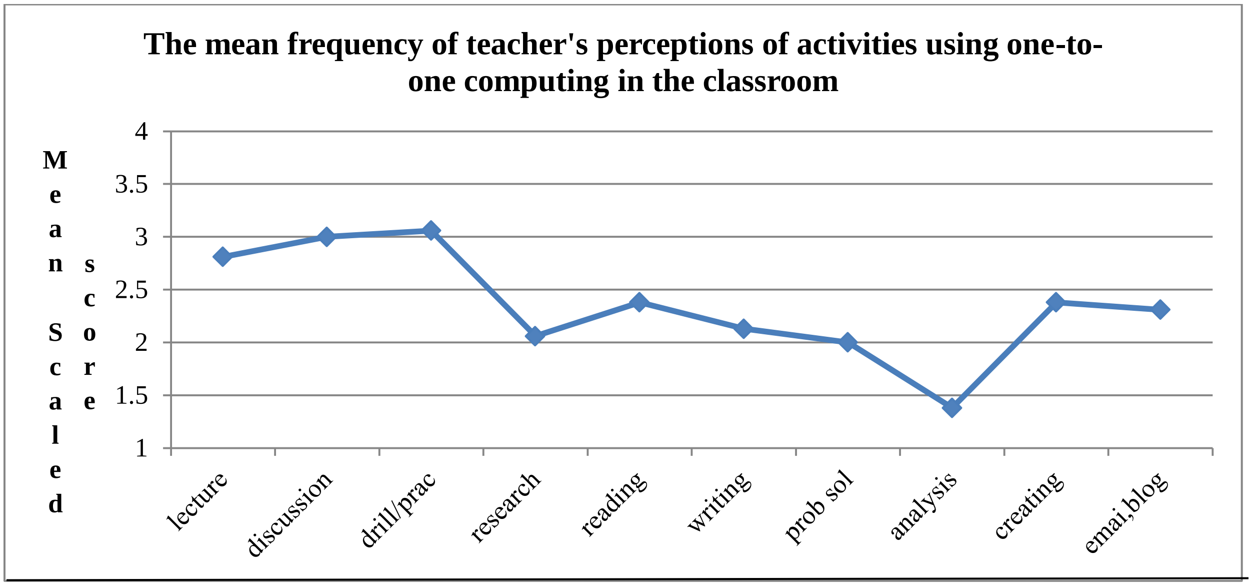

Figure 21. Frequency of teacher’s perceptions of activities in the classroom.

Question four of the teacher survey asked the teachers to rate how often, by hours per week that their students use computers for taking notes, homework, in-class assignments, searching for information and communicating with others. The data in Table 27 show that 81% of the teachers have the students take notes on the computer 0-2 hours per week, with no teachers using the computer for notes more than six hours a week. The computers are used for homework purposes 0-2 hours per week by 94% of the teachers with no teachers using the computer for homework more than six hours per week. In-class assignments using the computer are used 2-4 hours per week by 56% of the teachers. The computers are used to search for information 0-2 hours per week by 44% of the teachers and 2-4 hours per week by 44% of the teachers. Communication using the computer is only used 0-2 hours per week by 69% of the teachers.

Table 27

Teacher Perceptions of Frequency of Activities Using the Computer (Hours Per Week)

Type of activity	0 – 2		2 – 4		4 – 6		6+	
	#	%	#	%	#	%	#	%
Taking notes	13	81	1	6	2	13	0	0
Homework	15	94	1	6	0	0	0	0
In-class assignments	3	19	9	56	1	6	3	19
Searching for information	7	44	7	44	1	6	1	6
Communicating with others	11	69	1	6	2	13	2	13

Figure 22 is a visual representation of the teacher responses to question four of the teacher's survey. The vertical scale has been adjusted to the total number of respondents possible, allowing for a more understandable representation of the data.

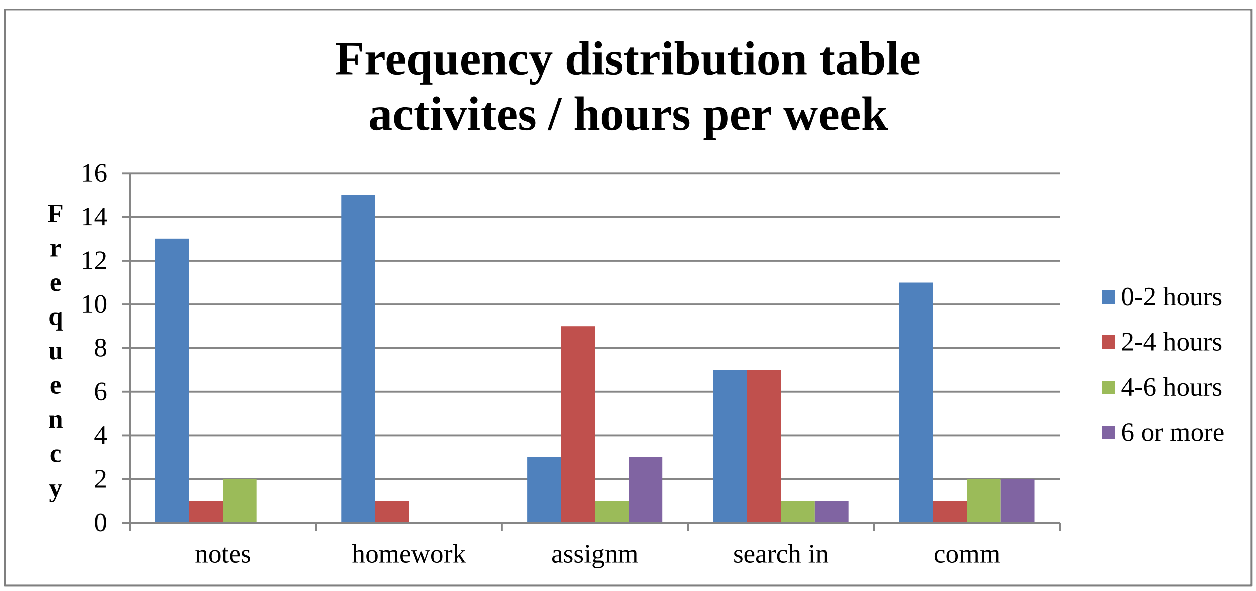

Figure 22. Frequency distribution graph of the perceptions of using one-to-one computing.

Question four of the teacher survey asks the teachers to give their perception of the amount of time that five different activities involving one-to-one computing consume in class. The mean score of all five activities matched individual response with the highest percentage.

The data in Table 28 show mean scores of the frequency with the resulting scale score as it relates to the most frequent individual response. Taking notes using a computer with a mean score of 1.31 or a time index of 0 – 2, did match the most frequent individual response. Homework using a computer with a mean score of 1.06 or a time index of 0 – 2, did match the most frequent individual response. In-class assignments using a computer with a mean score of 2.25 or a time index of 2 – 4, did match the most frequent individual response. Searching for information using a computer with a mean score of 1.75 or a time index of 0 – 2, did match the most frequent individual response. Communication using a computer with a mean score of 1.69 or a time index of 0 – 2, did match the most frequent individual response.

Table 28

The Mean Score of the Frequency of Time on Task of Different Activities Using Computers in Class as it Relates to the Most Frequent Individual Response Teachers

	Mean Score		Most Frequent Individual Response	
Type of Activity	Scale Score	Mean	Highest Percentage	Scale Score
Taking notes	0 – 2	1.31	81	0 – 2
Homework	0 – 2	1.06	94	0 – 2
In-class assignments	2 – 4	2.25	56	2 – 4
Searching for information	0 – 2	1.75	44	0 – 2
Communication	0 – 2	1.69	69	0 – 2

Figure 23 is a visual representation of the means represented in Table 28. The vertical scale has been adjusted to the match the possible number of hours per week. This allows for a more understandable representation of the data.

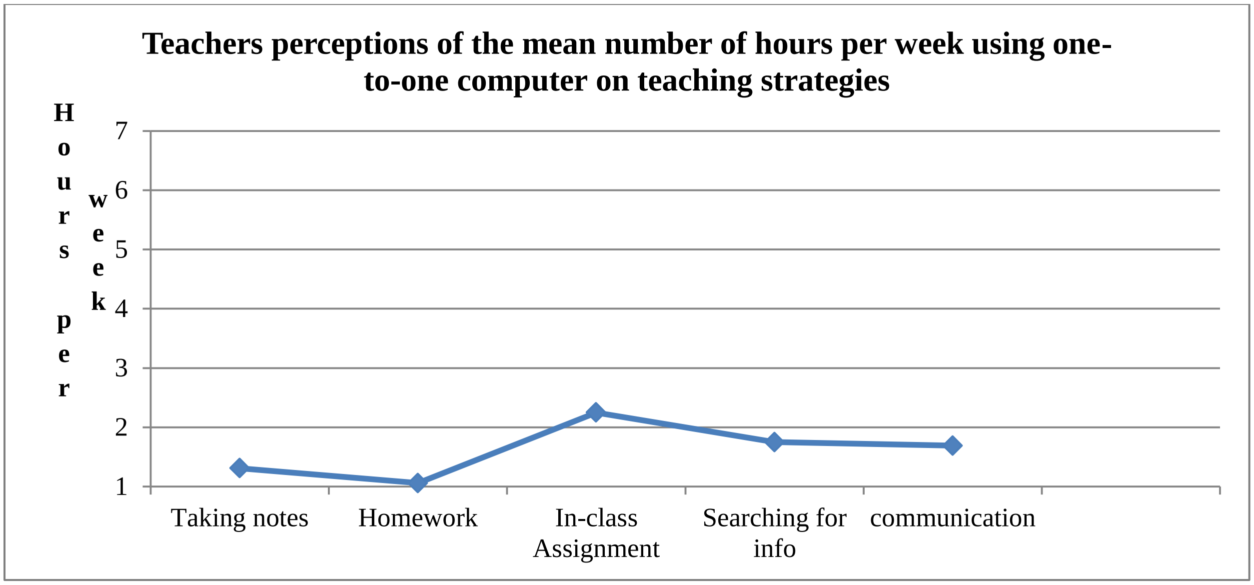

Figure 23. Teacher's perceptions of time spent on task.

Question five of the teacher survey asked the teachers to rate how often six different teaching styles are used in the classroom. The data in Table 29 show that applying real world concepts using the computer is used often by 31% of the teachers. Using the computers for basic skill level is used by 38% of the teachers rarely and 38% of the teachers sometimes, with 6% of the teachers never going above the basic skill level. Using the computers for electronic communication is never done by 38% of the teachers with only 25% of the teachers often using the computers for communication. Online research is used rarely by 44% of the teachers and only often used by 6% of the teachers. Using the computers for data analysis is rarely used by 44% of the teachers and only often used by 6% of the teachers. Using the computers for student expression is rarely used by 44% of the teachers, with 19% of the teachers never using the computers for student expression.

Table 29

Teacher's Perceptions of How Often are the Following Teaching Techniques Using One-to-One Computers Used in your Classroom?

Type of Activity	Never		Rarely		Sometimes		Often	
	#	%	#	%	#	%	#	%
Demonstrate or apply real world concepts w/computer	4	25	3	19	4	25	5	31
Going past the basic skill level w/computers	1	6	6	38	6	38	3	19
Electronic communication w/computers	6	38	3	19	3	19	4	25
Online research w/computers	4	25	6	38	4	25	1	6
Data analysis w/computers	5	31	7	44	3	19	1	6
Student expression w/computers	3	19	7	44	3	19	3	19

Figure 24 is a visual representation of the teacher responses to question five of the teacher's survey. The vertical scale has been adjusted to the total number of respondents possible, allowing for a more understandable representation of the data.

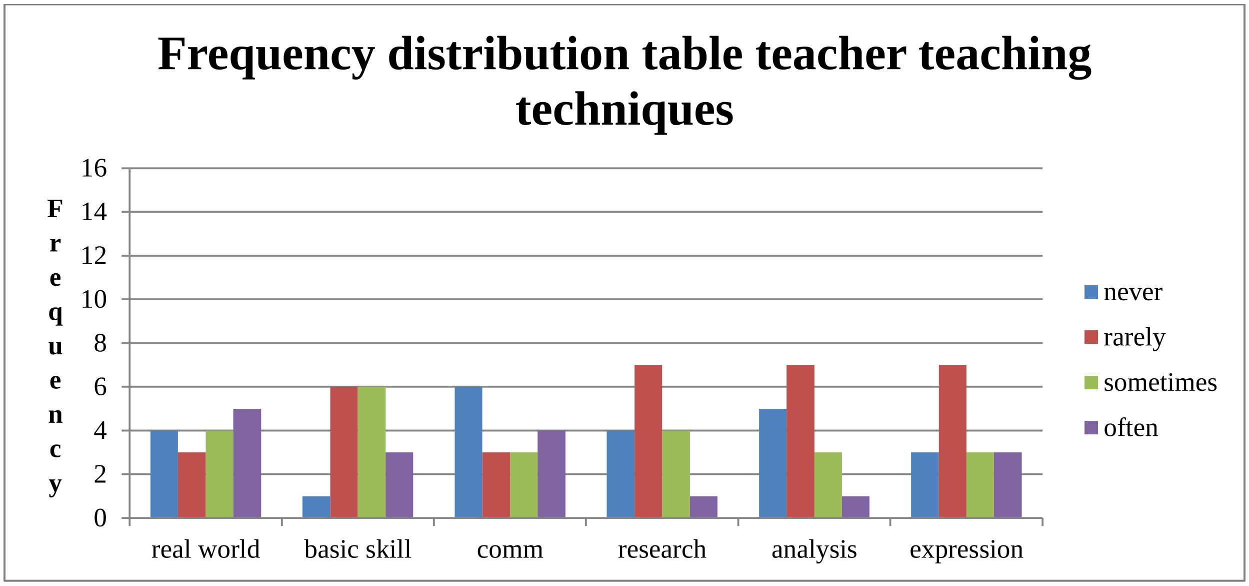

Figure 24. Frequency distribution table for teacher teaching techniques.

Question five of the teacher survey asks the teachers to give their perception of the frequency that six different teaching techniques involving one-to-one computing take place in a classroom. The mean score of four of the teaching techniques matched individual response with the highest percentage. Four of the teaching techniques had a mean score that fell into the rarely category with the remaining two techniques falling into the sometimes category.

The data in Table 30 show mean scores of the frequency with the resulting scale score as it relates to the most frequent individual response. Demonstrate or apply real world concepts using a computer with a mean score of 2.63 or a scale score of sometimes, did not match the most frequent individual response which was 31% for often. Going past the basic skill level using a computer with a mean score of 2.69 or a scale score of sometimes, did match the most frequent individual response. Electronic communication using a computer with a mean score of 2.31 or a scale score of rarely, did not match the most frequent individual response which was 38% for never. Online research using a computer with a mean score of 2.13 or a scale score of rarely, did match the most frequent individual response. Data analysis using a computer with a mean score of 2.00 or a scale score of rarely, did match the most frequent individual response. Student expression using a computer with a mean score of 2.38 or a scale score of rarely, did match the most frequent individual response.

Table 30

The Mean Score of the Frequency of Teaching Techniques Using Computers in Class as it Relates to the Most Frequent Individual Response – Teachers

	Mean Score		Most Frequent Individual Response	
Type of Activity	Scale Score	Mean	Highest Percentage	Scale Score
Demonstrate or apply real world concepts	Sometimes	2.63	31	Often
Going past the basic skill level	Sometimes	2.69	38	Sometimes
Electronic communication	Rarely	2.31	38	Never
Online research	Rarely	2.13	38	Rarely
Data analysis	Rarely	2.00	44	Rarely
Student expression	Rarely	2.38	44	Rarely

Figure 25 is a visual representation of the means represented in Table 30. The vertical scale has been adjusted to the match the scale scores. This allows for a more understandable representation of the data. The scale scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

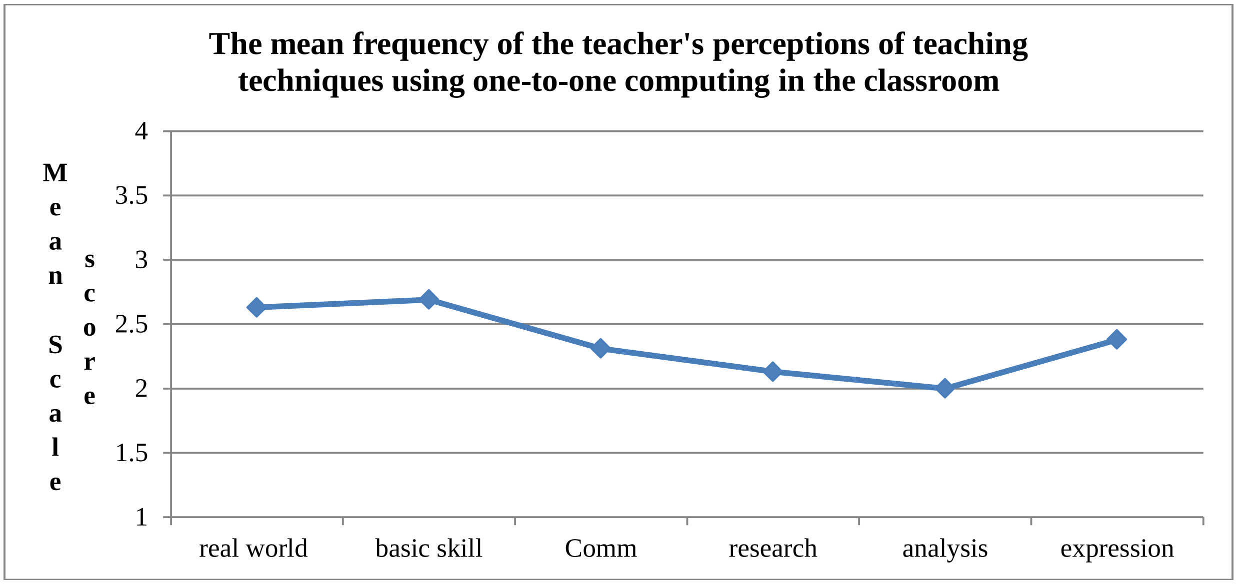

Figure 25. Mean frequency of teacher's perceptions of teaching techniques.

Summary for research question 2. The data for research question two is presented in a variety of methods. Descriptive statistics allowed the data to be presented in tabular and graphical form. The presentation and explanation of the data allowed for analysis of the data to be done. The analysis shows the teachers' perception of how frequently the computers were being used for different activities, how often the teachers allowed the students to use the computers, along with the teachers perceptions of what type of instructional strategies were being used that allowed the students access to the computers.

Research question 3: What are the perceptions of middle school students, by ethnicity, special education status, and gender on the educational effect that one-to-one computing is having on overall student performance in each of the core classrooms (English, math, science, social studies)?

A mean score was calculated for each subgroup within a question and the overall perception rating was determined using the mean as it related to the following scale:

1.00 – 1.50 Negative

1.51 – 2.50 Somewhat Negative

2.51 – 3.50 Somewhat Positive

3.51 – 4.00 Positive

Question four of the student survey asks the students to give their perception of the effect that one-to-one computers had on their academic performance in their English class. The data in Table 31 is looked at as either having a positive or negative effect. All subgroups showed a positive effect. African American males had a 92% positive effect with only 8% negative. African American females had an 89% positive and 11% negative. Both male and female Hispanic had a 100% positive, but had a low population. White males had a 94% positive and a 6% negative. White females had 93% positive and only 7% negative. Special education males had an 87% positive with special education females having a 79% positive. The other subgroup also had a positive effect with 82% and 87%, male to female.

Table 31

Student's Perceptions of the Effect on Student Performance Using One-to-One Computing in an English Classroom

Subgroup	Negatively		Somewhat Negatively		Somewhat Positively		Positively	
	#	%	#	%	#	%	#	%
African American Males	1	4	1	4	12	46	12	46
African American Females	3	11	0	0	7	25	18	64
Hispanic Males	0	0	0	0	3	43	4	57
Hispanic Females	0	0	0	0	1	100	0	0
White Males	1	1	5	5	46	48	44	46
White Females	1	1	5	6	34	38	48	55
Special Education Males	4	8	2	4	18	40	21	47
Special Education Females	5	13	3	8	13	34	17	45
Other Male	1	9	1	9	2	18	7	64
Other Female	1	4	2	8	6	26	14	61

Figure 26 is a visual representation of the student responses to question four of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by subgroup.

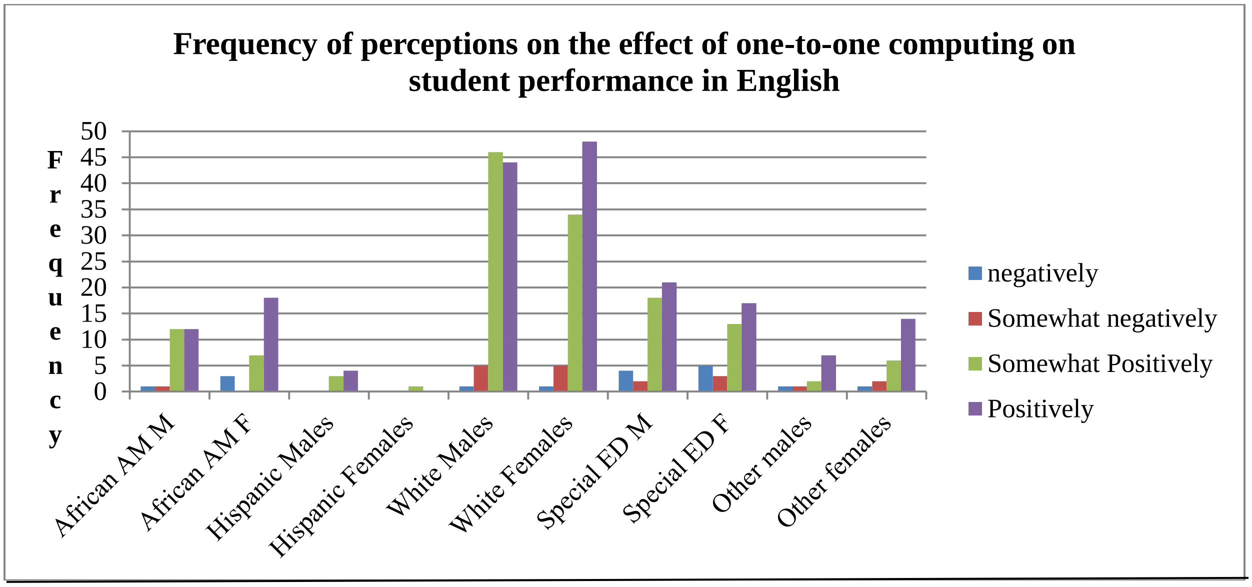

Figure 26. Student's perceptions of the effect using one-to-one computing in an English classroom.

Once the mean score was determined an analysis of variance (ANOVA) test was run on each of the four core subjects: English, math, science and social studies. All ten of the subgroups: African American males, African American females, Hispanic males, Hispanic females, White males, White females, special education males, special education females, other males and other females were used for the ANOVA to determine if there was a significant difference in the means of the group. Significance was determined if the (sig. $< .05$). If significance was determined a Tukey post hoc analysis was conducted to find if there was a significant difference between the individual means. An ANOVA was run on questions four, eight, twelve and sixteen of the student survey. Questions eight, twelve and sixteen had a significance of $p<.05$.

Question four of the student survey asks the students to give their perception of the effect that one-to-one computers is having on their academic performance in their English class. The mean score of four of the subgroups matched the individual response with the highest percentage. Nine of the subgroups had a mean that fell into the somewhat positive perception category; the remaining subgroup had a mean that fell into the positive perception category.

The data in Table 32 show mean scores of the frequency with the resulting perception score as it relates to the most frequent individual response. African American males with a mean score of 3.35 or a perception score of somewhat positive, did match the most frequent individual response. African American females with a mean score of 3.43 or a perception score of somewhat positive, did not match the most frequent individual response which was 64% for positive. Hispanic male with a mean score of 3.57 or a perception score of positive, did match the most frequent individual response. This subgroup had a low population of student participants. Hispanic females with a mean score of 3.00 or a perception score of somewhat positive, did match the most frequent individual response. This subgroup had a low population of student participants. White males with a mean score of 3.39 or a perception score of somewhat positive, did match the most frequent individual response. White females with a mean score of 3.47 or a perception score of somewhat positive, did not match the most frequent individual response was 55% for positive. Special Education males with a mean score of 3.24 or a perception score of somewhat positive, did not match the most frequent individual response which was 47% for positive. Special Education females with a mean score of 3.11 or a perception score of somewhat positive, did not match the most frequent individual response which was 45% for positive. Other male with a mean score of 3.36 or a perception score of somewhat positive, did not match the most frequent individual response which was 64% for positive. Other females with a mean score of 3.43 or a perception score of somewhat positive, did not match the most frequent individual response which was 61% for positive.

Table 32

The Mean Score of Student Perceptions, by Subgroup, on Student Performance Using Computers in an English Class as it Relates to the Most Frequent Individual Response

Subgroup	Mean Score Perception Score	Mean	Most Frequent Individual Response Highest Percentage	Perception Score
African American Males	Somewhat Positive	3.35	46	Somewhat Positive
African American Females	Somewhat Positive	3.43	64	Positive
Hispanic Males	Positive	3.57	57	Positive
Hispanic Females	Somewhat Positive	3.00	100	Somewhat Positive
White Males	Somewhat Positive	3.39	48	Somewhat Positive
White Females	Somewhat Positive	3.47	55	Positive
Special Education Males	Somewhat Positive	3.24	47	Positive
Special Education Females	Somewhat Positive	3.11	45	Positive
Other Males	Somewhat Positive	3.36	64	Positive
Other Females	Somewhat Positive	3.43	61	Positive

Figure 27 is a visual representation of the means represented in Table 32. The vertical scale has been adjusted to the match the perception scores. This allows for a more understandable representation of the data. The perception scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

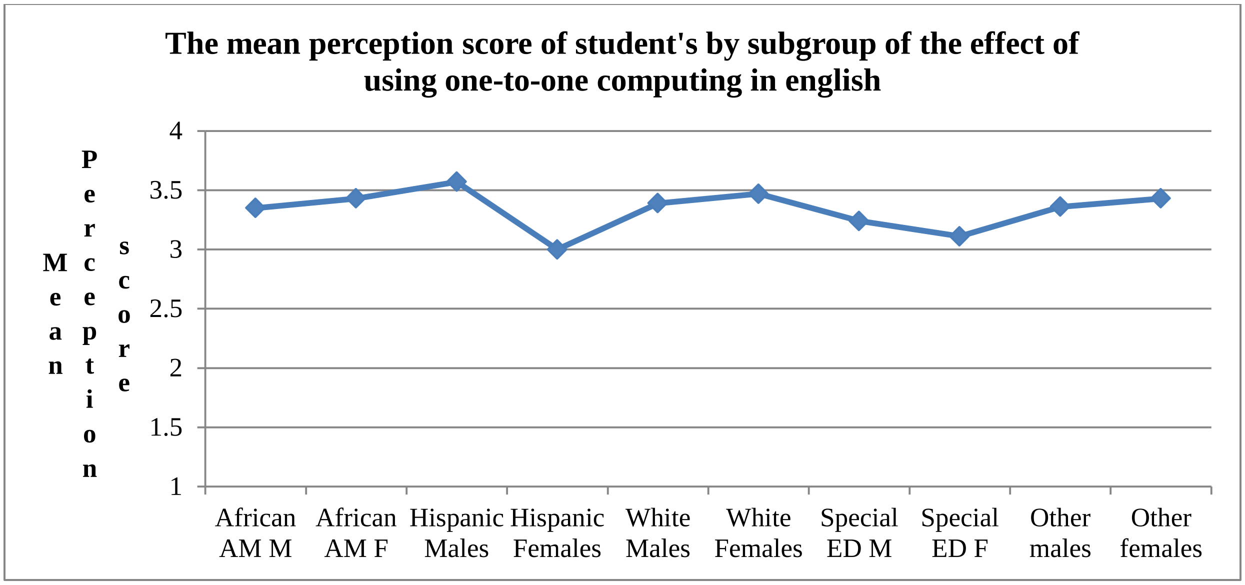

Figure 27. The mean perception score of effect by subgroup in English.

After the mean scores were established for English an ANOVA was run comparing the means of the group. A sig. of .095 was found. This did not meet the level of sig. <.05 so it was not necessary to run a post hoc analysis. The analysis was not significant. Sig.>.05 (sig = .095).

Table 33

ANOVA for English

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	2353.025	9	261.447	1.875	.095
Within groups	4183.750	30	139.458		
Total	6536.775	39			

Question eight of the student survey asks the students to give their perception of the effect that one-to-one computers had on their academic performance in their math class. The data in Table 34 is looked at as either having a positive or negative effect. Two subgroups data show a negative effect. Both male and female Hispanic students show a negative effect. Males had 60% negative and females had 100% negative. All other subgroups show a positive effect. African American males 82% positive, 18% negative. African American females 83% positive and 16% negative. White males 73% positive and 37% negative. White females 85% positive and 15% negative. Special education males 84% positive and 16% negative, with special education females also having 84% positive. Both of the other subgroups had positive effect with 63% and 66%.

Table 34

Student's Perceptions of the Effect on Student Performance Using One-to-One Computing in a Math Classroom

Subgroup	Negatively		Somewhat Negatively		Somewhat Positively		Positively	
	#	%	#	%	#	%	#	%
African American Males	1	9	1	9	7	64	2	18
African American Females	1	8	1	8	6	50	4	33
Hispanic Males	2	40	1	20	1	20	1	20
Hispanic Females	0	0	1	100	0	0	0	0
White Males	5	10	8	17	20	42	15	31
White Females	1	4	3	11	16	59	7	26
Special Education Males	5	11	2	4	24	53	14	31
Special Education Females	2	11	1	5	11	58	5	26
Other Male	2	25	1	13	5	63	0	0
Other Female	2	22	1	11	2	22	4	44

Figure 28 is a visual representation of the student responses to question eight of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by subgroup.

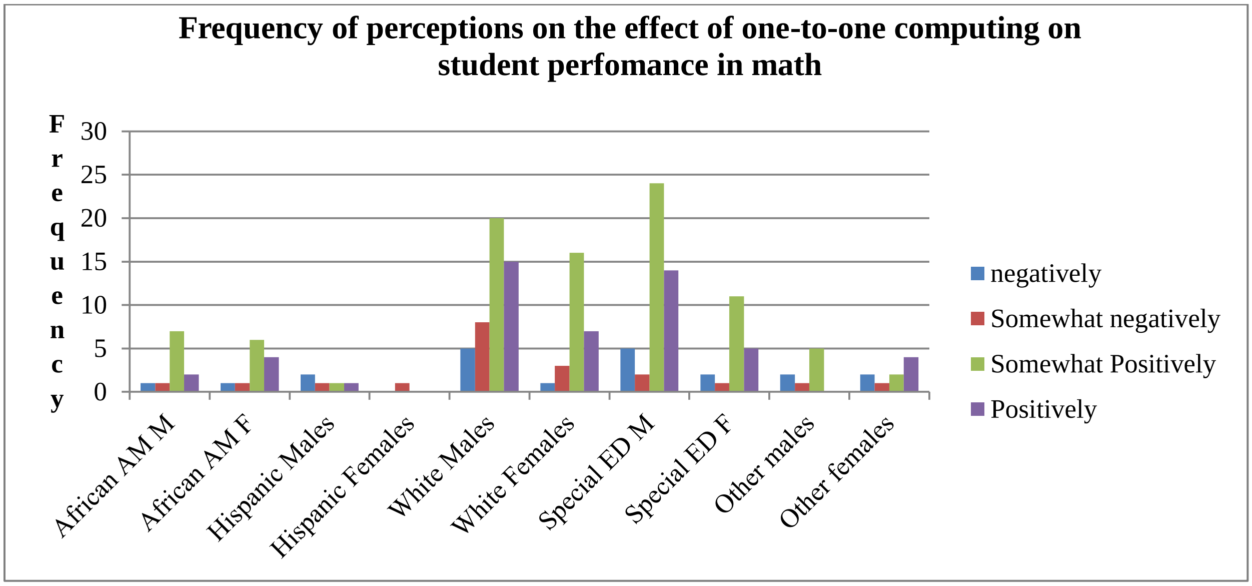

Figure 28. Student's perceptions of the effect using one-to-one computing in a math classroom.

Question eight of the student survey asks the students to give their perception of the effect that one-to-one computers is having on their academic performance in their math class. The mean score of eight of the subgroups matched the individual response with the highest percentage. Seven of the subgroups had a mean that fell into the somewhat positive perception category; the remaining three subgroups had a mean that fell into the somewhat negative perception category.

The data in Table 35 show mean scores of the frequency with the resulting perception score as it relates to the most frequent individual response. African American male with a mean score of 2.91 or a perception score of somewhat positive, did match the most frequent individual response. African American females with a mean score of 3.08 or a perception score of somewhat positive, did match the most frequent individual response. Hispanic male with a mean score of 2.20 or a perception score of somewhat negative, did not match the most frequent individual response which was 40% for negative. This subgroup had a low population of student participants. Hispanic females with a mean score of 2.00 or a perception score of somewhat negative, did match the most frequent individual response. This subgroup had a low population of student participants. White males with a mean score of 2.94 or a perception score of somewhat positive, did match the most frequent individual response. White females with a mean score of 3.07 or a perception score of somewhat positive, did match the most frequent individual response. Special Education males with a mean score of 3.04 or a perception score of somewhat positive, did match the most frequent individual response. Special Education females with a mean score of 3.00 or a perception score of somewhat positive, did match the most frequent individual response. Other male with a mean score of 2.38 or a perception score of somewhat negative, did match the most frequent individual response. Other females with a mean score of 2.89 or a perception score of somewhat positive, did not match the most frequent individual response which was 44% for positive.

Table 35

The Mean Score of Student Perceptions, by Subgroup, on Student Performance Using Computers in a Math Class as it Relates to the Most Frequent Individual Response

Subgroup	Mean Score Perception Score	Mean	Most Frequent Individual Response Highest Percentage	Perception Score
African American Males	Somewhat Positive	2.91	64	Somewhat Positive
African American Females	Somewhat Positive	3.08	50	Somewhat Positive
Hispanic Males	Somewhat Negative	2.20	40	Negative
Hispanic Females	Somewhat Negative	2.00	100	Somewhat Negative
White Males	Somewhat Positive	2.94	42	Somewhat Positive
White Females	Somewhat Positive	3.07	59	Somewhat Positive
Special Education Males	Somewhat Positive	3.04	53	Somewhat Positive
Special Education Females	Somewhat Positive	3.00	58	Somewhat Positive
Other Males	Somewhat Negative	2.38	63	Somewhat Positive
Other Females	Somewhat Positive	2.89	44	Positive

Figure 29 is a visual representation of the means represented in Table 35. The vertical scale has been adjusted to the match the perception scores. This allows for a more understandable representation of the data. The perception scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

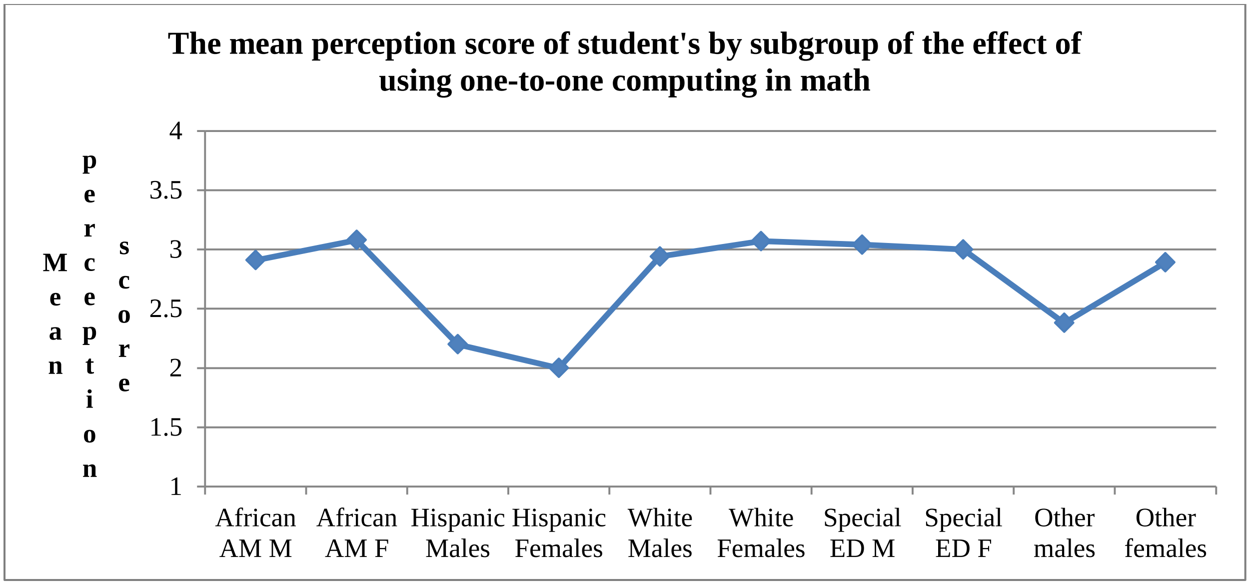

Figure 29. The mean perception score of effect by subgroup in math.

After the mean scores were established for math an ANOVA was run comparing the means of the group. A sig. of .013 was found. This did meet the level of sig. <.05 so it was necessary to run a Tukey post hoc analysis to determine if there were significant differences of the means of the subgroups. The analysis indicated there were significant differences sig<.05 (sig. = .013).

Table 36

ANOVA for Math

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	608.125	9	67.569	2.941	.013
Within groups	689.250	30	22.975		
Total	1297.375	39			

The Tukey post hoc analysis was run comparing one subgroup to each of the other nine subgroups. For this study nine separate comparisons were done. The results of the analysis determined that there were only significant findings within the comparison of one of the subgroups (White males). The Tukey for math shows only the single comparison which resulted in a significant finding. The Tukey for math data shows that the only significant difference that met the sig<.05 levels was between White males and Hispanic females with a sig. = .044. The data also shows a large mean difference of 11.75 between the subgroups.

Table 37

Tukey for Math

Subgroup	Subgroup	Mean Difference	Std. Error	Sig.
White Males	African American Males	9.25	3.38932	.207
	African American Females	9.00	3.38932	.237
	Hispanic Males	10.75	3.38932	.085
	Hispanic Females	11.75	3.38932	.044*
	White Females	5.25	3.38932	.861
	Special Ed Males	.75	3.38932	1.00
	Special Ed Females	7.25	3.38932	.516
	Other Males	10.00	3.38932	.135
	Other Females	9.75	3.38932	.157

*the mean difference is significant at the <.05 level

Question twelve of the student survey asks the students to give their perception of the effect that one-to-one computers had on their academic performance in their science class. The data in Table 38 are looked at as either having a positive or negative effect. All subgroups except one showed a positive effect. African American males had a 50/50 split with positive/negative. African American females had 88% positive. Hispanic males and females had 80% and 100% respectively. Hispanic has a low population. White males have a 70% positive effect with 21% negative. White females had an 85% positive and a 15% negative. Special education males and females have positive effects with males 72% and females 82%. Both the other subgroups showed a positive effect with 86% and 78%.

Table 38

Student's Perceptions of the Effect on Student Performance Using One-to-One Computing in a Science Classroom

Subgroup	Negatively		Somewhat Negatively		Somewhat Positively		Positively	
	#	%	#	%	#	%	#	%
African American Males	1	10	4	40	1	10	4	40
African American Females	0	0	1	11	4	44		44
Hispanic Males	1	20	0	0	2	40	2	40
Hispanic Females	0	0	0	0	1	50	1	50
White Males	8	13	11	18	23	37	21	33
White Females	3	9	2	6	6	19	21	66
Special Education Males	7	17	5	8	13	31	17	41
Special Education Females	2	9	2	9	4	18	14	64
Other Male	1	14	0	0	0	0	6	86
Other Female	2	14	1	7	1	7	10	71

Figure 30 is a visual representation of the student responses to question twelve of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by subgroup.

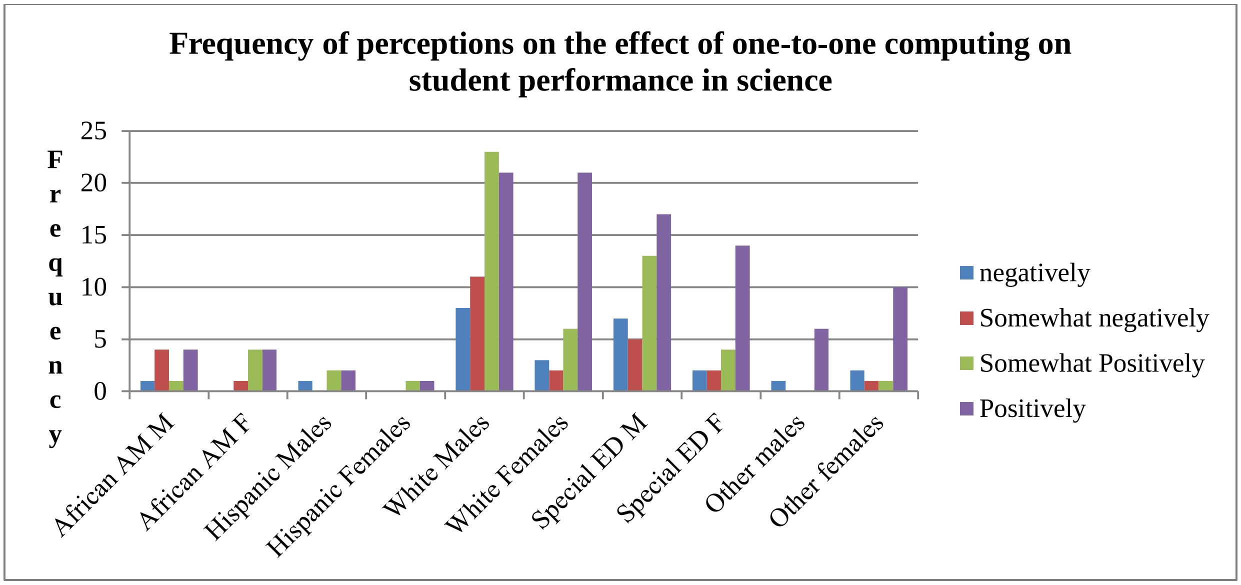

Figure 30. Student's perceptions of the effect using one-to-one computing in a science classroom.

Question twelve of the student survey asks the students to give their perception of the effect that one-to-one computers had on their academic performance in their science class. The mean score of five of the subgroups matched the individual response with the highest percentage. Nine of the subgroups had a mean that fell into the somewhat positive perception category; the remaining subgroup had a mean score that fell into the positive perception category.

The data in Table 39 show mean scores of the frequency with the resulting perception score as it relates to the most frequent individual response. African American male with a mean score of 2.80 or a perception score of somewhat positive, did not match the most frequent individual response which was 40% for positive. African American females with a mean score of 3.33 or a perception score of somewhat positive, did match the most frequent individual response. Hispanic male with a mean score of 3.00 or a perception score of somewhat positive, did match the most frequent individual response. This subgroup had a low population of student participants. Hispanic females with a mean score of 3.50 or a perception score of somewhat positive, did match the most frequent individual response. This subgroup had a low population of student participants. White males with a mean score of 2.90 or a perception score of somewhat positive, did match the most frequent individual response. White females with a mean score of 3.41 or a perception score of somewhat positive, did not match the most frequent individual response which was 66% for positive. Special Education males with a mean score of 2.95 or a perception score of somewhat positive, did not match the most frequent individual response which was 41% for positive. Special Education females with a mean score of 3.36 or a perception score of somewhat positive, did not match the most frequent individual response which was 64% for positive. Other male with a mean score of 3.57 or a perception score of positive, did match the most frequent individual response. Other females with a mean score of 3.36 or a perception score of somewhat positive, did not match the most frequent individual response which was 71% for positive.

Table 39

The Mean Score of Student Perceptions, by Subgroup, on Student Performance Using Computers in a Science Class as it Relates to the Most Frequent Individual Response

	Mean Score		Most Frequent Individual Response	
Subgroup	Perception Score	Mean	Highest Percentage	Perception Score
African American Males	Somewhat Positive	2.80	40	Positive
African American Females	Somewhat Positive	3.33	44	Somewhat Positive
Hispanic Males	Somewhat Positive	3.00	40	Somewhat Positive
Hispanic Females	Somewhat Positive	3.50	50	Somewhat Positive
White Males	Somewhat Positive	2.90	37	Somewhat Positive
White Females	Somewhat Positive	3.41	66	Positive
Special Education Males	Somewhat Positive	2.95	64	Positive
Special Education Females	Somewhat Positive	3.36	64	Positive
Other Males	Positive	3.57	86	Positive
Other Females	Somewhat Positive	3.36	71	Positive

Figure 31 is a visual representation of the means represented in Table 39. The vertical scale has been adjusted to the match the perception scores. This allows for a more understandable representation of the data. The perception scores are: 1-1.5, 1.51-2.5, 2.51-3.5, 3.51-4.

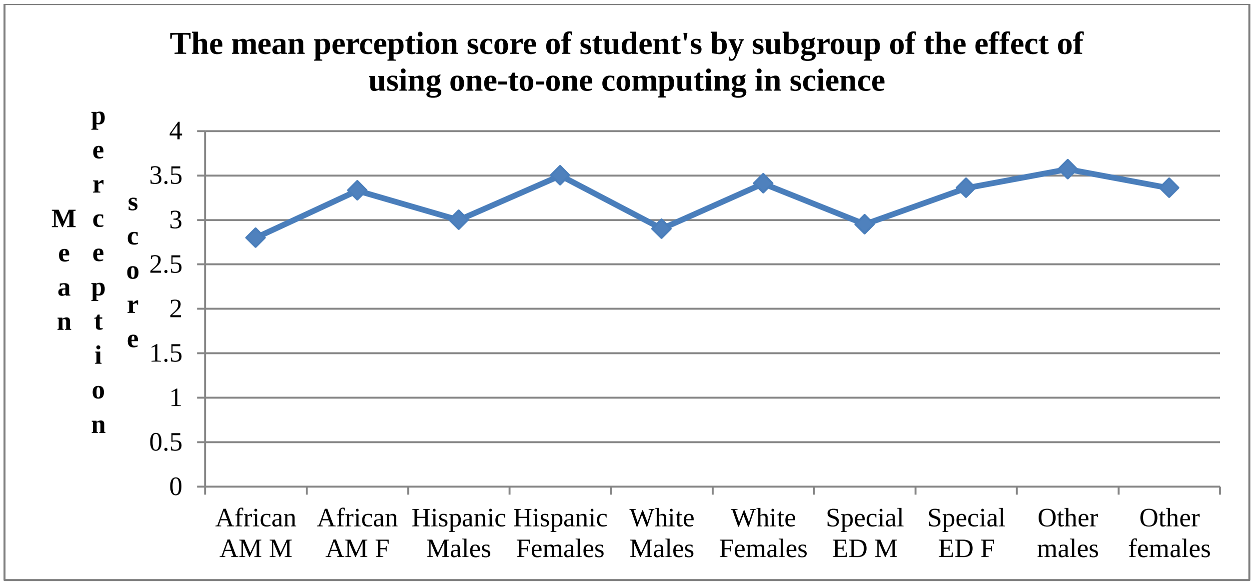

Figure 31. The mean perception score of effect by subgroup in science.

After the mean scores were established for science an ANOVA was run comparing the means of the group. A sig. of .002 was found. This did meet the level of sig. <.05 so it was necessary to run a Tukey post hoc analysis to determine if there were significant differences of the means of the subgroups. The analysis was significant sig<.05 (sig. = .002).

Table 40

ANOVA for Science

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	863.100	9	95.900	4.146	.002
Within groups	694.000	30	23.133		
Total	1557.100	39			

The Tukey post hoc analysis was run comparing one subgroup to each of the other nine subgroups. For this study nine separate comparisons were done. The results of the analysis determined that there were only significant findings within the comparison of one of the subgroups (White males). The Tukey for science shows six different subgroups that showed a mean difference that was significant.

Table 41

Tukey for Science

Subgroup	Subgroup	Mean Difference	Std. Error	Sig.
White Males	African American Males	13.25	3.40098	.016*
	African American Females	13.50	3.40098	.013*
	Hispanic Males	14.50	3.40098	.006*
	Hispanic Females	15.25	3.40098	.003*
	White Females	7.75	3.40098	.430
	Special Ed Males	5.25	3.40098	.864
	Special Ed Females	10.25	3.40098	.119
	Other Males	14.00	3.40098	.009*
	Other Females	12.25	3.40098	.032*

*the mean difference is significant at the 0.05 level

Question sixteen of the student survey asks the students to give their perception of the effect that one-to-one computers had on their academic performance in their social studies class. The data in Table 42 is looked at as either having a positive or negative effect. For this table there was no population for Hispanic females. Hispanic males had a 50/50 split between positive and negative. All other subgroups had a positive effect. African American males had 60% positive and 40% negative. African American females had 100% positive. White males had 76% positive and 24% negative. White females had 73% positive and 27% negative. Special education males had 75% positive while special education females had 88% positive. The other subgroups also had a positive effect with 75% and 95%, male to female.

Table 42

Student's Perceptions of the Effect on Student Performance Using One-to-One Computing in a Social Studies Classroom

Subgroup	Negatively		Somewhat Negatively		Somewhat Positively		Positively	
	#	%	#	%	#	%	#	%
African American Males	2	20	2	20	2	20	4	40
African American Females	0	0	0	0	4	57	3	43
Hispanic Males	1	50	0	0	1	50	0	0
Hispanic Females	0	0	0	0	0	0	0	0
White Males	9	20	2	4	16	36	18	40
White Females	3	12	4	15	7	27	12	46
Special Education Males	6	22	1	4	7	26	13	49
Special Education Females	2	13	0	0	7	44	7	44
Other Male	0	0	1	25	1	25	2	50
Other Female	0	0	1	10	4	40	5	50

Figure 32 is a visual representation of the student responses to question sixteen of the student survey. This allows for a more understandable representation of the data by showing a grouping of the data by subgroup.

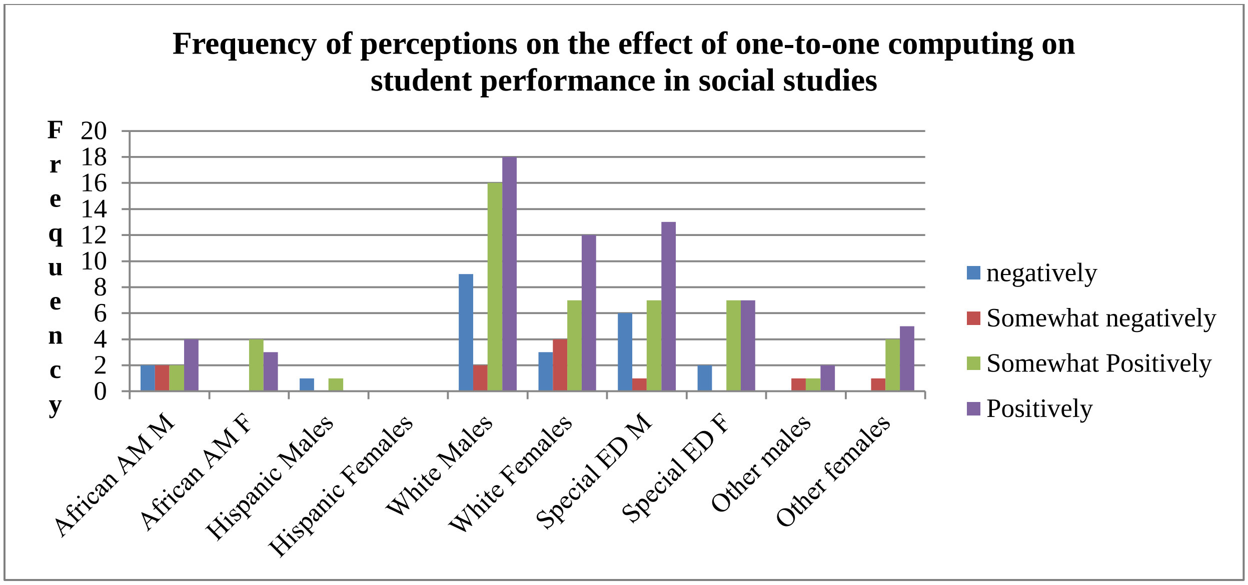

Figure 32. Student's perceptions of the effect using one-to-one computing in a social studies classroom.

Question sixteen of the student survey asks the students to give their perception of the effect that one-to-one computers had on their academic performance in their social studies class. The mean score of two of the subgroups matched the individual response with the highest percentage. Eight of the subgroups had a mean that fell into the somewhat positive perception category; Hispanic females had no respondents, and the remaining subgroup had a mean that fell into the somewhat negative category.

The data in Table 43 show mean scores of the frequency with the resulting perception score as it relates to the most frequent individual response. African American male with a mean score of 2.80 or a perception score of somewhat positive, did not match the most frequent individual response which was 40% for positive. African American females with a mean score of 3.43 or a perception score of somewhat positive, did match the most frequent individual response. Hispanic males with a mean score of 2.00 or a perception score of somewhat negative, did not match the most frequent individual response which was 50% for negative. This subgroup had a low population of student participants. White males with a mean score of 2.96 or a perception score of somewhat positive, did not match the most frequent individual response which was 40% for positive. White females with a mean score of 3.08 or a perception score of somewhat positive, did not match the most frequent individual response which was 46% for positive. Special Education males with a mean score of 3.00 or a perception score of somewhat positive, did not match the most frequent individual response which was 49% for positive. Special Education females with a mean score of 3.19 or a perception score of somewhat positive, did match the most frequent individual response. Other males with a mean score of 3.25 or a perception score of somewhat positive, did not match the most frequent individual response which was 50% for positive. Other females with a mean score of 3.40 or a perception score of somewhat positive, did not match the most frequent individual response which was 50% for positive.

Table 43

The Mean Score of Student Perceptions, by Subgroup, on Student Performance Using Computers in a Social Studies Class as it Relates to the Most Frequent Individual Response

	Mean Score		Most Frequent Individual Response	
Subgroup	Perception Score	Mean	Highest Percentage	Perception Score
African American Males	Somewhat Positive	2.80	40	Positive
African American Females	Somewhat Positive	3.43	57	Somewhat Positive
Hispanic Males	Somewhat Negative	2.00	50	Negative
Hispanic Females	No responses			
White Males	Somewhat Positive	2.96	40	Positive
White Females	Somewhat Positive	3.08	46	Positive
Special Education Males	Somewhat Positive	3.00	49	Positive
Special Education Females	Somewhat Positive	3.19	44	Somewhat Positive
Other Males	Somewhat Positive	3.25	50	Positive
Other Females	Somewhat Positive	3.40	50	Positive

Figure 33 is a visual representation of the means represented in Table 43. The vertical scale has been adjusted to the match the perception scores. This allows for a more understandable representation of the data. The perception scores are: 1-1.5, 1.51-2.5, 2.51-3.5, 3.51-4.

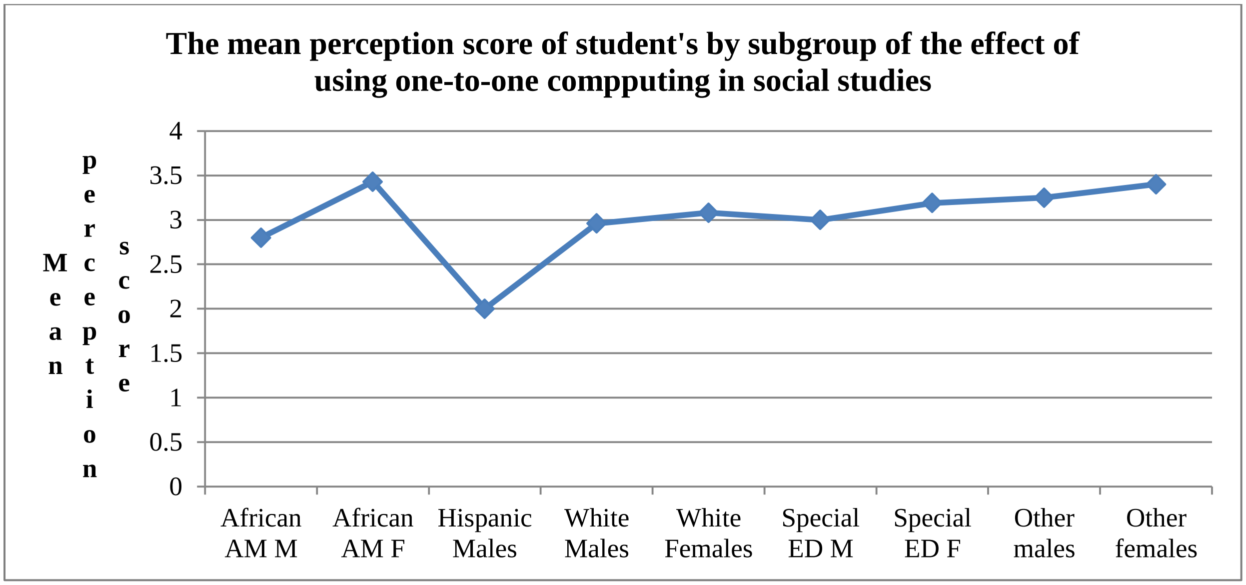

Figure 33. The mean perception score of effect by subgroup in social studies.

After the mean scores were established for social studies an ANOVA was run comparing the means of the group. A sig. of .005 was found. This did meet the level of sig. <.05 so it was necessary to run a Tukey post hoc analysis to determine if there were significant differences of the means of the subgroups. The analysis was significant sig<.05 (sig. = .005).

Table 44

ANOVA for Social Studies

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	388.500	8	48.563	3.701	.005
Within groups	354.250	27	13.120		
Total	742.750	35			

The Tukey post hoc analysis was run comparing one subgroup to each of the other nine subgroups. For this study nine separate comparisons were done. The results of the analysis determined that there were only significant findings within the comparison of one of the subgroups (White males). The Tukey for social studies shows five different subgroups that showed a mean difference that was significant.

Table 45

Tukey for Social Studies

Subgroup	Subgroup	Mean Difference	Std. Error	Sig.
White Males	African American Males	8.75	2.56129	.045*
	African American Females	9.50	2.56129	.023*
	Hispanic Males	10.75	2.56129	.007*
	White Females	4.75	2.56129	.648
	Special Ed Males	4.50	2.56129	.708
	Special Ed Females	7.25	2.56129	.152
	Other Males	10.25	2.56129	.011*
	Other Females	8.75	2.56129	.045*

*the mean difference is significant at the 0.05 level

A combination of total students surveyed and the responses they gave for each subject is shown in Table 46. This information was used to run an ANOVA. The ANOVA found that there are no significant differences in the means of the four core subjects. Sig =. 482. No post hoc analysis was necessary.

Table 46

Total Student Perception of Effect on Student Performance

Subject	Negatively		Somewhat Negatively		Somewhat Positively		Positively	
	#	%	#	%	#	%	#	%
English	17	5	19	5	142	39	185	51
Math	21	11	20	11	92	50	52	28
Science	25	12	26	13	55	27	100	48
Social Studies	23	16	11	7	49	33	64	44

Figure 34 is a visual representation of the means represented in Table 46. The vertical scale has been adjusted so that a clear picture of the data can be shown.

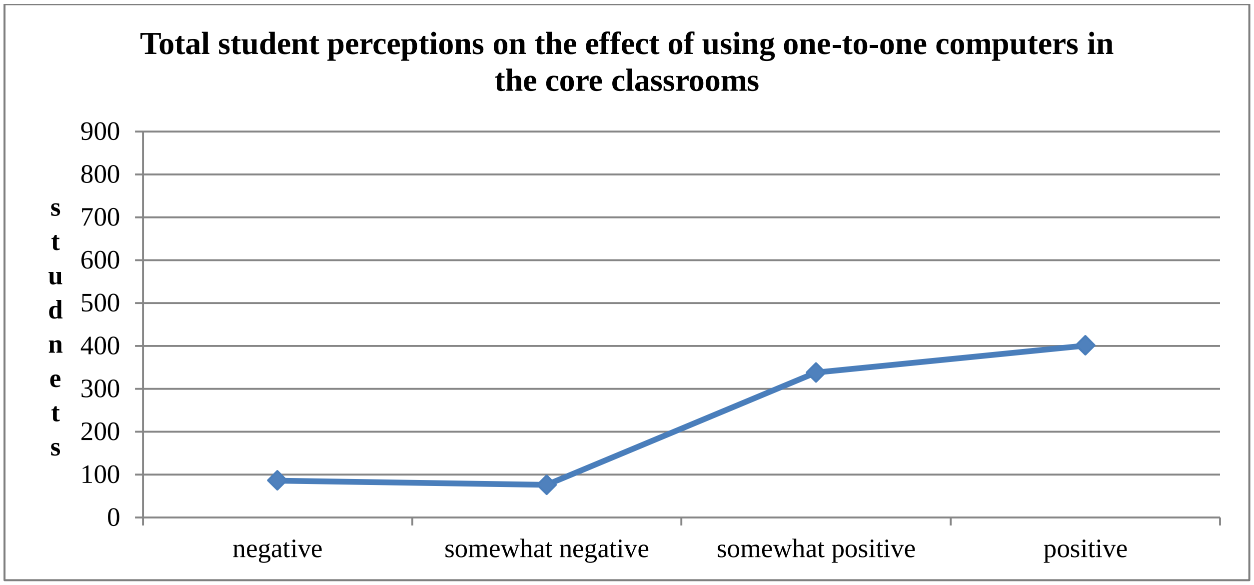

Figure 34. Total Student perceptions of effect in the classroom.

Table 47

ANOVA for Subjects

	Sum of Squares	df	Mean Square	F	sig.
Between groups	6772.188	3	2257.396	.874	.482
Within groups	31011.250	12	2584.271		
Total	37783.438	15			

Summary for research question 3. The data for research question three was presented in a variety of methods. Descriptive statistics allowed the data to be presented in tabular and graphical form. Analysis of the data was done by looking at the mean and mode of the data as it applied to the perceptions of the students. Once the analysis of the mode was complete an ANOVA was run on the means. This determined if there was a within group difference. If there was a statistical difference a Tukey post-hoc analysis was done. The Tukey allowed for further analysis of the difference between the subgroups within the group. Analysis of the data determined that there was an overall positive student perception on the use of one-to-one computers in the classroom.

Research question 4: What are the perceptions of teachers on the effect that one-to-one computing is having on the academic performance of students by ethnicity, special education status, and gender?

A mean score was calculated for each subgroup within a question and the overall perception rating was determined using the mean as it related to the following scale:

1.00 – 1.50	Negative
1.51 – 2.50	Somewhat Negative
2.51 – 3.50	Somewhat Positive
3.51 – 4.00	Positive

Question six of the teacher survey asked the teachers to rate their perceptions of the effect that having one-to-one computers is having on the educational performance on the individual subgroups within their class. The data in Table 48 show that teachers perceptions of the effect of one-to-one computers is having is a somewhat positive or a positive effect on subgroup performance. Half of the surveyed teachers believe that one-to-one computing is having a somewhat positive effect; while the other half believe that the computers are having a positive effect.

Table 48

Perception of Effect on Subgroup Performance

Subgroup	Negatively		Somewhat Negatively		Somewhat Positively		Positively		Do not have Class	
	#	%	#	%	#	%	#	%	#	%
African American Males	0	0	0	0	8	50	8	50	0	0
African American Females	0	0	0	0	8	50	8	50	0	0
Hispanic Males	0	0	0	0	3	19	3	19	10	63
Hispanic Females	0	0	0	0	3	19	4	25	9	56
White Males	0	0	0	0	7	44	9	56	0	0
White Females	0	0	0	0	8	50	8	50	0	0
Special Education Males	0	0	0	0	6	38	9	56	1	6
Special Education Females	0	0	0	0	7	44	8	50	1	6

Figure 35 is a visual representation of the teacher responses to question six of the teacher survey. The vertical scale has been adjusted to the total number of respondents possible, allowing for a more understandable representation of the data.

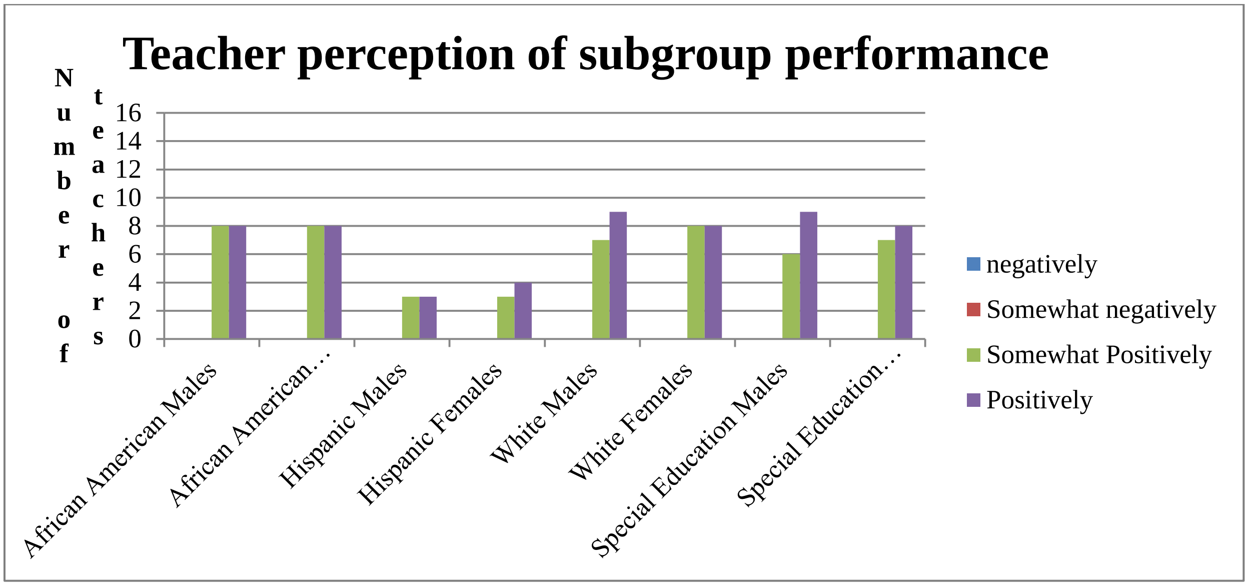

Figure 35. Teacher's perception of the effect of having one-to-one computing in the classroom on student performance.

Question six of the teacher survey asks the teachers to give their perception of the effect of having one-to-one computing in their class. Four of the subgroups had a mean score that fell into the somewhat positive perception category; and four or the subgroups had a mean that fell into the positive perception category.

The data in Table 49 show mean scores of the frequency with the resulting perception score as it relates to the most frequent individual response. African American males with a mean score of 3.50 or a perception score of somewhat positive, did match the most frequent individual response. African American females with a mean score of 3.50 or a perception score of somewhat positive, did match the most frequent individual response. Hispanic males with a mean score of 3.50 or a perception score of somewhat positive, did match the most frequent individual response. Hispanic females with a mean score of 3.57 or a perception score of positive, did match the most frequent individual response. White males with a mean score of 3.56 or a perception score of positive, did match the most frequent individual response. White females with a mean score of 3.50 or a perception score of somewhat positive, did match the most frequent individual response. Special Education males with a mean score of 3.60 or a perception score of positive, did match the most frequent individual response. Special Education females with a mean score of 3.53 or a perception score of positive, did match the most frequent individual response.

Table 49

The Mean Score of Teacher Perceptions, by Subgroup, on Student Performance Using Computers in Class as it Relates to the Most Frequent Individual Response

Subgroup	Mean Score Perception Score	Mean	Most Frequent Individual Response Highest Percentage	Most Frequent Individual Response Perception Score
African American Males	Somewhat Positive	3.50	50	Somewhat Positive
African American Females	Somewhat Positive	3.50	50	Somewhat Positive
Hispanic Males	Somewhat Positive	3.50	19	Somewhat Positive
Hispanic Females	Positive	3.57	25	Positive
White Males	Positive	3.56	56	Positive
White Females	Somewhat Positive	3.50	50	Somewhat Positive
Special Education Males	Positive	3.60	56	Positive
Special Education Females	Positive	3.53	50	Positive

Figure 36 is a visual representation of the means represented in Table 41. The vertical scale has been adjusted to the match the scale scores. This allows for a more understandable representation of the data. The scale scores are: 1-1.5, 1.51-2.5, 2.51-3.5, and 3.51-4.

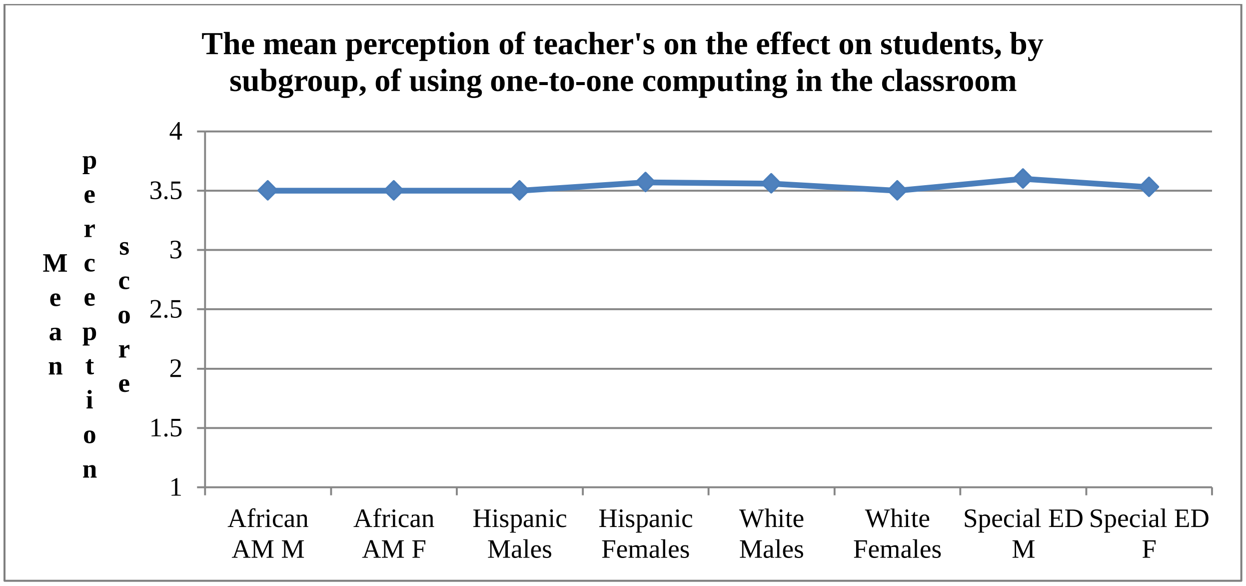

Figure 36. Teacher's perception of effect of one-to-one computing in the classroom.

Summary for research question 4. The data for research question four was presented in a variety of methods. Descriptive statistics allowed the data to be presented in tabular and graphical form. Analysis of the data was done by looking at the mean and mode of the data as it applied to the perceptions of the teachers. Analysis of the data determined that there was an overall positive teacher perception on the academic effect for students.

Conclusion

This chapter presented quantitative findings based on the four research questions concerning student and teachers perceptions on the frequency and type of use with computers in the core areas as well as perceived effect on student performance. Descriptive statistics were presented for both of the primary stakeholders (students and teachers) for frequency of activities, frequency of teaching strategies and perceived effect on student performance. A series of ANOVA and Tukey's post-hoc analyses was presented to show differences in the student's perceived effect on performance. The findings can be used to inform policy makers and administrators, as well as to inform professional practice. Chapter five will discuss the findings, and make recommendations for further study.

Chapter 5

This study dealt with the perceptions of teachers and students as they related to a one-to-one laptop program in a rural Virginia middle school. This chapter presents the findings and implications based on the date analysis reported in Chapter 4. This is followed by the recommendations for future research. This information may be used by policy makers and administrators as they consider the next steps in technology implementation.

Findings

Finding #1: The student's perceptions of the overall effect of one-to-one computers were positive.

In English 90 % of students surveyed said that having one-to-one computers in the class had a positive effect on their performance in that class. In math 78% of the students stated that the computers had a positive effect on their performance. Of the science students surveyed 75% of them said that the computer had a positive effect on their performance. In social studies 77% of the students stated on the survey that having one-to-one computing in the classroom had a positive effect on their performance in class.

Research supports these findings. Conway (2005) also supported the use of laptops by students with a disability by reporting the positive impacts of one-to-one laptop programs on students with reading or writing difficulties.

Research supports this finding. According to the international Society of Technology in Educations (ISTE) studies have shown statistically significant positive achievements of education technology on student reading, literacy and mathematical achievements (Mundy, Kupczynski, Kee, 2012).

Finding #2: The students stated that the computers were underutilized.

In English students stated on the survey that 70% of the activities had the highest percentage in never or rarely happened. In math the students stated that 90% of the activities on the survey had the highest percent in never. Science and social studies students stated that 90% of the activities on the survey had the highest percentage in never or rarely happened.

This research is consistent with other research studies. Multiple studies have indicated that more than half of the teachers equipped with computers only use them for administrative functions, and less than half of their students report using technology more than once a week.

(Abbott, 2003: National Teacher Survey, 2005). There are also subject-area differences that persist, with mathematics teachers having significantly lower levels of classroom immersion compared to teachers of other core-content area. The lower level of technology integration in math classes is consistent with findings from other studies reporting that technology is used less often in mathematics classes, especially compared to English language classes (Becker, 2001). The CDW*G report reveals the educators are using technology to teach, but that most of them are not allowing students to use it as a hand-on learning tool, depriving them the opportunity to develop important 21st century skills, such as critical thinking, research and information fluency, and communication (Wong, 2010).

Finding #3: The students reported that in the core curriculum areas of English, math, science and social studies the most frequent uses were discussion, drill and practice, and communication.

In English 40% of the students said drill and practice happened often, followed by discussion with 39% of the students saying it happened often, with communication following up with 34% of the students selecting often. In math 28% of the students said discussion happened often with 28% of the students also saying that drill and practice happened often. The data from science and social studies also show that 29% or more of the students selected discussion and drill and practice as accruing the most frequent. The three areas of discussion, drill and practice and communication fall on the lower levels of the Bloom's Digital Taxonomy Pyramid.

These findings are consistent from research done by (Dunleavy, Dextert, S., Heinecke, W.F., 2007) that stated the second most frequent laptop use among teachers and students across the sites was drill and practice and that there are isolated examples of 1:1 laptops being used for low-level drill and practice. Further research done by (Dunleavy, Dextert, S., Heinecke, W.F., 2007) stated that research also found that the third most frequent use was on-line environments such as: discussions, websites email and chat.

Finding #4: Teachers surveyed indicated that one-to-one computing had an effect on student performance in all subgroups identified in this study.

The data show that sixteen out of sixteen or 100% of the teachers surveyed indicated that one-to-one computing is having a positive effect on student performance in the subgroup categories of: African American male, African American female, Hispanic male, Hispanic female, White male, White female, Special Education male, Special Education females, other males, and other females.

Over the last several years, dozens of research studies have been published on laptop use and many of these studies suggest positive outcomes (Penuel, 2005). Research supports the idea that the teachers in the classrooms, their perceptions, their use of technology, and their perception of the benefits for students who use technology in the classroom will always be positive (Lei, 2009). From there, one is able to value the perceptions and judgments of the teacher on technology use in the classroom and learning (Mundy, Kupczynski, Kee, 2012). We give value to teacher perceptions of technology use in education and as such are able to determine that the integration of technology in the classroom is beneficial to the student (Mundy, Kupczynski, Kee, 2012).

Finding #5: Teachers surveyed indicated that computers in the classroom are rarely used for instructional activities with the students.

The data show the mean average for the time that the computers are used on any of the activities included on the teacher survey was 1.61 hours per week. Homework had the lowest mean of 1.06, taking notes had a mean of 1.31, searching for information had a mean of 1.75, communication had a mean of 1.69, and in-class assignments had the highest mean of 2.25. The classroom time possible for computer use was 7 hours per week. This means that the computers were used for only 23% of the possible time on any of the activities from the survey.

A number of authors suggest the importance of examining the impacts of one-to-one computing in the context of use and practice (Lei & Zhao, 2008). Research states that teachers use technology for grade keeping, attendance, organization and to facilitate and deliver instruction, but do not integrate technology as well into teaching and learning (Shapley, 2010).

Further research has found that inquiry oriented teacher’s deployed technology to support and expand enquiry; more traditional teachers used the technology according to their values in conducting a teacher centered classroom (Drayton & Falk & Stroud & Hobbs & Hammerman, 2010).

Finding #6: There was a significant difference in how the subgroups from the survey perceived the value of one-to-one computing in the core areas of math, science and social studies.

The data show that in the area of math, White females had the highest positive perception with 95% and Hispanic males had the lowest positive perception with 40%. In the area of science African American females had the highest positive perception with 88% and African American males had the lowest positive perception with 50%. In the area of social studies, African American females had the highest positive perception with 100% and Hispanic males had the lowest positive perception with 50%.

An ANOVA was run on the mean averages for the group in the core areas of math, science and social studies, using a factor of $p<.05$ to determine if there is significant difference. The significance for math was $p = .013$. The significance for science was $p = .002$. The significance for social studies was $p = .005$. These findings are significant, which means there are significant differences within the groups in math, science and social studies. To further explore these differences a Tukey post hoc analysis was done. There is no research to support or deny these findings.

Finding #7: There was not a significant difference in the how the subgroups from the survey perceived the value of one-to-one computing in the core area of English.

The data show an overall positive perception by all the subgroups in the core area of English. The highest positive perception was Hispanic females with 100%, and the lowest positive perception was Special Education females with 79%.

An ANOVA was run on the mean averages for the group in core area of English. Using a significant factor of $p<.05$ to determine if there was a significant difference within the group. The significance for English was $p = .095$. This finding was not significant. There is no research to support or deny these findings.

Finding #8: There were significant differences between White males and other ethnic subgroups in each of the core areas of math, science and social studies.

The data show that in the area of math, White males had significant differences with the subgroups that had mean differences of more that eleven. In the area of science White males had significant differences with subgroups having a mean difference greater than twelve. In the area of social studies White males had significant differences with subgroups that had a mean difference greater than eight.

When running the Tukey Post hoc analysis only the White males had significant differences for the within group analysis in all three of the areas of math, science, and social studies. In math the difference were White males to Hispanic females (.044). In science the difference was White males to African American males (.016), African American females (.013), Hispanic males (.006), and Hispanic females (.003), other males (.009), and other females (.032). In social studies the difference was White males to: African American males (.045), African American females (.023), Hispanic males (.007), other males (.011), and other females (.045). There is no research to support or deny these findings.

Implications

Implication #1: Administration needs to begin exploring the idea of providing ongoing meaningful staff development to the teachers on how to integrate technology into the classroom.

For policymakers and administrators this means not only looking at the plan of purchasing the computers, but they must consider the time and cost of a well-thought out, meaningful professional development plan. Administrators must recognize and understand that it takes time to integrate technology. Teachers are busy teaching in the class room and need more time for learning, planning and preparation to integrate technology into the classroom. “The challenges that teachers face in delivering instruction in a dynamic technology environment are the same challenges that student face as they prepare for their careers. As teachers continue to learn and work to integrate technology into teaching and learning as well as develop best practices, both teacher and students benefit from quality educational experiences” (Gorder, 2008 p75).

Implication #2: Administration needs to monitor the integration of technology into the classroom through the use of lesson plans, classroom observations, surveys, and the attendance of teachers to a variety of technology based and technology integration trainings.

There are already very positive perceptions on the effectiveness of one-to-one computing in the classroom by teachers. The positive perceptions show that the teachers want to use the technology to enhance learning they are just unsure of how to integrate the technology into their classrooms. This is apparent by the low level frequency of use on any activity in this study.

The positive perceptions on the teacher’s part mean they are willing to learn how to use the technology as an ongoing part of their education. It is my hope that the efforts of researchers and evaluators will document as well as inform the next generation of educational policy and practice (Bebell and Kay, 2010).

Implication #3: Administrators and policy makers need to investigate how different ethnic and gender populations can be supported with technology integration.

Even though there are very positive perceptions on the effectiveness of one-to-one computing in the classroom by students. There are multiple members of different subgroups that do not think that technology has a positive effect on their education. Educators need to determine what the factors are that have these students not seeing technology as a positive item.

Examined collectively, it is apparent that the factors, which may influence the implementation of a one-to-one laptop program are quite complex. The research reveals that great potential benefits for student learning and achievement from one-to-one laptop programs (Bebell, D. & O'Dwyer, 2010).

Implication #4: Administrators and policy makers need to find a way to expand the use of one-to-one laptops in the classroom to a larger population. A large population of the special needs students of this study indicated the perceived positive effects of one-to-one laptop usage in the classroom. One-to-one computing gives the students a hands-on, visual and audio sensory way of learning. Special needs students in all areas of education may benefit from the introduction of a one-to-one computer policy.

Harris and Smith (2004) studied the use of laptops by seventh grade students with disabilities and found that the laptops helped the students with disabilities to improve their engagement in learning, increase their motivation and ability to work independently, and improved their class participation and interaction with others.

Implication #5: Teachers need to find a way to integrate technology into the classroom as a learning tool. This can be accomplished through professional development, or observation of other teachers who have adopted the constructivist framework. This framework allows the students to be engaged in the active learning process.

In addition, newer teachers from digital native generations must be taught how their skills can be used to integrate technology into the classroom to provide complex cognitive engagement for their students (Mundy, Kupczynski &Kee, 2012). It is impossible to overstate the power of individual teachers in the success or failure of one-to-one computing and that teachers nearly always control how and when students access and use technology during the school day (Bebell & O'Dwyer, 2010).

Implication #6: Administrators need to be able to accurately evaluate teachers on the technology integration into the classroom. This can be accomplished by professional development on effective technology integration.

With the introduction of the new teacher evaluation model in July of 2012, and the new principal evaluation model coming into effect in July of 2013, administrators need to understand how to evaluate teachers on the integration of technology into the classroom.

Recommendations for Future Research

The research questions from this study focused strictly on the frequency of use, type of use, and what were the perceptions of students and teachers on the educational effect that one-to-one laptops are having in the classroom. Further research is needed to answer questions such as: what are the conditional variables that influence the use of one-to-one laptops as a teaching tool (Dunleavy, Dextert, & Heinecke, 2007). The case study approach used for this study has specific implications for the individual school and is much more feasible on a small scale, although large scale replications of this study are possible. This researcher would limit the scope of a larger survey to the district level. There are too many variables that may influence the outcome of a larger survey.

Further information could also be added to this survey to narrow down the statistical differences in the subgroups. Information that could be added to this survey would be the socio-economic status of the students to determine if the statistical differences in the subgroups are due to exposure to technology at home, or access to technology outside of the educational arena.

Also to further enhance the information of this survey a qualitative method of analysis could be added. Open-ended questions could be asked of individual stakeholders, or small focus groups could be interviewed. These collective responses would be away to further exploring the frequency of use along with how the computers are actually being used in the classroom.

Conclusion

This study presented quantitative findings based on the four research questions concerning student and teachers perceptions on the frequency and type of use with computers in the core areas as well as perceived effect on student performance. The data show that computers are not being used by the teachers or the students to the fullest extent. School systems can use this information to address district-wide staff development and policy issues that have surfaced as a result of the growing need to teach 21st century technology skills. The administration needs to identify ways to motivate faculty members to at least try newer innovative methods of technology implementation into their classrooms.

The data from this study also show that the majority of teachers and students perceptions of one-to-one computing on specific subgroup populations are positive. School systems must continue to develop or redesign and implement an effective technology integration plan that specifically addresses the needs of these subgroups. Technology is here to stay. So it is our job as educators to ensure the proper training and use of the technology for all of our students.

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Appendix A

Rural Virginia Counties with One-to-One Computing

county number	name		locale	description	one-to-one computers
1	Accomack	County	Rural	Remote	no
2	Albemarle	County	Rural	Fringe	yes
3	Alleghany	County	Rural	Fringe	no
4	Amelia	County	Rural	Distant	no
5	Amherst	County	Rural	Fringe	no
6	Appomattox	County	Rural	Distant	no
8	Augusta	County	Rural	Fringe	no
9	Bath	County	Rural	Remote	no
10	Bedford	County	Rural	Fringe	no
11	Bland	County	Rural	Fringe	no
12	Botetourt	County	Rural	Distant	no
13	Brunswick	County	Rural	Fringe	no
14	Buchanan	County	Rural	Remote	no
15	Buckingham	County	Rural	Remote	no
16	Campbell	County	Rural	Fringe	no
17	Caroline	County	Rural	Distant	no
18	Carroll	County	Rural	Distant	no
20	Charlotte	County	Rural	Remote	no
22	Clarke	County	Rural	Fringe	no
23	Craig	County	Rural	Distant	no
24	Culpeper	County	Rural	Fringe	no
25	Cumberland	County	Rural	Remote	no
26	Dickenson	County	Rural	Remote	no
27	Dinwiddie	County	Rural	Distant	no
30	Fauquier	County	Rural	Distant	no
31	Floyd	County	Rural	Distant	no
32	Fluvanna	County	Rural	Distant	no
34	Frederick	County	Rural	Fringe	no
35	Giles	County	Rural	Distant	no
36	Gloucester	County	Rural	Fringe	no
37	Goochland	County	Rural	Distant	no
38	Grayson	County	Rural	Remote	no
39	Greene	County	Rural	Distant	no
40	Greensville	County	Rural	Fringe	no
42	Hanover	County	Rural	Fringe	no
44	Henry	County	Rural	Fringe	no
45	Highland	County	Rural	Remote	no

county number	name		locale	description	one-to-one computers
51	Lancaster	County	Rural	Remote	
52	Lee	County	Rural	Distant	no
54	Louisa	County	Rural	Distant	yes
55	Lunenburg	County	Rural	Remote	no
56	Madison	County	Rural	Distant	no
57	Mathews	County	Rural	Distant	no
58	Mecklenburg	County	Rural	Distant	no
59	Middlesex	County	Rural	Distant	no
62	Nelson	County	Rural	Distant	no
65	Northampton	County	Rural	Remote	no
66	Northumberland	County	Rural	Remote	no
67	Nottoway	County	Rural	Distant	no
68	Orange	County	Rural	Distant	no
69	Page	County	Rural	Distant	no
70	Patrick	County	Rural	Distant	no
71	Pittsylvania	County	Rural	Distant	no
72	Powhatan	County	Rural	Distant	no
77	Pulaski	County	Rural	Fringe	no
78	Rappahannock	County	Rural	Remote	no
79	Richmond	County	Rural	Fringe	no
82	Rockingham	County	Rural	Fringe	no
83	Russell	County	Rural	Distant	no
84	Scott	County	Rural	Fringe	no
85	Shenandoah	County	Rural	Distant	no
87	Southampton	County	Rural	Distant	no
88	Spotsylvania	County	Rural	Fringe	no
89	Stafford	County	Rural	Fringe	no
127	Suffolk	City	Rural	Fringe	no
90	Surry	County	Rural	Distant	no
91	Sussex	County	Rural	Distant	no
94	Washington	County	Rural	Fringe	no
95	Westmoreland	County	Rural	Distant	no
96	Wise	County	Rural	Fringe	no
97	Wythe	County	Rural	Remote	no

Appendix B

Phone Interview Script

Phone interview script used to contact schools regarding one-to-one laptop or computer initiatives.

Hello, my name is Sandra Payne. I am calling on behalf of Thomas Schott. He is currently a doctoral student at Virginia Tech and is attempting to gather information about the computer set up in rural Virginia middle schools. Do you have a minute?

The following questions were asked:

1. Do you have a one-to-one set up for computers? By this I mean do all the students in any classroom have access to computers every day in that classroom, or does each of your students have a computer? This does not mean in a computer lab.
2. If so do you have any collaborative classes that have this one-to-one computer set up?
    a. By collaborative I mean having a regular and special education teacher in the classroom at the same time.

Thank you very much for the information.

Appendix C

Teacher Survey

Teacher Perceptions of One-to-One Computing in the Classroom

You are being asked to participate in this survey because you are a middle school teacher in a rural Virginia county that currently has computers in a one-to-one ratio in your classroom. This researcher is interested in teacher's perceptions of having computers in a one-to-one ratio (computers to students) in middle schools in rural Virginia.

1. On average, how many hours per week do you involve students using computers in the classroom?

- ☐ 0-2 hours per week
- ☐ 2-4 hours per week
- ☐ 4-6 hours per week
- ☐ 6+ hours per week

2. On average, how many hours do students spend using laptops to complete assignments from your class?

- ☐ 0-2 hours per week
- ☐ 2-4 hours per week
- ☐ 4-6 hours per week
- ☐ 6+ hours per week

3. How often do you incorporate the following activities in your classroom?

	Never	Rarely 1-2 times a month	Sometimes 3-4 times a month	Often 5 or more times a month
Lecture	○	○	○	○
Discussion	○	○	○	○
Drill and Practice Assignments on the computer	○	○	○	○
In-class research using computers	○	○	○	○
In-class reading using computers	○	○	○	○
In-class writing using computers	○	○	○	○
Projects involving problem solving using computers	○	○	○	○
Projects involving analysis of data using computers	○	○	○	○
Ability to create an original product using computers	○	○	○	○
Use of email, blogs, or wiki	○	○	○	○

4. How often do your students use computers for the following activities?

	0-2 hours	2-4 hours	4-6 hours	more than 6 hours
Taking notes	○	○	○	○
Homework completion	○	○	○	○
In-class assignments	○	○	○	○
Searching for information	○	○	○	○
Communicating with the teachers or fellow students	○	○	○	○

5. How often do you use the following teaching techniques in your classroom?

	Never	Rarely 1-2 times a month	Sometimes 3-4 times a month	Often 5 or more times a month
Using computers to demonstrate or apply real world concepts (topic writing, using data to create graphs, problem solving)	○	○	○	○
Using computers to go past the basic skills level (use of word, basic typing)	○	○	○	○
Using computers to allow for student electronic communication (email, blogs, wiki)	○	○	○	○
Using computers for online research	○	○	○	○
Using computers for data analysis (interpretation of graphs, charts, math problems)	○	○	○	○
Using computers to allow for student expression (art expression, original writing)	○	○	○	○

6. Please rate the degree to which you believe that using computers in the classroom has effected the following student subgroup performance. Some of your students may fall into two categories.

	Negatively effected	Somewhat negatively effected	Somewhat positively effected	Positively effected	Do not have in class
African American male students	○	○	○	○	○
African American female students	○	○	○	○	○
Hispanic male students	○	○	○	○	○
Hispanic female students	○	○	○	○	○
White male students	○	○	○	○	○
White female students	○	○	○	○	○
Special Education male students	○	○	○	○	○
Special Education female students	○	○	○	○	○

Demographics

7. Gender

- ☐ Male
- ☐ Female

8. Years of teaching experience

- ☐ 0-5 years
- ☐ 6-10 years
- ☐ 11-15 years
- ☐ 16-20 years
- ☐ more than 20 years

9. What subject or class do you teach in?

- ☐ Science
- ☐ English
- ☐ Math
- ☐ Social Studies

Appendix D

Student Survey

Students Perceptions of One-to-One Computers in the Classroom

You are being asked to participate in this survey because you are a middle school student in a rural Virginia county that currently has computers in a one-to-one ratio in the classroom. This researcher is interested in student perceptions of having computers in a one-to-one ratio (computers to students) in middle schools in rural Virginia.

* Required

1. Do you have one-to-one computing in your English class? * This means do you have access to a computer every day in your English class.

- ○ Yes, Continue to Question 2
- ○ No, Skip to question 5

2. How often do the following activities occur in your English classroom?

	Never	Rarely 1-2 times a month	Sometimes 3-4 times a month	Often 5 or more times a month
Lecture	○	○	○	○
Discussion	○	○	○	○
Drill and Practice assignments	○	○	○	○
In-class research using computers	○	○	○	○
In-class reading using computers	○	○	○	○
In-class writing using computers	○	○	○	○
Projects involving problem solving using computers	○	○	○	○
Projects involving analysis of data using computers	○	○	○	○
Creating original products using the computer (graphs, charts, original writing)	○	○	○	○
Use of email, blogs, wiki	○	○	○	○

3. How often does your English teacher have you do the following activities?

	Never	Rarely 1-2 times a month	Sometimes 3-4 times a month	Often 5 or more times a month
Using computers to demonstrate or apply real world concepts	○	○	○	○
Using computers to go past the basic skill level (use of word or drill and skill activities)	○	○	○	○
Using computers to allow for electronic communication (email, blogs, wiki)	○	○	○	○
Using computers for online research	○	○	○	○
using computers for data analysis	○	○	○	○
Using computers to allow for student expression (graphs, charts, art expression, original writing)	○	○	○	○

4. Please rate the degree to which you believe that using computers in the classroom has effected your performance in English.

- ○ Negatively effected
- ○ Somewhat negatively effected
- ○ Somewhat positively effected
- ○ Positively effected

5. Do you have one-to-one computing in your Math class? * This means do you have access to a computer every day in your math class.

- ○ Yes, Continue to question 5
- ○ No, Skip to question 9

6. How often do the following activities occur in your Math classroom?

	Never	Rarely 1-2 times a month	Sometimes 3-4 times a month	Often 5 or more times a month
Lecture	○	○	○	○
Discussion	○	○	○	○
Drill and Practice assignments	○	○	○	○
In-class research using computers	○	○	○	○
In-class reading using computers	○	○	○	○
In-class writing using computers	○	○	○	○
Projects involving problem solving using computers	○	○	○	○
Projects involving analysis of data using computers	○	○	○	○
Creating original products using the computer (graphs, charts, original writing)	○	○	○	○
Use of email, blogs, wiki	○	○	○	○

7. How often does your math teacher have you do the following activities?

	Never	Rarely 1-2 times a month	Sometimes 3-4 times a month	Often 5 or more times a month
Using computers to demonstrate or apply real world concepts	○	○	○	○
Using computers to go past the basic skill level (use of word or drill and skill activities)	○	○	○	○
Using computers to allow for electronic communication (email, blogs, wiki)	○	○	○	○
Using computers for online research	○	○	○	○
using computers for data analysis	○	○	○	○
Using computers to allow for student expression (graphs, charts, art expression, original writing)	○	○	○	○

8. Please rate the degree to which you believe that using computers in the classroom has effected your performance in Math.

- ○ Negatively effected
- ○ Somewhat negatively effected
- ○ Somewhat positively effected
- ○ Positively effected

9. Do you have one-to-one computing in your science class? * This means do you have access to a computer every day in your science class.

- ○ Yes, Continue to question 8
- ○ No, Skip to question 13

10. How often do the following activities occur in your science classroom?

	Never	Rarely 1-2 times a month	Sometimes 3-4 times a month	Often 5 or more times a month
Lecture				
Discussion				
Drill and Practice assignments				
In-class research using computers				
In-class reading using computers				
In-class writing using computers				
Projects involving problem solving using computers				
Projects involving analysis of data using computers				
Creating original products using the computer (graphs, charts, original writing)				
Use of email, blogs, wiki				

11. How often does your science teacher have you do the following activities?

	Never	Rarely 1-2 times a month	Sometimes 3-4 times a month	Often 5 or more times a month
Using computers to demonstrate or apply real world concepts	○	○	○	○
Using computers to go past the basic skill level (use of word or drill and skill activities)	○	○	○	○
Using computers to allow for electronic communication (email, blogs, wiki)	○	○	○	○
Using computers for online research	○	○	○	○
Using computers for data analysis	○	○	○	○
Using computers to allow for student expression (graphs, charts, art expression, original writing)	○	○	○	○

12. Please rate the degree to which you believe that using computers in the classroom has effected your performance in Science.

- ○ Negatively effected
- ○ Somewhat negatively effected
- ○ Somewhat positively effected
- ○ Positively effected

13. Do you have access to one-to-one computing in your social studies class? * This means do you have access every day to a computer in your social studies class.

- ○ Yes, continue to question 14
- ○ No, Skip to question 17

14. How often do the following activities occur in your social studies classroom?

	Never	Rarely 1-2 times a month	Sometimes 3-4 times a month	Often 5 or more times a month
Lecture	○	○	○	○
Discussion	○	○	○	○
Drill and Practice assignments	○	○	○	○
In-class research using computers	○	○	○	○
In-class reading using computers	○	○	○	○
In-class writing using computers	○	○	○	○
Projects involving problem solving using computers	○	○	○	○
Projects involving analysis of data using computers	○	○	○	○
Creating original products using the computer (graphs, charts, original writing)	○	○	○	○
Use of email, blogs, wiki	○	○	○	○

15. How often does your social studies teacher have you do the following activities?

	Never	Rarely 1-2 times a month	Sometimes 3-4 times a month	Often 5 or more times a month
Using computers to demonstrate or apply real world concepts	○	○	○	○
Using computers to go past the basic skill level (use of word or drill and skill activities)	○	○	○	○
Using computers to allow for electronic communication (email, blogs, wiki)	○	○	○	○
Using computers for online research	○	○	○	○
using computers for data analysis	○	○	○	○
Using computers to allow for student expression (graphs, charts, art expression, original writing)	○	○	○	○

16. Please rate the degree to which you believe that using computers in the classroom has effected your performance in Social Studies.

- ○ Negatively effected
- ○ Somewhat negatively effected
- ○ Somewhat positively effected
- ○ Positively effected

Demographics

17. Gender

- ◯ Male
- ◯ Female

18. Ethnicity

- ◯ African American
- ◯ Hispanic
- ◯ White
- ◯ Other

19. I am a student with an IEP (individual education plan)

- ◯ Yes
- ◯ No

Appendix E

IRB Approval Letter

!!! VirginiaTech |

Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, Virginia 24060
5401231-4606 Fax 540/231-0959
irb@vt.edu
Website: www.irb.vt.edu

MEMORANDUM

DATE: April 2, 2012

TO: Carol Cash, Thomas Schott

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires May 31, 2014)

PROTOCOL TITLE: Rural Virginia Middle School Teachers and Students Perceptions on the Influence of One-to-One Computers in the Classroom

IRB NUMBER: 12-336

Effective April 2, 2012, the Virginia Tech IRB Chair, Dr. David M. Moore, approved the new protocol for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRS-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at http://www.irb.vt.edu/pages/responsibilities.htm (please review before the commencement of your research).

PROTOCOL INFORMATION:
Approved as: Expedited, under 45 CFR 46.110 category (ies) 7
Protocol Approval Date: 412/2012
Protocol Expiration Date: 411/2013
Continuing Review Due Date*: 3/18/2013

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federally regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals *I* work statements to the IRB protocol(s) which cover the human research activities included in the proposal/ work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Appendix F

IRB Approved Teacher Information Document

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Informed Consent for Participants in Research Projects Involving Human Subjects

Teacher Information Document

Project Title: Rural Virginia middle school teachers and students perceptions of the influence of one-to-one computers in the classroom

Investigator: Thomas J. Schott
Doctoral Student at Virginia Tech

Email: Thomas.J.Schott@gmail.com Phone: 804-306-3614

Teachers: You are being asked to participate in this survey because you are a middle school teacher in a rural Virginia county that currently has computers in a one-to-one ratio in your classroom. This researcher is interested in teacher's perceptions of having computers in a one-to- one ratio (technology to students) in middle schools in rural Virginia.

Nature and Purpose of the Project:
The purpose of this study is to examine the perceptions of middle school teachers and students in rural Virginia on the frequency and effect of one-to-one computing in the core areas of math, English, science, and social studies.

Explanation of Procedures:
Teachers will receive a personal email with the electronic link to the survey on http://www.Googledocs. Teachers wishing to participate in the survey may click on the link and respond to the items. You will only be filing out one survey.

Risks:
There are no known risks for you completing this survey

Benefits:
The researcher will compile all data and report significant findings across the two major user groups (teachers and students) based on frequency, type of use, and overall effect of one-to-one computing. This information will benefit teachers and administrators in planning for future use of one-to-one computing in the classroom.

No promise or guarantees of benefits have been made to encourage your participation.

Confidentiality/Anonymity:
Anonymity is provided for the participant through the collection of data procedures. Names or identification numbers will not be included in on the survey. Participants and their survey will not be linked in any manner by the researcher Survey results will be stored on a computer/flash drive in the researcher's office. This will only be accessible to the investigator and the faculty advisor. No surveys will have any names or any means to track them electronically.

Compensation:
There is no compensation given to you for your participation in this study.

Refusal/Withdrawal:
Anyone who agrees to participate in this study is free to withdraw from participating in the survey.

Appendix G

IRB Approved Parent Information Document

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Information Sheet for Parents of Participants in Research Projects Involving Human Subjects

Parent Information Document

Project Title: Rural Virginia middle school teachers and students perceptions of the influence of one to-one computers in the classroom

Researcher: Thomas J. Schott
Doctoral Student at Virginia Tech

Email: Thomas.J.Schott@gmail.com Phone: 804-306-3614

Parents: Your son/daughter is being asked to participate in this survey because they are a middle school student in a rural Virginia county that currently has computers in a one-to-one ratio in the classroom. This researcher is interested in students' perceptions of having computers in a one-to-one ratio (computers to students) in middle schools in rural Virginia.

Nature and Purpose of the Project:
The purpose of this study is to examine the perceptions of middle school teachers and students in rural Virginia on the frequency and effect of one-to-one computing in the core areas of math, English, science, and social studies.

Explanation of Procedures:
Your son/daughter will be asked to complete an online survey. This survey will provide information to this researcher on your child's perceptions on the use of one-to-one laptops in the class. They will be given a further explanation of the survey before the day of the survey. The survey will be done during one of the core class times. Students will use the laptops in class to complete the survey. If your son/daughter is absent the day of the survey they will not participate in this study.

Risks:
There are no known risks for your child participating in this study.

Benefits:
The researcher will compile all data and report significant findings across the two major user groups (teachers and students) based on frequency, type of use, and overall effect of one-to-one computing. This information will benefit teachers and administrators in planning for future use of one-to-one computing in the classroom.

No promise or guarantees of benefits have been made to encourage participation.

Confidentiality/Anonymity:
Anonymity is provided for the participant through the collection of data procedures. Names or identification numbers will not be included in on the survey. Participants and their survey will not be linked in any manner by the researcher. Survey results will be stored on a computer/flash drive in the researcher's office. This will only be accessible to the investigator and the faculty advisor. No surveys will have any names or any means to track them electronically.

Compensation:
There is no compensation given to you for your participation in this study.

Refusal/Withdrawal:
Anyone who agrees to participate in this study is free to withdraw from participating in the survey.

Subjects Responsibilities:
The students voluntarily agree to participate in this study.
The students agree to answer the questions honestly.

Should I have any questions about this research or its conduct I may contact:

Thomas J. Schott (804) 306-3614/ thomas.j.schott@gmail.com
Investigator

Dr. Carol Cash ccash48@vt.edu
Faculty Advisor

David M. Moore (540) 231-4991/ moored@vt.edu
Chair, Virginia Tech Institutional Review
Board for the Protection of Human Subjects
Office of Research Compliance -
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, VA 24060

Parents:

If you DO NOT wish for your child to participate in the one-to-one perceptions of laptops in the classroom survey, please sign below and return this form to your child's English teacher within five days of receipt of this letter.

I DO NOT wish for my child, ____to participate in the one-to-one perceptions of laptops in the classroom survey.

______________________ Student name	______________________ English Teacher
______________________ Parent/Guardian Signature	______________________ Date

Appendix H

Division and School Research Approval Letters

Louisa County Public Schools
DEBORAH D. PETTIT, DIVISION SUPERINTENDENT
953 Davis Highway
Mineral, Virginia 23117
(540) 894-5115 FAX (540) 894-0252

Mr. Thomas Schott
953 Davis Highway
Mineral, VA 23117

Dear Mr. Schott:

The purpose of this letter is to grant you permission to conduct a survey with the teachers and students at Louisa County Middle School as a part of your doctoral program at Virginia Tech. I understand that this will be an anonymous survey that will examine the perceptions of middle school teachers and students in a select rural Virginia Middle school on the frequency and effect of one-to-one computing in the core areas of math, English, science, and social studies.

If I can be of further assistance to you, please do not hesitate to contact me.

Sincerely,

Deborah D. Pettit
Division Superintendent

LOUISA COUNTY MIDDLE SCHOOL

1009 Davis Highway
Mineral, Virginia 23117
(540) 894-5457 • Fax (540) 894-5096

Lee Downey, Principal
Nicholas LeReche, Assistant Principal
Laura Mondrey, Assistant Principal
Joel Rupert, Assistant Principal

March 21, 2012

Mr. Thomas Schott
953 Davis Highway
Mineral, VA 23117

Dear Mr. Schott:

The purpose of this letter is to grant you permission to conduct a survey with the teachers and students at Louisa County Middle School as a part of your doctoral program at Virginia Tech. I understand that this will be an anonymous survey that will examine the perceptions of middle school teachers and students in a select rural Virginia Middle school on the frequency and effect of one-to-one computing in the core areas of math, English, science, and social studies.

If I can be of further assistance to you, please do not hesitate to contact me.

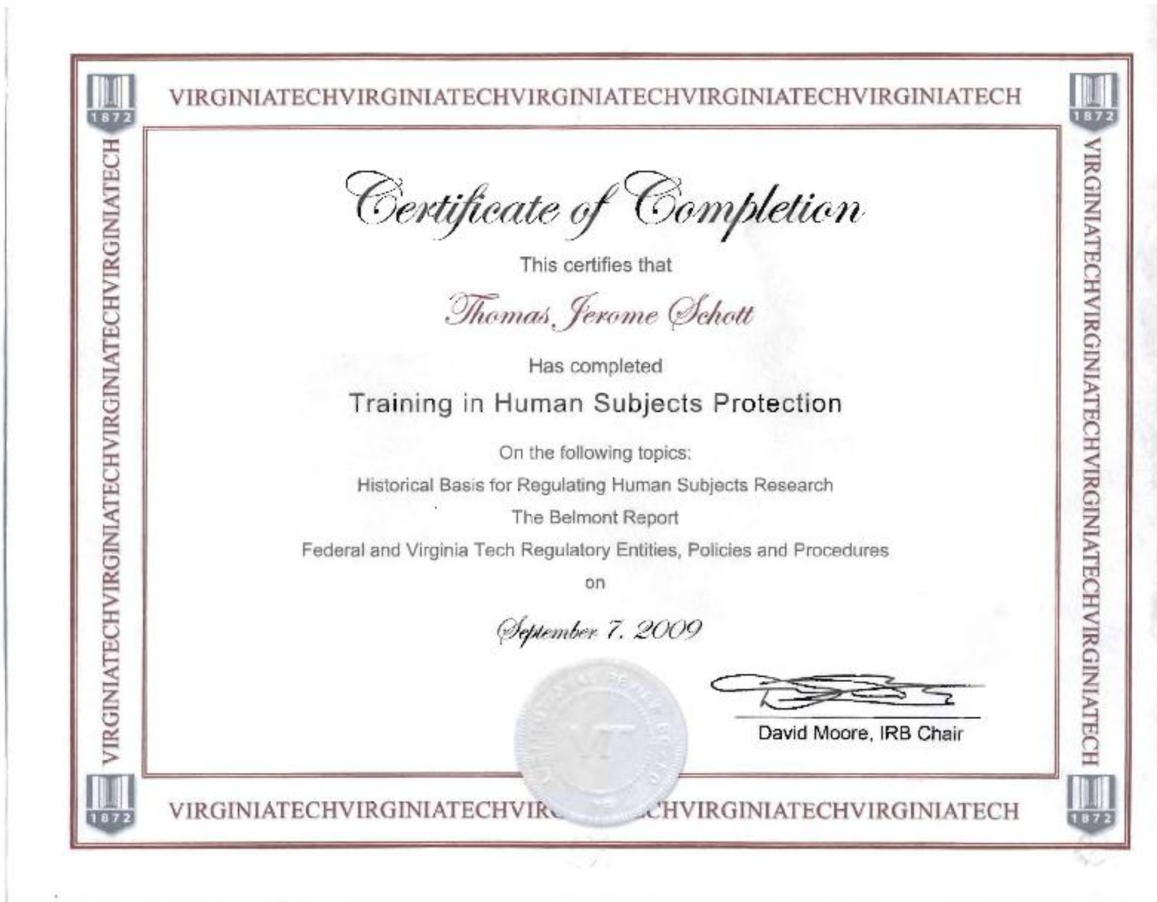
Sincerely,

Lee

Lee Downey
Principal
Louisa County Middle School

Appendix I

Certificate of Completion – Training in Human Subjects Protection



VIRGINIATECHVIRGINIATECHVIRGINIATECHVIRGINIATECHVIRGINIATECH

Certificate of Completion

This certifies that

Thomas Jerome Schott

Has completed

Training in Human Subjects Protection

On the following topics:

Historical Basis for Regulating Human Subjects Research

The Belmont Report

Federal and Virginia Tech Regulatory Entities, Policies and Procedures

on

September 7, 2009

David Moore, IRB Chair

Appendix J

Permission for Use of the NCREL Range of Use Chart.

Mr. Schott,

We are happy to grant you permission to use the NCREL Range of Use chart as outlined in your request and have attached a PDF of the chart. Because the document you cite is a publication of the Virginia Department of Education, we cannot give permission for content other than the NCREL chart.

Thank you for your interest, and best of luck with your dissertation.
Martha Ramirez
Resource Center Assistant
mramirez@air.org

-----Original Message-----
From: thomas.j.schott@gmail.com [mailto: thomas.j.schott@gmail.com]
Sent: Wednesday, June 29, 2011 8:28 AM
To: permissions
Subject: Copyright Permission Request
Date Requested: 6/29/2011 8:28:13 AM
User First Name: Thomas
User Last Name: Schott
User Email: thomas.j.schott@gmail.com
User Title: Doctoral Student
User Organization: Virginia Tech
User Street: 10646 Argonne Drive
User City: Glen Allen
User State: VA
User Zip: 23060
User Country: USA
Title Of Material: NCREL range of use chart
Source Pub Web: Learning without boundaries Virginia Department of Education 2008-2009 report
Page Numbers: 11-12
Author: Virginia Department of Education
Publication Date: September 2009
Using: Full Text
What Else: I would like to use the Range of use chart to help explain the Conceptual Framework of my dissertation.
Dissertation topic: One-to-one computing in rural Virginia middle schools.