A Thesis

entitled

The Impact of Laptop Computers on Student Learning Behaviors

as Perceived by Classroom Teachers

by

Rebecca Righi

Submitted to the Graduate Faculty as partial fulfillment of the requirements for the

Master of Education Degree in Educational Administration and Supervision

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An Abstract of

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The purpose of this study was to determine the impact of laptop computers on student learning behaviors. Each student and teacher was equipped with a laptop computer in which they had 24/7 access. Qualitative research methodology was used in this study and the data consisted of classroom observations, a review of the teachers’ lesson plans, and in-depth interviews with five classroom teachers. The results of this study revealed that laptop computers had a positive impact on student learning behaviors. Students were engaged in the learning process, produced higher quality work, and had improved communication with their teachers when they had access to laptop computers. Through analysis of the data, the researcher suggested that the changes in student behavior occurred because of personalized learning for each student, access to multiple materials and media, and the laptop computer serving as assistive technology.

Key Words: one-to-one program, laptop computers, learning behaviors, student engagement, deep learning
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Chapter One

Introduction

Students’ lives today are filled with technology that gives them access to information and resources 24/7. Students are able to create multimedia content and immediately share it with the world and participate in social networks where people from all over the world share ideas, collaborate, and learn new things. Outside of the classroom, students have the freedom to pursue their passions in their own way and at their own pace. Opportunities for today’s students are limitless, borderless, and instantaneous (Office of Educational Technology, U.S. Department of Education, 2010) so it only logical that their learning environment should reflect their everyday lives.

Forty-five of the fifty states in the United States have adopted the Common Core State Standards. The standards define the knowledge and skills students should have within their K-12 education careers so they will graduate from high school able to succeed in college courses and in workforce training programs. The Common Core Standards are focused, coherent and include rigorous content and application of knowledge through higher-order thinking skills. This new set of standards is based on evidence, research, and is internationally benchmarked so that students are prepared to succeed in our global economy and society (Council of Chief State School Officers and National Governors Association Center for Best Practices, 2010). With the implementation of these standards, American students should be fully prepared to compete successfully in the global economy. All students must be prepared to compete not only with their American peers in the next state, but with students from around the world (Council of Chief State School Officers and National Governors Association
In order for students to think deeply, be globally competitive, and meet the new standards, it is essential they have access to technology.

Mike Muir, Bette Manchester and Jim Moulton (2005), authors of *Learning with Laptops*, explained that laptop computers can accelerate, enrich, and deepen basic skills, motivate and engage students in learning, increase the visibility of tomorrow’s workers and connect students and schools to the real world. Just as pens and pencils were the predominant tools for knowledge and learning during a large part of the last century, computers and the Internet are key tools for learning and knowledge production for the 21st century (Warschauer, 2005). Demski (2012) says, “If we want our students to be able to find meaningful work and be contributing members of a global society, then we need to prepare them for their future, not our past” (p. 36).

It is imperative that students can interact with technology and the Internet because the 21st century offers us far more options to learn and grow intellectually. In fact, today more than a million people in the United States alone are learning online (Bonk, 2010). Laptop computers and wireless connectivity represent two of the fastest-growing technologies in schools (Warschauer, 2005). The opportunities that technology brings to the classroom open up walls so that a classroom is no longer a closed system (Demski, 2012).

The Office of Educational Technology in the U.S. Department of Education is calling for a 21st Century Model of Learning Powered by Technology (2010). This model calls for engaging and empowering experiences for all learners through the power of technology to provide personalized learning instead of a one-size-fits-all curriculum, pace of teaching, and instructional strategies. In order for this to happen, students need access
to technology that mirrors their everyday life and the reality of their future. The Office of Educational Technology through the U.S. Department of Education is recommending that students and educators have adequate broadband access to the Internet and adequate wireless connectivity both inside and outside of school. Additionally, it is recommended that each student and educator have at least one Internet access device, software, and resources for research, communication, multimedia content creation, and collaboration for use both inside and outside of school (2010).

Some school districts in Georgia, Florida, Kansas, Louisiana, Maine, Massachusetts, Michigan, Missouri, New Hampshire, California, Pennsylvania, and South Dakota are ahead of the curve and have already implemented one-to-one laptop computer initiatives. One-to-one laptop computer programs equip each student and educator with a laptop computer. One-to-one laptop computer initiatives have the potential to significantly impact education, and school districts implementing laptop programs report improvements in day-to-day operations (Holcomb, 2009). Districts are meeting one-to-one laptop programs with enthusiasm and many school principals are ordering more electronic learning tools and fewer textbooks (O’Hanlon, 2007).
Chapter Two

Literature Review

Across schools in every grade and in every subject, students involved in one-to-one laptop initiatives outperformed students in all other tech-distribution initiatives; however how the implementation of one-to-one initiative is implemented is equally important (Demske, 2012). “Laptops tend to amplify what is already taking place in schools,” says Mark Warschauer (2005), associate professor of education at the University of California-Irvine; “Whatever a school is doing well, it can probably do better with laptops” (p. 34). Laptop computers facilitate the kinds of learning, thinking and analysis that today’s world demands in the workplace. The computers give students “plentiful data at their fingertips” (p. 35) and they learn to access information, analyze it, critique it, and work into a wide variety of authentic products.

The literature about one-to-one laptop initiatives demonstrates that although there is no significant effect on student achievement, student learning behaviors are positively impacted. Students are more engaged due to personalization and are demonstrating their knowledge through deep, rich learning experiences. Teachers indicated that there is increased communication and interaction in student-to-teacher and student-to-student relationships.

While there are exceptions to the rule, laptop computer programs in general have not had any appreciable effect on student test scores. Even in Maine, whose achievement test scores are already the highest in the United States, scores failed to rise in the first phases of the state’s laptop program (Warschauer, 2005). An impressive laptop program in California was also examined and did not show gains in achievement test scores
An exception to this rule are writing scores. Bryan Goodwin (2011), author of *One-to-One Laptop Programs Are No Silver Bullet*, said writing scores “edged up 3.44 points (in range of 80 points) in five years” (p. 78). Studies by Lori Holcomb (2009), assistant professor of instructional technology at North Carolina State University and author of *Results and Lessons Learned from 1:1 Laptop Initiatives: A Collected Review*, found that students in one-to-one programs earned significantly higher test scores and grades for writing. The percentage of students who produced writing samples that met or exceeded writing performance standards for their grade rose from 70% in fall to 92% the following spring. The number of students who met performance standards over the course of one year increased 22% (Jeroski, 2003, as cited by Holcomb, 2009). The reason for this increase is that students spent more time using their laptops to write, edit, and reflect on their writing (2009).

“The evaluators speculated that the reason other subjects have not shown measurable growth could be that the state assessment does not measure the 21st century technology skills that laptop initiatives promote,” says Goodwin (2011, p. 78). Warschauer (2005) agrees with Goodwin: “The learning advantages that laptops bring to students through greater ease in searching for information, using multiple media, and revising writing – do not necessarily show up on paper-and-pencil tests. And second, because laptop programs are still in their infancy, and almost any technological innovation takes a number of years to have a full impact” (p. 34). The benefits and impact that 24/7 access to laptop computers bring cannot be measured on state achievement tests. Joe Hofmeister, technology director at Cincinnati Country Day School, says, “If a kid gets excited about Hamlet because he worked on set design on his tablet PC in class, or
he got to speak with actors playing Hamlet in the Globe Theater in London via videoconference, how do you measure that? Passion is a hard thing to measure” (O’Hanlon, 2007, p. 28).

One-to-one laptop programs make a difference outside school walls, and the benefits ultimately spill out to the community and into individual homes. Anita Givens, senior director of instructional materials and educational technology at the Texas Education Agency, explained, “We hear stories that parents have been able to get better jobs by learning how to use a computer with these laptops – that they’ve gotten raises” (O’Hanlon, 2007, p. 78). This rings true with what popular author Jim Collins (2001), author of Good to Great says about technology, “When used right, technology is an essential driver in accelerating forward momentum” (p. 159). The impact of laptop computers is allowing students to become more engaged in their learning and provide optimal, personalized learning experiences. When students have access to laptop computers, their classroom walls expand globally and their learning behaviors improve. The information students have access to, combined with the multiple ways of demonstrating their knowledge, results in deeper learning for the students and increased communication with their teachers.

Students participating in one-to-one laptop programs demonstrate higher levels of engagement, and engaged students spend more time on task, work more independently, enjoy learning more and take part in a multitude of learning activities at school and home (Warschauer, 2005). Lisa Wilson, director of Freedom to Learn, Michigan’s one-to-one laptop initiative, observed many classrooms and found that technology-equipped students are more in engaged in the education process. “I have never witnessed such a powerful
transformation as now,” she said. “I am in awe when I walk into the classrooms and see what these students are accomplishing, where students go with learning. There is no question that this is spurring a new way of learning. It’s like night and day – students are fueled by their own drive and their own capacity to learning” (O’Hanlon, 2007, p. 28). Wilson adds that a major difference is the absence of downtime in the classrooms. “The moment they walk in the door, they are learning. The students are completely engaged, and when they are engaged, things happen” (O’Hanlon, 2007, p. 28).

Studies by Holcomb (2009) showed that many one-to-one programs have reported a decrease in absentee rates while Goodwin (2011) and O’Hanlon (2007) found that discipline problems decreased as well because students are engaged in the learning process instead of finding ways to get in to trouble. Chrystalla Mouza (2008), author of Learning with Laptops: Implementation and Outcomes in an Urban, Under-Privileged School, observed that students became more motivated to complete their schoolwork and often went beyond required assignments, thereby improving the quality of their work. Thomas Greaves, CEO of the educational consulting firm The Greaves Group, suggested that “The student using technology is better able to personalize their learning than a teacher is” (Demski, 2012, p. 34). Students are more engaged because they have choice in how they represent their learning and understanding.

Technology provides an outlet to provide for a more personalized learning environment; Demski (2012) explained that personalizing learning is not individualized learning in which students share the same learning goals but progress through the curriculum at their own pace. Nor is it differentiated instruction where students share learning goals but receive instruction tailored to their individual learning needs. Will
Richardson (2012), the cofounder of Powerful Learning Practice, a program that offers professional development to educators around the globe about 21st century skills, explained that personalizing learning means allowing students to choose their own paths through a curriculum. The personalized learning experience is not just a possibility anymore, but an expectation. Karen Cator, director of the Office of Educational Technology at the U.S. Department of Education, explained that access to technology is “the essence and the nature of the opportunity to provide a much more personalized learning environment for students” (Demski, 2012, p. 34). She continued,

In any personalized learning model, the student – not the teacher – is the central figure. In a technophillic view of a personalized learning environment, students have access to traditional learning resources like books and hands-on materials, and time-honored support from people like teachers, parents, mentors, coaches, and schoolmates. But critically, they have ubiquitous access to technology, which allows them to connect to learning communities, information management and communication tools, personal learning networks, information and data, expertise and authoritative sources, online tutoring and guided sources tailored to their needs, knowledge-building tools, and peers with common interests (Demski, 2012, p. 34).

Personalized learning environments are powered by a student-centered classroom in which students have choice in what they learn, how they learn, and when they learn. When students have direct access to a laptop computer, the learning switch is always on and there is a chance to constantly keep learning in motion. Richardson (2012) explained, “The ability to learn what we want, when we want, with whomever we want as long as
we have access creates a huge push against a system of education steeped in time and place learning” (p. 23). Personalization allows for a learning experience to be self-paced and diagnostically driven while still having the ability to adapt to a student’s specific learning styles, interests and backgrounds (Demski, 2012). When students have 24/7 access to laptop computers and choice in how they demonstrate their understanding, learning becomes personalized for all learners.

In a personalized learning environment fueled by student choice, each child follows a rubric that covers areas such as standards, learning outcomes, work ethic, and general requirements for assignments. Learning such as this requires students to create something new, to reflect deeply on their efforts and assess their work and progress as they learn. Personalized learning is a fundamental part of developing skills and dispositions that continue a learning process after a class ends (Richardson, 2012). Personalized learning results in a deep and profound learning experience that is richer than memorizing facts and spitting them out on a paper-pencil test.

Access to laptop computers and technology in general provides students with multiple sources for the same topic, thus resulting in project-based work that enables them to dig further and deeper (Warschauer, 2005). Leslie Wilson, director of Freedom to Learn, frequently observed many one-to-one classrooms and saw completely student-centered teaching and learning. She said, “All of the lessons are taught in project-and-team-based settings, so students are able to take the learning experience beyond where they are to continue to be successful. It’s no longer a passive learning experience” (O’Hanlon, 2007, p. 28).
Muir, Manchester, and Moulton (2005) found that students use the Internet to do research and apply information they find to enhance their projects rather than using the Internet as one big answer key. Their findings also suggested that teachers’ lessons are more extensive, use up-to-date resources and provide more opportunities for students to explore knowledge and information in more depth. Creating work on laptops requires students to engage in project based learning and to tap into the highest levels of learning in Bloom’s Taxonomy. Project based learning allows educators to address multiple intelligences and diverse learning styles but still give students more choice in synthesizing and applying their learning.

The software and web applications provided by direct access to laptop computers offer unlimited media for students to use to research and find information, as well as create projects that demonstrate thorough understanding and deep learning of a subject. For example, free software like Skype allows students to participate in face-to-face conversations with people all over the globe. The Smithsonian offers free videos, lectures, and online exhibitions, and National Geographic’s website has a plethora of multimedia resources designed to take students on exciting adventures (Sloan, 2011). These resources allow students of all abilities and socioeconomic levels to participate in learning experiences. Muir, Manchester, and Moulton (2005) shared that a nearly illiterate special education student, who has never participated in class, produced an incredible iMovie telling the story of a bomber in World War II. This newly motivated student was able to demonstrate his understanding of a topic, despite his inability to read, because of the laptop he received in a one-to-one laptop program.
Laptop computers can foster communication, engagement, and interaction. Teachers do not need to know how to create the projects that students create; they only look for understanding of theme and the ability to communicate and demonstrate their understanding (Scherer & Cator, 2010). The benefit is that students get to see their teachers’ genuine reactions to new discoveries as well as to challenges, and see the learning process modeled. Students begin to understand that there is no one “right” answer that the teacher expects; rather there are many answers. Students and teachers often made these discoveries together through dialogue as students explain their digital work (Richardson, 2012). Students are learning more through laptop programs because of fostered, collaborative instruction with their teacher and peers. The doors of communication are opened, and students’ education goes beyond the classroom (O’Hanlon, 2007).

“Integrating technology into the classroom can provide teachers with instant data and offer a new exciting challenge for students,” says Jennifer Henderson (2010), author of Forming Assessment Through Technology. “Everything is interactive. As a teacher, you can really see who understands what. It’s easy to gauge student understanding” (p. 1). Findings from Mouza’s 2008 study demonstrate increased interaction among students and teachers in laptop classrooms. Laptop students frequently traded skills with other students, shared technology related tips and would serve as peer tutors for technology and non-technology related topics. Peer sharing and collaboration was the key to the implementation of laptops in her classroom. Students who finished their work would volunteer to provide their peers with help in technical or academic support.
A one-size-fits-all approach to education does not lead to a level of student engagement, growth and academic success that schools strive to achieve. A successful customized approach to delivering instruction combines project based learning, collaborative learning, and combines different learning styles. The use of laptop computers with the aforementioned strategies simultaneously creates infinite opportunities for student growth because of the access to materials for research and production (Demski, 2012). A digital learning environment facilitates personalization, engagement, and collaboration with people in the classroom or across the world (Scherer & Cator, 2010).

The access to laptop computers impacts the learning behaviors of students – specifically their engagement level and depth of their completed work. Students are more engaged in the learning process because of the personalization that laptop computers offer. Because learning experiences are personal, students take ownership in their learning and produce quality work they can take pride in. As students collaborate with one another on projects and explain their work to their teachers, their communication skills and classroom relationships strengthen.
Chapter Three

Methodology

The purpose of this qualitative research study was to examine the impact of laptop computers on student engagement as perceived by classroom teachers. Specifically, this study examined the impact of unlimited access to laptop computers on student learning behaviors for middle school and high school students through a subjective view from their classroom teachers. The data collected from this study were duplicated data from a study the researcher was co-researching titled, “The Impact of Technology on Teaching Pedagogy.” Findings from that study also showed significant impact of laptop computers on student learning behaviors.

Qualitative research studies essentially provide a “complex, holistic picture” (Creswell, 1998, p. 17) with a detailed view of the topic. Therefore, the research questions should be “open ended, evolving, and nondirectional” (Creswell, 1998, p. 99). This qualitative research study sought to address the following question: How does access to a laptop computer impact student learning behaviors as perceived by classroom teachers?

Laptop computers facilitate the kinds of learning, thinking, and analysis that today’s world demands. Through laptop computers, students learn to access information, analyze and critique it, and work that information into a variety of authentic products (Warschauer, 2005). Thus, this research study provides insight into a small, but relevant, sample of teachers’ perceptions about the impact of access to laptop computers on student learning behaviors. The results of this study have the potential to contribute to the
improvement of student learning and achievement through encouraging teachers to include laptop computers and related technology into their instructional materials.

The examination of the impact of laptop computers on student learning behaviors requires a research methodology that enables the researchers to observe classroom behaviors of teachers and students using laptop computers. This thorough understanding is fostered through the collection and analysis of data gathered from multiple sources: classroom observations, interviews, and a review of documents. This qualitative research study provides evidence that laptop computers positively impact student learning behaviors.

Classroom observations, interviews with the teachers, and a review of documents were used in this study. The classroom observations prior to the interviews allowed for a more in-depth discussion of the technology and methodology used by the teacher. A qualitative approach was used because it allowed the researcher to develop a level of detail about the individual and place, as well as be highly involved in actual experiences of the participants (Creswell, 2003).

In this qualitative research study, the researcher recruited the participants; explained the informed consent to the participants; collected and secured the informed consent signed forms; conducted participant observations and wrote descriptive field notes either by hand or on a laptop; interviewed participants; viewed student work and teacher lesson plans about doing lessons with laptop computers and without laptop computers; transcribed interviews; conducted the data collection; and managed, analyzed, and interpreted the data.
Although the researcher was a graduate student in the Judith Herb College of Education, Health Science and Human Service (JHCEHSHE) during the time this study was conducted, her role in the research was wholly that of a researcher. This role was established through discussions with the teachers, administrators, and The University of Toledo faculty included in the research. The researcher also served as a graduate assistant in the Educational Foundations and Leadership Department of JHCEHSHE. During her time as a graduate assistant, she took part as co-researcher in a research study titled, “The Impact of Technology on Teaching Pedagogy,” which cultivated her interest in the impact of teachers using technologies in the classroom and the impact on student behavior. These additional roles provided the researcher with supplementary frameworks that influenced the analysis and interpretation of the data.

Creswell (1998) explains the importance of finding a site that is “accessible, willing to provide information” and that can shed light on a specific issue being explored (p. 111). Five teachers from a mid-western suburban school district were used in this qualitative study during the fourth quarter of the 2010-2011 academic school year. The teachers came from one middle school with approximately 700 students and one high school with approximately 1400 students. The students in both schools are predominately white, middle-class students. Both schools made Adequate Yearly Progress during the 2010-2011 school year.

This study focused on five teachers who taught language arts, science, or mathematics. Principals of the two schools identified these five teachers who were recognized as exemplary in their use of technology-based tools in their classrooms. Each teacher is considered to be technology literate among their principals and peers. Two of
the teachers have received a technology certificate from a university offering graduate level courses in technology integration.

In order to take part in this study, the teachers were required to sign the Institutional Review Board informed consent, which simply explicated the purpose of the study, the description of the procedures, potential risks, potential benefits, confidentiality, voluntary participation, and the contact information of the researcher and The University of Toledo Social, Behavioral, and Educational Institutional Review Board. It was made clear that the participants would remain anonymous and that their lesson plans and students’ work would not be identified in the research study. To protect the teachers’ anonymity, the following pseudonyms will be used: Ms. Jones, eighth grade math and science teacher; Ms. Elliott, seventh grade language arts teacher; Ms. Warren, eighth grade language arts teacher; Ms. Jackson, high school language arts teacher; and Ms. Leonard, eighth grade math teacher. Furthermore, the researcher assured the teachers that participation was voluntary and that they could opt out of the interview procedures at any time.

During the observations, the researchers were able to observe students’ interaction and engagement with the laptop computers. Observing the classroom environment permitted the researchers to view the students’ work and witness the completion of complex projects. The direct observations allowed the researchers to have a firsthand experience with participants and record the information accurately as it was revealed. Interviews with individual teachers provided historical information and allowed the teachers to elaborate on what the researcher viewed during the observations. Interviewers were used in order to control a line of questioning (Creswell, 1998) and allow teachers to
explain their lessons and the students’ learning behaviors as laptop computers were integrated into their classroom.

Prior to the observations and interviews, the teachers were asked to provide copies of their lesson plans before laptop integration and after laptop integration. This request allowed the researchers to see the pedagogical shift with the use of laptop computers. The lesson plans were available to the researcher during the observation. During the observation, the researcher sat in the back of the classroom and jotted descriptive field notes either by hand or on her laptop. Directly after the lesson was completed, the researchers conducted a tape-recorded interview with the teacher. The interviews included thirteen open-ended questions (Appendix A). The researchers asked additional questions to participants as the interview progressed. The questions were to clarify their answers or to get an elaborated response. The additional questions asked were specific to the lesson the researcher observed or to the lesson plan documents the researchers reviewed.

Creswell (1998) recommends storing the qualitative data in printed transcripts and computer files. He also suggest that attention be paid to how the information will be organized and stored, along with creating backup copies or files of data collected. In this qualitative research study, the interviews were tape-recorded using a digital audio recording device, saved to a computer, then transcribed. The transcripts were printed and placed in a folder.

This research study was an offspring of a study that the researcher and her professor conducted entitled, “The Impact of Technology on Teaching Pedagogy.” For “The Impact of Technology on Teaching Pedagogy,” the researchers visited the school
sites to observe teachers using laptop computers in their lessons. Prior to observations the 
researchers would review the teachers’ lesson plans on how the teachers would teach the 
same concept before they had daily access to laptops and after the 1:1 laptop initiative 
implementation. After the observations the researchers interviewed each teacher about 
their shift in pedagogy due to the integration of laptop computers.

In doing the coding and analysis of “The Impact of Technology on Teaching 
Pedagogy” as a co-researcher, the researcher found results about the impact of laptop 
computers on student learning behaviors were emerging. These emergent findings are 
the basis of this study: the impact of laptop computers on student learning behaviors.

In “The Impact of Technology on Teaching Pedagogy,” interviews of the teachers 
were transcribed and coded by hand to sort, analyze, and code common themes that were 
discussed and described during the interviews. Lesson plans from previous years when 
technology was not available were reviewed and compared with current lessons with 
technology integration. These documents enabled the researcher to identify the shifts in 
teaching pedagogy, expectation of student production, and instructional materials as well 
as to serve as an unobtrusive source of information (Creswell, 2003). Common themes 
emerged from a cross analysis of the interviews, observations, and lesson plan 
documents.

For this research study, the same data were recoded with various colors of 
highlighters. Each color highlighter represented a different code. The codes were: 
engagement, work completion, expectations, communication with teachers, 
differentiation, and access to materials. The codes were based on interpretation and 
analysis of the researcher. The coding system was then revised and the most prevalent
codes that emerged from the data were the identified themes of the research study: student engagement, depth and efficiency of completed work, and communication with classroom teachers.

Since this research represented an ethnographic case study, the researcher collected multiple sources of data including field notes, observations, lesson plan documents, viewing student assignments, and interviews. For the specific analysis of the impact of laptop computers on student learning, the researcher chose to analyze data from all sources of data. The amount of data collected during qualitative research through multiple sources can be overwhelming. Consequently, the analysis process took time due to many readings of the collected data and reflecting on the research.
Chapter Four

Findings

The daily and direct use of laptops has impacted student learning behaviors as perceived by classroom teachers in a positive manner. As teachers made a shift in their pedagogical approach with the use of technology, the behaviors of the students made a shift as well. Teachers described themselves more as facilitators of instruction when using laptop computers with students rather than in the traditional role of the instructor that lectures in front of the classroom. The use of laptop computers each day in the classroom resulted in teacher perceptions that students were more engaged in learning, completing their work with more depth and efficiency, and having improved communication with their teachers.

Student Engagement

A key element in the academic success of students is active engagement in their learning. The teachers observed that access to laptop computers provided a big change in how their students were engaged in content and activities during the lesson. Ms. Warren said, “They really were much more actively taking on this learning. They wanted to do it. They wanted to participate. They wanted to create whatever it was we were doing.” Ms. Warren continued:

My affirmation is when I look around the classroom right now every student is engaged. They are all engaged in the learning and taking it seriously whereas before students would shut down the minute you give them an assignment to do that was challenging. They wouldn’t actively participate. They really are more engaged; they’re learning; they’re taking away and when they are done they have a project they are proud of. When they are done they are excited and definitely more invested.

Ms. Jones said:
Even with partner work after sharing a laptop, I see more engagement. Even if it’s just working in a very slow pace they are getting something done instead of just putting their head down and saying, “I am bored.”…It keeps kids more engaged and active in their learning instead of just staring at a piece of paper or listening to someone… there’s fewer kids off task.

During an observation of a lesson on mythology, the researcher noted that students immediately began working. After the teacher began the class with a few reminders and instructions, the students moved their chairs and sat side-by-side with their partners and started researching Greek mythology. The students used websites that were saved on the teacher’s shared hard-drive and were completely on-task. While one student was researching, the other was taking notes on their laptops and vice-versa. After completing the research, the students began to create their own mythological character. The teacher never had to redirect behavior.

In addition to students being more engaged, teachers found that students are enthusiastic about their work and what they are accomplishing. Ms. Jackson indicated that the students’ motivation went sky high, and they get very animated about the use of laptop computers. Ms. Elliott said:

I think they’re completely excited. There is so much more motivation. Some of the kids are resistant to paper-pencil work. Those kids are more motivated to be on the computer. They might need more verbal reminders to stay on the computer and remain on task but getting them through the resistance of even just starting a project is much more relevant than starting with paper [and] pencil.

The students are also more motivated because they have more choice in their assignments. The teachers used aspects of layered curriculum in their lessons. Ms. Jackson explained that she gave students the certain components that must be included in their assignments but how they do them is completely up to them. The choice and
freedom that the students have to complete their assignments sparks motivation within the students. According to Ms. Jackson,

There is so much [motivation] with flexibility or choice…choice is huge. So you got flexibility, teacher facilitated, and discovery learning [based off] of what is of interest of students, because all of this creates motivation.

The lesson plans reviewed by the researcher revealed that students have choice in the assignments they choose to complete. The students were not required to use a specific software programs or even complete the same type of assignments as their peers. The rubrics indicated that the students only had to demonstrate a high degree of understanding in a particular topic.

This generation of students has access to laptop computers and various technologies in their homes, so the use of technology is a familiar and integral part of their lives. It is logical to carry over technology use into a learning environment. Ms. Warren elaborated:

They have grown up using this technology their entire lives so it’s natural for them to be able to do things. It was natural for them to be able to sit down and get started on this project in a matter of minutes. Had I said, ‘Okay, we’re going to handwrite this paper,’ they would not have. They would’ve felt like, ‘I don’t want to do this at the end of the school year,’ but the minute they got the computer they were looking at images, they were looking at science-fiction pictures, they were generating ideas and brainstorming.

According to Goodwin (2011) and O’Hanlon (2007), the involvement of technology in a classroom lessens behavior problems and disruptions in the learning environment. Teachers said that with technology integrated into daily lessons, students act out less because using technology is one of their strengths, and they do not need to misbehave to detract from completing their work. Ms. Warren indicated that she is more engaged with the students as well because she deals with fewer behavior disruptions.
Students may still have sidebar conversations but not as much as in previous years. The researcher observed that the students are focused when they are working on their laptop computers. They may get off task from time to time but they were usually focused on completing their work. Ms. Elliott said:

Students that have had behavior problems in the past definitely have less behavior problems now. They are more motivated to do the work because technology is involved. Many of the students are very good with technology so it does capture one of their strengths even if the content is not a strength. All of a sudden those students who are not good leaders can be a good leader and a good partnership, as they might know how to navigate through the technology.

**Degree of Completed Work**

The increase in student engagement led to more time on task which ultimately led to completing more work. Ms. Jackson was proud of the level of work completion from the students in her classes. She said:

Every single student this year in all my classes turned in every single assignment. That is unheard of! I’m really proud of that…The thing that’s different is technology use…I have given out – well they have earned – more A’s…they all did acceptable work and then went beyond. It’s like teaching gifted and talented to all levels. I have mastery learning. If they don’t have everything on there from the rubric, I have them give it back to me. I don’t accept it unless it’s 100% or has all the rubric items.

The standard of what constitutes a grade of “A,” “B,” or “C” has changed too. In reviewing the lesson plans, the researcher noted that student work that would constitute a grade “A” prior to the use of technology would be equivalent to a lower grade on the rubrics used to assess students with access to laptop computers. The researcher inferred that the teachers had higher expectations of what students can accomplish with the use of laptop computers.
The researcher observed the students taking more pride in the work they were completing. The laptop computers are equipped with software that allows students to create high-tech, professional, and sleek projects and documents. Ms. Jackson explained that the software allows the students projects to look polished and professional with both their ideas and their brain work. Not only do students get a refined project or document, but also the computer knowledge and application behind it as well. Ms. Warren elaborated:

When you look at the significance of their projects now in the technology that they’re using, it goes up in my classroom and they are proud of it. They are excited to share about it. They show it to their parents. It’s definitely more professional, the work we are getting from them.

The researcher witnessed students problem solving, engaging in conversation within groups and using all types of interpersonal skills. The work that is produced on the laptop computers is more sophisticated than paper-pencil work so students have to problem solve, troubleshoot, find answers, and be creative on the fly. During an observation of Ms. Jackson’s class, the researcher saw a group of students that lost their project because they did not save it correctly. The students asked for fifteen minutes to recreate a different version of their project and to figure out a new way to present their information. The students solved the problem, stayed calm, and found a solution. The creative problem solving occurred in addition to the deeper level of learning that the laptop computers allow the students to be engaged in. Ms. Jackson explained:

It’s those skills that you don’t realize; they’re kind of like happy accidents where they are learning the different technology. Things come up, they get to problem solve. It’s really not the particular software. It’s about being able to take on a problem, use technology to help you solve the problem and then be creative about it.
Ms. Jones and Ms. Elliott referred to students’ learning as a richer, deeper learning that is not just simple recall. As perceived by Ms. Leonard, in many cases students are synthesizing, evaluating, and creating, which are the highest levels of learning according to Bloom’s Taxonomy. Ms. Warren explained:

You are seeing much more of the deeper analysis and synthesis level. They are processing it. They are not just trying to learn it so they can recall it for a test. They are applying it. .. It’s definitely a deeper level thinking because they have to. They can’t simply just spit out that information. They think about how it applies; how to transform.

During a classroom observation of a science lesson, the researcher studied a group of students interpreting Newton’s laws. The students were creating a video and discussing with one another how to act out or demonstrate the laws. The students’ conversation displayed understanding and application of the laws that had a more significant impact on them than memorizing the laws for a fill-in-the-blank test. Students also had a lot of choice during this assignment. Some students were working with a group creating a movie, while other students worked independently using animation software to demonstrate Newton’s laws or create a movie with still pictures.

During an interview, Ms. Warren explained that she still practices lecturing and note taking to help students get basic knowledge and understanding about a topic before they start assignments. She explained that she does this so students will be prepared for other classes in high school and college but also because it’s important for students to understand a concept before they can begin to think deeply about it. The projects students create using laptop computer software provide opportunities for students to transfer knowledge into application, synthesis, evaluation, and creation of something new. Ms. Warren said:
The software really allows students to use all the higher levels of Bloom’s taxonomy. It’s important for me to provide the foundational information, the understanding, the knowledge part that they need to help them. It’s [higher level thinking] inherent in using technology.

**Communication with Teachers**

Each student has an email account so classroom teachers can communicate with students via email to remind them about assignments, school events, or to clarify questions. Ms. Warren said she sends email updates once or twice a week to students about homework and other classroom happenings. Emails give students a direct line to their teacher in a nonthreatening environment. Ms. Warren said:

I feel like the kids feel valued. They feel like, ‘I can ask my teacher anything’ and she’ll respond. It’s on a variety of different levels. Sometimes it’s ‘what’s due tomorrow?’ or ‘I don’t understand this’ or ‘can you help me think about ideas?’ I use it probably a great deal and before, [students had laptops] not so much. I always had kids who emailed me but it was much more sporadic and now it is [a] much more consistent basis. I probably get six or seven student emails over the weekend.

Along with communicating via email, teachers can communicate with students through an instant messaging program during class. The researcher observed a teacher using a program called LanSchool. Through LanSchool, teachers have access to view and monitor all their students’ computer screens during class. This allows the students to ask teachers questions and also allows teachers to see if students are struggling through an assignment. Ms. Warren said:

You can have direct conversations with students without ever having a verbal conversation. If I see a student who was struggling I might send a message, ‘what can I help you with?’ It might be students who never ask any questions that would be too shy or embarrassed to ask.

Since the students are immersed in technology use in all of their classes, they are exposed to many types of software and programs. Ms. Jackson admitted that the students
know more about and better know how to use the software than the teachers do. Ms. Jones disclosed that she relied heavily on the students when she does not know the answer to a technology question or problem; students often know the answers and are eager and willing to share with their classmates a solution. The researcher observed that this facilitated learning environment made teachers more approachable to students and made for a shared classroom environment. Ms. Jackson shared:

I don’t pretend that I know it all. I say, ‘hey, teach me’ or ‘show me how to do that.’ ‘Can you show me? Oh, that’s so cool.’ So it’s really a give and take learning environment. It’s less teacher directed and more student. It’s more teacher facilitated. .. Some of them [students] just have more experience with the actual software and how to use it. I let them go with it. They say can ‘hey can I do this?’ I say, ‘sure, go for it.’ I rarely say no to anything.

This research study generated findings pertaining to the impact of laptop computers on student learning behaviors through teachers’ perceptions. The data indicated that students had noticeable classroom learning behavior changes through the daily use of laptop computers. Students were more engaged in their work, finishing their work to a higher degree of completion and depth, and have improved communication with their teacher. Through analysis of the data, the researcher proposed that the changes in student behavior occurred because of 1) student choices and options within assignments, 2) access to materials, and 3) the laptop computer serving as assistive technology.

**Student Choice and Options within Assignments**

The access to a laptop computer provided more options and opportunities for students to produce assignments for their teachers. Ms. Warren said her students have choices in what they do, but they do not have the choice not to do assignments. Ms. Jones
gave general guidelines in her assignments but ultimately allowed students to pick the medium in which to display their work and thinking. The students were able to take the information they learned and use it in ways that best showed their understanding. She elaborated by saying, “Giving something [assignments] some structure so kids have an idea what to do but then really letting them play with their strengths.” Ms. Jackson indicated that, “It’s a lot more organized chaos, a lot more learning, a lot more opportunities for every student to shine and pick their interest when they have choice.”

Allowing students to choose how they represent what they learned makes their learning personal. When learning is personal to students, they are able to reflect deeply on their efforts and assess their own work and progress. Reflection is fundamental in developing skills and dispositions to continue their learning after a class ends (Richardson, 2012). Teachers who have access to digital tools are able to spend more time each day on personalized learning and collaborative small-group instruction rather than traditional lectures (Demski, 2012). Choice creates motivation and gives students power, resulting in students taking ownership of their learning. When students are engaged in meaningful work, it encourages them to take charge of their own learning (Muir, Manchester, & Moulton, 2005).

**Access to Materials**

Access to technology offers a vast array of resources, interest areas, and information that can come to a classroom. The classroom is not a closed system anymore because the Internet literally brings the world to a student’s fingertips. Ms. Elliott explained that she did not have to limit her projects based on the resources or books she had in her classroom because students had access to unlimited information, research, and
materials all over the Internet. Some of her recent projects could not have been completed without the use of technology because the research and pictures the students needed were too contemporary. The reports that the students needed were so current that the reports were only published online.

Ms. Leonard used the United Nations website that has a live feed of population data where students could physically see the counter moving. She said:

It allows for a greater number of experiences (especially if we are looking at generating data) that was impossible in the past. For example, in the advanced class we are working on exponential growth and decay. That class was able to work through a situation where they assessed a United Nations population data and actually saw the counter moving. They were just fascinated by that. It really adds relevance more than anything else.

Ms. Leonard spent multiple hours outside of class when she created lesson plans to find relevant resources for her students. She explained:

Everything in every class is different from the day before or the week before because of finding the resources and incorporating them, changing how I present something in order to make more logical progression given what they can discover with the technology.

Not only do students have access to the latest research and information, but they have access to software that can allow them to see and manipulate complex mathematical concepts. Ms. Leonard explained,

The lesson today which was the area of the trapezoid was like pulling teeth with paper and pencil version because they [students] had to construct a trapezoid … which did not go well on the best day. Then they had to clone the trapezoid, manipulate it, and by the time all of that, they had to keep track of base one, base two, and height…kind of a nightmare. This [software] allowed so many more students to see and make that connection. They can flip it 100 times if they need to on the screen and change the trapezoid. To do that before they had to physically create the objects and that was very, very demanding on them.
Along with software to understand mathematical concepts, students have access to teacher-made materials and supplemental curriculum resources. During an observation the researcher saw that students have the option to access their textbooks online with a variety of study materials, quizzes, flashcards, and other resources. The teachers also put their self-made materials, assignment guidelines, and class materials on their websites for students to access at home. The teachers indicated that students who are absent or may need more time and/or help have the option to access materials with their laptop from home.

Students are completing their work with higher efficiency and competency because they have access to a variety of materials. Teachers indicated that students are no longer constrained to the print resources or human resources in a classroom because the Internet offered more resources than one can fathom. In fact, Demski (2012) found that the number one predictor for success in schools in a number of areas was the availability of fully digital-driven remedial courses that had online curriculum behind them. Students are not limited to the software that is installed on their laptop computers either. There are thousands of free software and programs available to download, present, publish, broadcast, and create multimedia posters and pages. The researcher saw students using a variety of programs.

**Laptop Serving as Assistive Technology**

The laptop computer serves as a learning tool that can be tailored to individual student needs. Ms. Elliott explained that the laptop offers multiple ways of visual representation for students that need more explanation or clarification of directions. The researcher saw students use their headphones and laptop computer to get text read aloud
to them. The read-aloud feature is helpful for students who struggle with focusing or paying attention. Ms. Elliott said:

I also think that it’s important for kids that struggle with attention because if they have the words right in front of them and the headphones on, I think it helped them focus so that somebody else’s pencil sharpening or whatever does not distract them from what their assignment is.

Ms. Elliott also explained how students can navigate through reading grade-level content in order to complete assignments even if they cannot read and comprehend well:

I know that’s [reading] a big challenge for them. In order for them to get through the assignment today, I knew they needed somebody to read it to them. They often do not want a teacher reading it to them. They want to do that part independently… the students have a choice to select the text that they want read to them…they can put headphones in and the text reads it. Often time that helps them get through their assignments at the pace of the rest of the class because they are not stumbling over words. It also does not necessarily interfere with their comprehension.

The laptop is a significant tool specifically for students with disabilities because of the read-aloud feature and visual presenting. For example, Ms. Jackson said:

I change things up, every 10 minutes things are different for them. As you noticed today, our schedule we did three separate things. Physically do different things. We’re moving. Software allows me to cater to all three styles of learning: auditory, visual, kinesthetic. You saw today everyone using all three. With the scaffolded opportunities, my special education students have leveled the playing ground. You told me you couldn’t pick them out. That’s awesome. That’s amazing. I’m really happy about that. It’s the great equalizer. Technology can be a great equalizer.

The laptop computers also allow students to cater to their own personal learning style and techniques. During the observations, most of the teachers allowed the students to listen to music through their headphones while they’re working in class to help them focus. During an interview, Ms. Elliott explained that she encouraged students to use Google Calendar or another type of electronic calendar to keep them organized. The computer can be used as a tool for students with poor organizational skills because papers
are not getting lost in the constant shuffle between classes and to and from school because documents can be saved electronically.
Chapter Five

Discussion

This small study supports the idea of the use of laptop computers in classrooms. The benefits that laptop computers bring to students’ learning behaviors are immeasurable. The choices students have combined with the access to materials provide a learning environment that gives students infinite opportunities for success. The opportunities and experiences that students have in a technology-rich classroom are preparing them for post-secondary education and the current competitive job market.

Access to laptop computers equip students with the 21st century skills that are necessary to survive in the real world. Ms. Jackson says,

[They need] 21st century skills. They’re going to be working on computers, using software programs [in the workforce]. Their supervisors will say, “hey can you create this for me?” but then they don’t tell you what software program to use or how to use it. You got to do a lot of problem solving and figuring things out for yourself.

Laptop computers bring the classroom alive to students. The academic freedom and expanded classroom that students have with their laptop computers creates unlimited opportunities for students to grow. It is every teacher’s dream for their students to blossom into independent, critical thinkers and hard workers. Classroom observations revealed that the access to laptop computers puts students in positions in which they have to think deeply and take ownership in their learning. Ms. Jackson summed it up perfectly when she said, “The sky is the limit. Students are able to do what they can do and then discover, push themselves, [and] challenge themselves.”

A one-to-one laptop program transforms the way a classroom operates. The use of laptop computers dramatically changes both the role of the teacher and the role of the
learner. A teacher is no longer the sage on a stage but a facilitator of learning. The teacher is a guide as the student navigates through a subject. The role of a passive student who listens to a lecture and recites facts back to the teacher is extinct. With the use of technology, students are involved in a process of discovery and exploratory learning. A laptop computer in the classroom exists as a cognitive tool to foster creativity, innovation, and assist in the development of a self-sufficient student.

It is not enough to simply equip each student with a laptop computer and expect a miraculous fix to the problems in classrooms. Teachers need to be educated on the benefits of incorporating laptop computers into their classrooms and then trained on how to integrate the computers effectively. Educators need to challenge their mental models of what a classroom should look like and have an open mind about what it could look like if each student had direct access to a laptop computer. Universities need to consider rethinking how they train their teachers, so that new teachers come into classrooms with a fresh and innovated perspective on the role of a teacher in the 21st century.

Limitations

This research provided insight on the impact of laptop computers on student learning behaviors; however, there were limitations to the study. The sample of teachers was a small group of computer-literate teachers from one, small school district. Teachers who do not have technology skills may find the integration of laptop computers a challenge. Another limitation pertains to the demographics of the school because the students are middle class white students. Therefore, the results generated from this study cannot be used to generalize all teachers’ perceptions on the impact of laptop computers on student learning behaviors.


**Recommendations for Further Research**

The results of this research study could lead into a variety of directions. It would be interesting to interview students and get their perceptions and thoughts on how their engagement, degree of learning, and communication with their teachers have changed. A larger study could also be conducted that compares the impact of laptop computers on student learning behaviors across specific content areas. Elementary schools could also be examined which would broaden the study about learning behaviors while students are being introduced and taught how to use laptop computers.

Laptop computers in classrooms have the potential to change the way teachers teach and the way students learn. A laptop computer is a versatile learning tool that serves as a source of limitless new knowledge and puts education directly in the hands of students. The preliminary findings of this study produce exciting results that could lead to increases in student learning and achievement.
Appendix A

Interview Questions

1. Can you recall a time when and how you made the connection between when you decided to use software to teach this lesson?

2. What were some of the challenges you faced when you worked through integrating technology into this lesson?

3. In what way is the use of software different from traditional ways to present concepts and lessons to students?

4. Have you noticed any changes in student behavior or learning on the lesson when you integrate technology?

5. If you were going to use Bloom's taxonomy (recall, application, comprehension, analysis, synthesis, evaluation) would you describe the shifts in student learning using that language when you integrate technology?

6. How would you have taught this same lesson 4 years ago pretechnology?

7. If you were looking down at your evolution of moving this lesson from a more traditional way of presenting to using software as part of your pedagogy, what would you see?

8. How would you describe your own shift in using technology pedagogy in your lesson design?

9. Are you the same, worse, or better teacher when using technology to teach?

10. Has your preparation time changed for lessons as you use more technology?

11. Would you be able to do the same lesson without technology?

12. In what ways is the use of software different from the traditional ways you used to
present content and lessons to students?

13. Is anything else that you want to tell me that I didn't ask you?
References


