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# A qualitative study of the perceptions of first year college students regarding technology and college readiness.

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**A qualitative study of perceptions of first-year college students regarding technology  
and college readiness**

by

**Trenton A. Grundmeyer**

A dissertation submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Education

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2012

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## ABSTRACT

College ready students have the skills and knowledge to be successful in college without remedial classwork. High schools strive to graduate students who meet this standard. However, recent college readiness indicators routinely contend that high schools are not meeting college readiness standards. Some high schools have adopted a 1:1 laptop initiative in an effort to promote college readiness.

Early computers were seldom used in education because of their impracticality. Since the cost, size, and functionality of computers and evolved in the last 50 years, computers have found a place in education along with mainstream adoption. Laptops are now used by teachers and students alike to conduct research, network with others, communicate, and demonstrate learning.

The study, based in the constructivist paradigm, used a phenomenological strategy to explain first-year college students' perceptions of the effects of a 1:1 laptop experience on their readiness for college and the uses of technology for instructional purposes by high school teachers and college professors. The study employed participants who had experienced a 1:1 laptop initiative while in high school for two or more years. Participant experiences and feedback were analyzed to answer the posed research questions presented in the study.

Methodology utilized in the study included interviews with fifteen participants from two different countries and five different high schools. Field notes were also collected during each interview. Data collected from each interview and the researcher's field notes were compared to identify themes. The themes synthesized from the research results helped to answer the studies research questions.

This study found first-year college students believed they were more college ready after experiencing a 1:1 laptop initiative in high school. The use of the school issued laptop computer for taking online classes was reported as a major benefit toward improved college readiness. The participants in this study also believed that their high school teachers implemented technology more routinely and effectively than their current college professors. Participants reported their high school teachers worked hard to integrate laptops into classroom lessons. Furthermore, they reported that professor's use of technology was inconsistent and often lacked integration in the classroom even though students were expected to utilize technology outside the classroom.

There are implications in the research findings for students, parents, teachers, school leaders, professors, and policymakers. The implications identified for each stakeholder group promote a more effective and productive 1:1 laptop adoption. The implications in this study for the various stakeholder groups could result in a more effective and smooth 1:1 laptop adoption and consequently enhanced college readiness skills for high school graduates.

Recommendations based on the findings of this study include utilizing the laptop computer to teach social etiquette and for schools to adopt a 1:1 laptop initiative as a thoughtful and well-planned initiative. These recommendations would maximize the 1:1 laptop initiative potential on college readiness. Schools need more information as they adopt 1:1 laptop initiatives to ensure the program effectively promotes college readiness for students. Furthermore, high school teachers and college professors alike need the skills and training to maximize technology integration.



## ACKNOWLEDGEMENTS

I am a life-long learner that strives to learn what I can to be the best person and leader I can be. I wanted to get my doctorate degree for various reasons. One reason I wanted the degree is to prove that a person with average intelligence can get the degree through hard work, perseverance, and the help of others. I also wanted to get the degree to continuing learning. I wanted to learn about the process of writing a dissertation as well as my dissertation topic. I also wanted to earn my doctorate because I believe it will open doors in my professional life. My goal is to someday be a college president who will be able to reflect on this process and share my passion to be a life-long learner with others. Lastly, I vowed I would not attend a high school reunion until I had Dr. in front of my name. I'm looking forward to attending my fifteen-year high school class reunion and glad I didn't have to wait to attend the 20-year!

I am not a procrastinator at all in my life. However, the time consuming process of writing a dissertation was one that wore on my approach to get things done. Staying motivated to write and following APA formatting was a chore throughout the writing and revision process. I have many people to thank. First of all, I want to thank my wife. I must thank her for her patience and understanding throughout the process of both taking classes and writing the dissertation. My wife is my biggest critic but also my biggest fan. I thank her for her brutally honest feedback even though there are times I do not enjoy hearing it. I love her and thank her for allowing me to follow my dreams, goals, and passions. I am excited about the opportunities, responsibilities, and privileges that the hard work and dedication to our professional lives will provide my wife and I the rest of our lives. Though my daughters are young, I also appreciate their understanding in

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## CHAPTER 1. INTRODUCTION

Educators, along with parents and businesses, are searching for effective ways to increase students' college readiness and 21st century skills and retain college students through graduation. Schools today are given the task of not only educating students with the three Rs of Reading, wRiting, and aRithmetic but also are expected to help students develop strong backgrounds in science, technology, global studies, and a diversity of so-called *21st century skills* such as critical thinking, collaboration, agility, initiative, oral and written communication skills, ability to analyze information, and imagination (Wagner, 2008). Attention has turned to the use of technology to help achieve these goals. Despite current budget challenges, 65 percent of school districts plan to increase technology investments in the classroom over the next two years (CDW Government, 2011).

Many high school graduates seem to be underprepared for the rigors of college. The percentage of high school graduates meeting the college readiness benchmarks set by the American College Testing Service is dismal. In 2010, only 66% met the benchmark for English; 52% met the reading benchmark; 43% met the mathematics benchmark, and 29% met the science benchmark (ACT, 2010). The lack of college readiness seems to lead to remedial course demands for students in college. The National Center for Education reported that more than one-third of college students require remedial coursework, and the majority of students who begin in remedial courses never complete their college degrees (Gerald & Hussar, 2010). Further, fewer than half of the students in high education institutions receive a certificate, associate, or bachelor's degree in six years (Gerald & Hussar, 2010).

As college graduation rates drop, the number of occupations requiring postsecondary education has increased from 28% in 1973 to 59% in 2008 (Gerald & Hussar, 2010). The number of occupations requiring postsecondary education is projected to increase to 63% within the next decade (Ramey, 2010). To meet these job market demands, the nation will need an additional 22 million workers with postsecondary degrees; yet projections indicate the nation will fall short of this goal by 3 million degrees (Carnevale, Smith, & Strohl, 2011). Technology infused into the process of PreK-12 education could improve college readiness and better prepare a future workforce, thus overturning current, dire predictions.

In the early years, the primary users of computers were businesses (Hermes, 2009). Computers didn't make their first appearance in schools until the 1950s. Early use of computers in education was primarily found in mathematics, science, and engineering as a mathematical problem-solving tool (Schifter, 2008). During the 1970s, the personal computer revolution began and computers became more affordable. The computer was then no longer a luxury but became a necessity for many schools and universities (Schifter, 2008).

Over time, computer use expanded to all content areas in education. Evidence of this can be found in CDW-Government's recent *21st Century Classroom Report* (2011). The percentage of Information Technology (IT) professionals who rate their district's technology as cutting edge or current grew from 41% in 2010 to 64% in 2011 (CDW Government, 2011). Although 94% of students say that technology skills will improve their educational and career opportunities, just 39% of students say their high school is meeting their technology expectation (CDW Government, 2011). Seventy-five percent of

high school teachers report regular use of technology, but only 45% of high school teachers report that their classroom technology meets their expectations (CDW Government, 2011).

There is no doubt that the tools and expectations for technology have increased and are continuing to shape PreK-12 public school education. In his best selling book, *The World Is Flat*, Thomas Friedman (2005) described the advances of technology and proclaimed, “There is no turning back” (p. 273).

There also has been rapid growth and change in higher education delivery because of technology. In the United States, survey data indicate an increasing number of postsecondary leaders saying that offering online courses is critical to their institution’s long-term strategy. These same leaders believe that the learning outcomes for online education are now equal to or superior to those for face-to face instruction (Allen, Seaman, & Garret, 2007).

Recently, Arne Duncan, U.S. Secretary of Education, released the 2010 National Education Technology Plan with praise for the potential of technology and a call to arms: “As research gives us new insights into how today’s students learn, and technology enables us to respond as never before, [educators] can help lead the way in providing a model for 21st century learning” (Duncan, 2010).

Innovative educators are beginning to embrace 1:1 computing initiatives (i.e., every individual has a computer, typically a laptop) as a catalyst for improving current statistics on college readiness, retention, and graduation rates. A synthesis of the research on 1:1 computing initiatives indicates that individual initiatives generally focus on one of four goals: (a) improving *academic achievement* with the use of technology, (b)

increasing *equity of access* to digital resources and reducing the digital divide, (c) increasing *economic competitiveness* by preparing students more effectively for today's technology-saturated workplaces, and (d) seeking to *effect a transformation in the quality of instruction* by making it more student-centered or differentiated, problem- or project-based, and demanding of higher-order thinking skills (Apple Computer, Inc., 2005, p. 3).

Although *college readiness* may be implied in the goals above, it is not explicitly stated as a goal of recent research studies on 1:1 computing initiatives. Given the increasing prevalence of 1:1 laptop programs and the need to discover ways to increase students' college readiness, one might expect to find research studies that focus on the relationship of the two factors. However, a review of the literature did not uncover direct research studies on the impact of 1:1 computing initiatives on the college readiness of first-year college students.

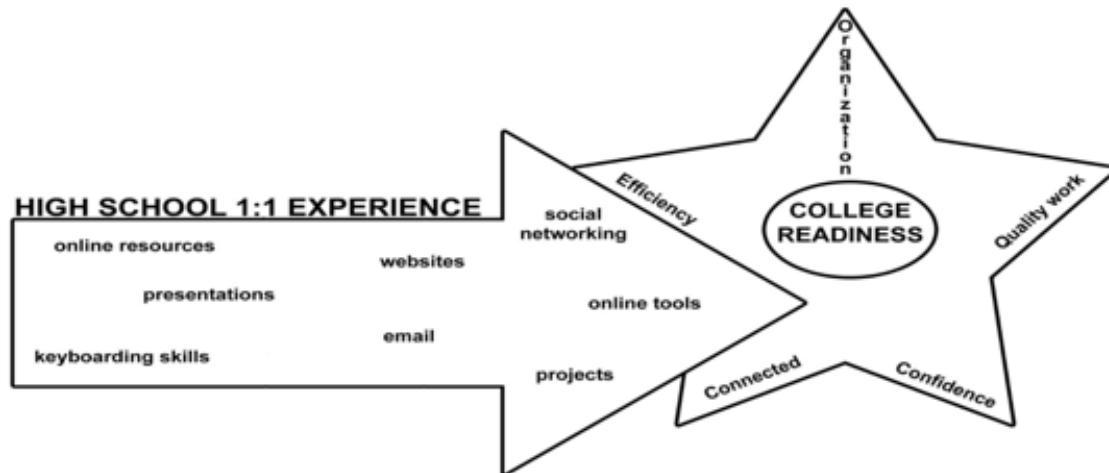
Figure 1 below illustrates how having and using a laptop computer while in high school might promote college readiness. The researcher developed this mental model as a framework for thinking about how 1:1 laptop initiatives might facilitate students' college readiness.

Listed inside the arrow are specific computer-related tasks that students exposed to a 1:1 laptop initiative would be more likely to perform on a routine basis during high school. The mental model of the researcher presumed that it is less likely that students who are not exposed to a laptop initiative would perform these tasks. The researcher presumed that inside the star are traits possessed by students who are more ready for college. The researcher believed that first-year college students who had years of experience with a 1:1 laptop initiative while in high school are more likely to possess

these traits than first-year college students who did not have a 1:1 laptop experience while in high school. For example, a student who is routinely asked to create computer-generated presentations during high school (because of having access to a laptop computer) should be more efficient when developing presentations in college.

As part of this study, the researcher asked first-year college students who had a 1:1 laptop experience in high school about the perceived impact of their laptop experiences on their readiness for college. The participants also were asked to compare their responses to the traits depicted in Figure 1 to determine if there was a relationship between 1:1 laptop initiatives and college readiness themes as hypothesized by the researcher.

**Figure 1. Potential Effects of a High School 1:1 Experience on College Readiness**



### Statement of Problem

Public schools are spending increasing amounts of money on technology initiatives despite shrinking funding and little evidence that such approaches increase students' readiness for college or work. Although there is a growing body of research that

address the impacts of 1:1 laptop initiatives on students while they are in high school, few studies examine whether these initiatives support *college readiness*. In addition, few studies have compared the instructional uses of technology by high school teachers and college professors.

### **Purpose of the Study**

The primary purpose of this qualitative study was to understand first-year college students' perceptions of their high school 1:1 laptop experience as it related to their perceived readiness for college. A second purpose was to understand first-year college students' perceptions of the uses of technology for instructional purposes by high school teachers and college professors. Specifically, the study examined the perceptions of first-year college students who had experienced 1:1 laptop initiatives for a minimum of two years in high school. Study results may shed light on these topics and provide budgetary guidance to schools regarding the best use of their limited resources.

### **Research Questions**

Three research questions guided this study:

1. What are first-year college students' perceptions of the relationship between their high school 1:1 laptop experiences and their readiness for college?
2. What are first-year college students' perceptions of the uses of technology for instructional purposes by high school teachers?
3. What are first-year college students' perceptions of the uses of technology for instructional purposes by college professors?



### **Assumptions of the Study**

This study made multiple assumptions about the 1:1 laptop experiences of high school students. Although every high school provides a unique 1:1 laptop experience, this study assumed that all students with a 1:1 laptop experience had opportunities to utilize similar technology-based resources and develop skills that meet the goals set by the International Society of Technology in Education Standards (2011; see Appendix A).

While this study assumed that students who used a laptop while in high school possess more technology skills and are more adept at utilizing online resources, it did not actually assess this. This study also did not take into account whether the skills were taught by high school teachers or learned outside of high school classes. For purposes of this study, how students learned their technology skills was of little interest because the goal of the study was to assess the college readiness of students exposed to a 1:1 laptop initiative for multiple years in high school, not to evaluate or compare the various 1:1 initiatives to which students were exposed.

This study asked participants about their perceptions of the use of technology by their professors and by high school teachers. The study assumed that, in responding to this question, participants would make comparisons of the instructional use of technology by their past high school teachers and current college professors. This may not be a fair comparison since participants only experienced how their professors used technology for instructional purposes for less than a full academic year. Participants in the study were first-year college students who were interviewed for this study in January and February 2012. With more experiences in various college classes with different professors, their

perception of technology use by professors might change, and new understandings might be created.

### **Summary**

Educators are continuously searching for ways to increase high school graduates' college readiness. Increasing attention is being given to 1:1 computer initiatives as a vehicle for improving college readiness and improving teaching and learning.

In this chapter a rationale for conducting this research study was presented. The evolution of computers in PreK-16 education was introduced and a graphic representation of the researcher's mental model was presented. Three research questions that guided this study were listed. Assumptions of the study also were presented. In Chapter 2, relevant literature is reviewed. Chapter 3 includes a detailed discussion of the research design and methodology utilized to carry out the study. Chapter 4 discusses the research results from the study. Chapter 5 outlines a discussion, presents recommendations for future research, and describes implications for various stakeholder groups.

## CHAPTER 2. LITERATURE REVIEW

This chapter begins with an overview of some literature pertaining to the evolution and future of computers, technology use in education, 1:1 computing, Gartner's Hype Cycle, and challenges for computer use in education. The next section discusses relevant literature related to college readiness. Finally, the chapter hones in on some theoretical underpinnings of this study.

### The Evolution of Computers

The first substantial computer ever created was a giant Electrical Numerical Integrator and Calculator (ENIAC) machine invented by John W. Mauchly and J. Presper Eckert at the University of Pennsylvania. Storage of this large machine required over 167 square meters or 1,800 square feet of floor space. (Wolfe, 2003)

In the 1950s, the invention of the transistor revolutionized the computer field by replacing vacuum tubes previously used in computers, radios, and other electronics (Wolfe, 2003). The mainframe computer came about after the development of the transistor in the late 1950s.

In the 1960s large mainframe computers became much more common in large industries as well as in the U.S. military and space programs (Wolfe, 2003). These machines were difficult to use and were large, expensive, and prone to errors. Schools did not even consider purchasing these types of computers because they were so expensive and large to store.

Around the time of the Cold War, U.S. legislators began to realize the need for technological advancement. This led to increased federal funding for American public schools. In 1965, mainframes and minicomputers were placed in some schools but mostly

for administrative purposes (Hermes, 2008). However, during the 1960s, school vocational programs began teaching computer maintenance and soon computers were used for computer-assisted instruction (CAI). With CAI, the computer instructed students on basic skill development (Murdock, 2004).

In the 1970s, an explosion of personal computers began with Steve Jobs' and Steve Wozniak's exhibition of the first Apple II at the First West Coast Computer Fair in San Francisco. The Apple II computer had built-in BASIC programming language, color graphics, and a 4100-character memory. Programs and data could be stored on a commonplace audiocassette recorder. Before the end of the fair, Wozniak and Jobs had secured 300 orders for the Apple II and from there Apple sales soared. (Wolfe, 2003)

In 1977, the TRS-80, a home computer manufactured by Tandy Radio Shack, was introduced. This TRS-80 Model II was designed with a 64,000 character memory as well as a disk drive for storing data. At this time, only Apple and TRS had machines with disk drives. The arrival of the disk drive and its capacity to distribute software catapulted sales of personal computers. (Wolfe, 2003)

IBM, which up to this time had been producing mainframes and minicomputers for medium to large-sized businesses, decided to invade the PC market and begin working on the Acorn, which would later be called the IBM PC. When it was introduced, the PC came with a 16,000-character memory, keyboard from an IBM electric typewriter and a connection for a tape cassette player. The PC was the first computer designed for the home market. Most of the components, surprisingly, came from outside IBM because building the PC with IBM parts would have made costs prohibitive for the home computer market. (Wolfe, 2003)

In 1984, Apple and IBM companies both launched new computer models. Apple released the first generation Macintosh, which was the first computer equipped with a graphical user interface (GUI) and a mouse (Wolfe, 2003). The GUI made the machine much easier to use, which was appealing to home computer users. Sales of the Macintosh soared, but IBM refused to be left behind and released the 286-AT which, with applications like Lotus 1-2-3 and Microsoft Word, quickly became the favorite of business and industry (Wolfe, 2003).

The evolution of the computer over the last 50 years has been rapid and life changing (Schifter, 2008). During that time, continuous advancement of computer hardware and software has resulted in ubiquitous use of computers that are smaller, less expensive, and easier to use than ever before (Schifter, 2008). Today there is an almost seamless integration between Mac and PC computers, smart phones, and networks that allow them to function in multiple, interconnected ways.

Computer users also have changed dramatically over the years. Whereas in the early days mainly computer geniuses (e.g., Seymour Cray, Bill Gates, Bill Joy, Steve Jobs, and Steve Wozniak) used computers, today people from all lifestyles use them (Hermes, 2009).

### **Technology Use in Education**

Despite the widespread use of computers, for a long time businesses were the primary users of computers (Hermes, 2009). Over time, computer use spread to higher education, PreK-education, and the homes of all types of people.

### **Technology Use in Higher Education**

Beginning in the 1950s, higher education began using computers. Various research articles and historical documents suggest initial uses for computers in higher education primarily were for functional purposes such as payroll, accounting, and electronic storage of student records. Colleges and universities across the United States slowly started adopting computers as the price of machines decreased. It wasn't until 1967 that many colleges started teaching computer programming (Murdock, 2004).

University professors sometimes have been slower to adopt computers in their educational practice, often seeing them as more of a distraction than learning tool. However, since the birth of the Internet in 1995, computers have been seen as a valuable research tool in higher education. Many colleges across the country now provide students with computers. The demands from students have increased as the availability of computers has expanded in higher education.

Libraries at higher education institutions also have changed. Libraries used to be places where one could find books on the shelves. Today, most college libraries provide students with computers, books, magazines, online databases, research journals, and search engines to enable students to conduct efficient and meaningful research.

### **Technology Use in PreK-12 Education**

Since the late 1970s, there has been a rapid growth in the use of computers throughout PreK-12 education (Hermes, 2009). When computers were first introduced into schools, they were used largely for secretarial tasks and administrative purposes (Schifter, 2008). During this time, computers increased administrative efficiency in many areas including processing and printing student schedules, monitoring library usage,

storing student and faculty records, taking inventory, and doing accounting tasks. Schools were able to produce and maintain financial accounts and student reports. Computers helped improve organizational accuracy and efficiency. Computers enabled teachers to calculate student grades, which saved teacher's time and energy from previous methods of scoring, and grading. In addition, teachers could create and store individualized student records with details about students' needs, academic progress, and social development.

In the 1980s, educators began using computers for instructional purposes, including preparing lesson plans, work sheets, tests, and reports. Thus, computers enhanced teachers' productivity, accuracy, and ability to analyze data in order to improve teaching and learning in the classroom (Murdock, 2004).

In time, educators expanded their use of computers and are now utilizing them for a variety of purposes. Many educators utilize computers on a daily basis to blog, engage in online learning networks, Skype with other classes, use online textbooks, and utilize Web 2.0 tools. The use of computers in education has dramatically increased and is only limited by time for training and hardware that varies among schools.

Research and survey data indicates that computer usage in PK-16 schools has grown significantly. The percentage of American schools with at least one computer rose from 18% in 1981 to 95% in 1987 (Hermes, 2009). In 1983, 40% of elementary schools and 75% of secondary schools used computers for instruction (Murdock, 2004). By 1985, one million schools had computers (Murdock, 2004). In 1995, there were 5.8 million computers in U.S. schools (Schifter, 2008). In 2003, all (100%) of American schools had access to the Internet (Schifter, 2008). Today, almost every teacher in the nation has a

computer in his or her classroom (Hermes, 2009). Curriculum content ensures students have computer experience in many subjects and in many formats, ranging from games that teach multiplication tables to Internet-based research projects (Murdock, 2004).

### **Factors That Influence Computer Use in Education**

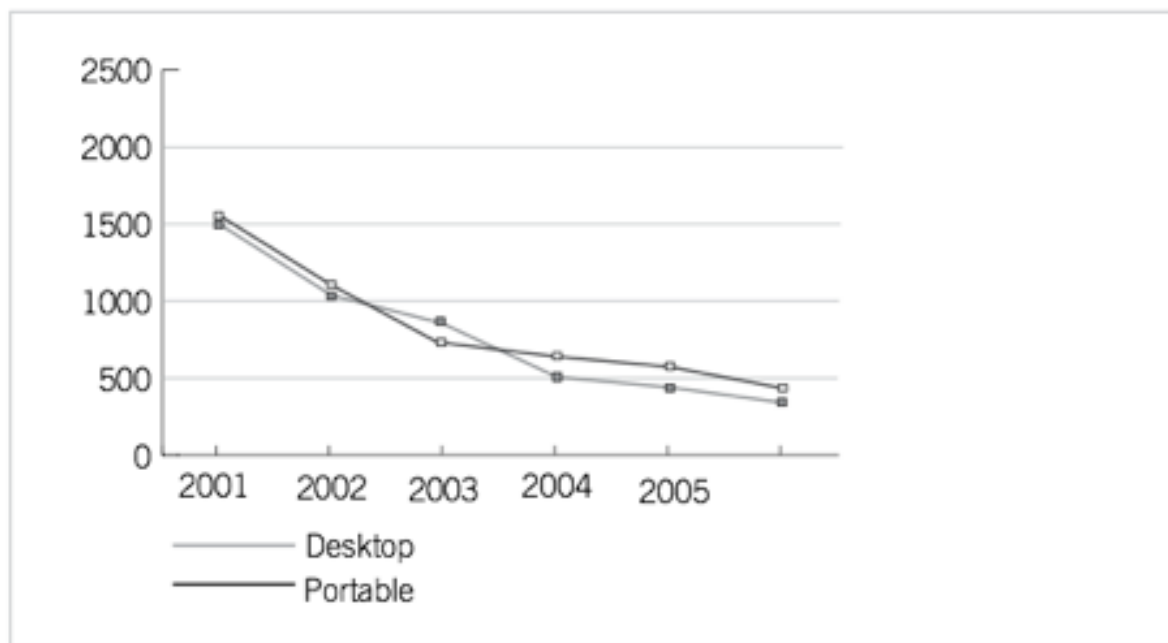
Factors that influence the increased use of computers include costs, professional development, educators' attitudes, and software advancements, among other factors unique to education.

#### **Costs**

Technology has become more affordable and accessible in education since the 1960s. Figure 2 shows that the cost of computers has decreased while the availability of the machines have increased. Due to the drop in computer prices over the last decade, schools have been able to afford to increase computer hardware in schools. Computers have become necessary investments. The ongoing challenge for schools is to keep computer software up-to-date. Many schools also have a computer rotation cycle that allows computers to be updated or replaced so that they continue to be efficient and dependable for teachers and students.



**Figure 2. Computer Prices Over Time**



*Figure 2.* Adapted from Avalon PC Price History (2007).

### **Educators' Attitudes**

Many educators believe that computers and other technologies are distracting toys rather than useful teaching tools. The attitudes of educators have been a limiting factor in the rate and speed of computer adoption in schools. This includes not only classroom teachers attitudes but also those of school administrators, who often focus more on the potential risks than benefits.

Teachers usually prefer to be comfortable with the tools and instructional approaches that they use. The quickly changing world of technology makes it difficult for faculty and higher education institutions to be “the experts” (Educause, 2011). A collaborative approach to learning about mobile technologies might be an approach that could benefit both teachers and students. Nonetheless, one of the key factors that put

schools behind businesses in adopting technology is the attitude and understanding of teachers regarding how new innovations can be educationally integrated.

### **Professional Development**

Since the 1960s, computer usage in American schools has grown tremendously. Yet, as recently as the 1980s, few teachers knew how or were willing to use computers (Hermes, 2009). That situation began to change in 1983 when the National Commission on Excellence in Education recommended computer science as a requirement for high school graduation (Hermes, 2009). Computer labs in secondary schools were the primary hosts to teach computer literacy. Most teachers did not know how to use computers, and students didn't use them outside the lab (Schifter, 2008).

With the introduction of the Apple II in 1977 came computer-based tutorials and learning games. Software was developed that quizzed elementary students on facts or required them to perform simple mathematic drills (Hermes, 2009). With this advancement, increasing numbers of teachers became interested in using computers. Thus, professional development on technology became more prevalent. Most teacher preparation programs now require future teachers to take classes on computer literacy and/or technology. Some schools now engage candidates in technology assessments before interviewing potential teachers.

### **Software Advancements**

During the 1980s, little educational software was available and few teachers had access to computers or knowledge of how to operate them (Hermes, 2009). As computer technology became more prominent in the business world, it was apparent that students needed to become computer literate, which meant learning computing languages such as

LOGO and BASIC (Hermes, 2009). Although LOGO programming language had been developed for educational use in 1967 by Feurzeig and Papert, its use was not widespread until the 1980s when Apple, Inc. developed Apple LOGO for its Apple II computer and promoted the software to primary teachers by emphasizing LOGO's usefulness in teaching computer fundamentals to novice programmers.

In 1984, the Apple Works suite became available and featured word processing, spreadsheet, database, and paint and drawing applications (Hermes, 2009). Students could use this new software for a variety of subjects; e.g., typing essays, organizing data, and/or illustrating their work (Murdock, 2004).

In the early 1990s, laserdiscs emerged and textbook companies often paired textbook material with laserdiscs featuring video clips, images, or diagrams (Murdock, 2004). Secondary schools that offered typing classes mostly transitioned from typewriters to computer keyboards at this time. Further, in 1995, schools started widely using the Internet and, the following year, new graphics and multimedia tools were developed for delivering information and instruction via the Internet (Schifter, 2008).

The integration of computers into schools has resulted in inevitable changes in curriculum and instruction (Schifter, 2008). Today, computer software programs are designed specifically for educational instruction. For example, instructional games, tutorials, drills, and simulations are routinely used to assess student abilities and improve academic achievement in today's classrooms. Most educators would agree that these advances, made possible by the computer, have created a more efficient and productive school environment.

### **Benefits of Computer Use in Education**

Schools today are given the task of not only educating students with the three Rs of Reading, wRiting, and aRithmetic but also are expected to give students strong backgrounds in science, technology, global studies, and a diversity of so-called “21st century skills” such as critical thinking, collaboration, agility, initiative, oral and written communication, analyzing information, and imagination (Wagner, 2008). Recognizing that we now live in a digital rather than analog world, many schools are implementing one-to-one computing initiatives to help accomplish these academic goals and many others are considering making the transition (McLeod & Sauers, 2010). Schools use a variety of tools, particularly effective instruction and technology, to engage students and increase student achievement (Schifter, 2008).

Today’s school-aged children have grown up with technology. Students today expect to have technology available. On average, 13- to 18-year-olds spend more than six hours per day using digital media (Metiri Group, 2006). However, schools typically have not capitalized on the tools and technologies that often engage students. Further, although outside of school students instant message, download and listen to music, compose and send emails, watch television, exchange text messages and digital images via cell phone, browse the web, and play interactive games, such facility with technology should not be mistaken for expertise or literacy with technology (Metiri Group, 2006). Most students are in direct need of conventions that will enable them to use technologies to prepare them for college and work (Metiri Group, 2006). In other words, most students need access to and skill in using technologies to develop and utilize 21st century skills such as critical thinking, creativity, social adeptness, and complex communication skills

as well as proficiency in the areas of finances, technology, health, civic, and employability skills (Iowa Department of Education, 2011).

Results of research studies indicate that teachers understand in general that technology engages students and improves learning. For example, in a landmark study of 40,000 teachers conducted by Scholastic, Inc. and the Bill and Melinda Gates Foundation (Primary Sources, 2008), participants were asked two questions that are of importance to the present study. First, when asked what engages students in learning, 57% *agreed strongly* and 38% *agreed somewhat* that those digital resources such as classroom technology, and web-based programs engage their students in learning. In comparison, only 6% of participants *agreed strongly* and 40% *agreed somewhat* that traditional textbooks engage their students in learning.

Responses to a second question indicated that 44% of participants *agreed strongly* and 49% *agreed somewhat* that digital resources such as classroom technology and web-based programs help their students' academic achievement. In contrast, 12% of participants *agreed strongly* and 57% *agreed somewhat* that traditional textbooks help their students' academic achievement.

Results of an earlier meta-analysis of technology studies indicated similar findings regarding student engagement and academic achievement (Apple, Inc., 2002). Those findings indicated that:

- Students, especially those with few advantages in life, learn basic skills – reading, writing, and arithmetic – better and faster if they have a chance to practice those skills using technology.

- Technology engages students, and as a result, they spend more time on basic learning tasks than students who use a more traditional learning approach do.
- Technology offers educators a way to individualize curriculum and customize it to the needs of individual students so all children can achieve their potential.
- Students who have the opportunity to use technology to acquire and organize information show a higher level of comprehension and a greater likelihood of applying what they learn later in their lives.
- Students with access to a broader range of resources and technologies can express their ideas more clearly and powerfully.
- Technology can decrease absenteeism, lower dropout rates, and motivate more students to continue their education after high school.
- Students who regularly use technology take more pride in their work.

In spite of these findings, teachers do not often have the skills, time, or training necessary to always employ technology effectively to engage students and improve student learning.

### **Challenges for Computer Use in Education**

Despite the advances of computer use in schools, problems persist. For example, although access to computers has risen sharply, the amount of time that most students spend on computers at school has not significantly changed and their primary access to computers still is in computer labs or libraries (Schifter, 2008). Utilizing a computer is still an episodic event for most students rather than a routine part of the school experience. Second, because computer technology is an ever-advancing industry, it has been difficult for schools to keep up with technology advancements (Schifter, 2008).

Each time computing power or technology increases, public schools, given their limited capacity and budgets, are left with outdated computer models and software (Schifter, 2008). Third, there are inequities across schools. Up-to-date computers are more likely to be found in affluent, suburban schools while less affluent inner city or rural schools usually have older models, despite the fact that the *No Child Left Behind Act of 2001* requires all students to be computer literate by the eighth grade (Schifter, 2008). Finally, teachers do not have routine time to identify ever-changing digital resources so they often resort to utilizing the same resources that they have used for years.

The life cycle of computer applications changes at a far more rapid rate than the educational systems and beliefs of most schools. It also seems there may be a subtle undercurrent that continues to flow through education that prohibits the advancement of technology. For example, anyone with a camcorder, camera phone, and/or DVR knows that one can record and play back nearly every aspect of life, including weddings, anniversaries, family reunions, TV shows, and sports events. One exception is the educational experience. Although recording, reviewing, and critiquing the classroom experience could be instructive for improving teaching and learning, this use of technology rarely happens and the educational experience remains a one-time event for many students. There are various reasons that schools are slower to adopt digital technologies.

Money is a particularly important issue. Administrators identify limited state funding as an ongoing barrier to offering more online courses (Project Tomorrow, 2011). Administrators acknowledge that, with recent budget constraints, paying teachers for their time in creating online courses has been put on the back burner despite

understanding the possible benefits. Another barrier to improved technology use in education is the demands of teacher training. In a recent survey of students, faculty, and information technology staff, 16% of IT professionals reported teachers' lack of training as the "biggest challenge of classroom technology" (21st Century Classroom Report, 2011).

### **A National Focus on One-to-One Computing**

In his best-selling book, *The World Is Flat*, Friedman (2005, p. 273) proclaimed, "There is no turning back..." a reminder that technology has irrevocably redefined our world. U.S. Education Secretary Arne Duncan also has underscored the prominent role that technology plays in education today. During the release of the latest version of the National Educational Technology Plan, Duncan stated, "As research gives us new insights into how today's students learn, and technology enables us to respond as never before, [educators] can help lead the way in providing a model for 21st century learning" (2008, p. 1). The national plan focused on development of 21st century learning environments that improve learning, instruction, and assessment *through technology*.

Accepting Duncan's challenge, innovative educators have embraced a bold new catalyst to learning in the form of 1:1 computing. One-to-one computing initiatives that provide laptop computers and Internet access to students for use at home and school are expanding rapidly across the globe (Penuel, 2006). The "laptop for every student" concept is changing how, when, and where students learn (Penuel, 2006). A 1:1 laptop initiative can help facilitate the transition in schools from occasional, supplemental use of computers for instruction to more frequent, integral use of technology across a multitude of settings (Apple, 2005). Anytime access to a computer and the Internet make it possible



for students to access a wider array of resources to support their learning. These initiatives also allow students to communicate with peers and their teachers and to become efficient in their use of the technological tools of the 21st century workplace. Being able to take computers home further expands students' access and facilitates students keeping their work organized (Apple, 2005).

A synthesis of the research on 1:1 computing initiatives indicated that individual initiatives generally focus on one of four goals: (a) improving *academic achievement* with the use of technology, (b) increasing *equity of access* to digital resources and reducing the digital divide, (c) increasing the *economic competitiveness* of the region by preparing its students more effectively for today's technology-saturated workplaces, and (d) seeking to *effect a transformation in the quality of instruction* by making it more student-centered or differentiated, problem- or project-based, and demanding of higher-order thinking skills (Apple Computer, Inc., 2005, p. 3).

The potential of 1:1 learning can be maximized in schools where the technology tools are deployed in classrooms characterized by academic rigor, real-world experiences, and high-quality teaching that incorporates research on how people best learn (Metiri Group, 2006). Laptop initiatives can enable educators to model and teach the 21st century skills that students will need to know for success in the real world such as collaboration, creativity, problem-solving, and critical thinking.

The state of Maine currently is the most high profile state to implement a statewide laptop initiative because the initiative was rolled out by the Maine Department of Education. However, state-level initiatives (past and present) also have been adopted in Florida (Leveraging Laptops), Michigan (Freedom to Learn), North Carolina (1:1

Learning Technology Initiative), Pennsylvania (Classrooms of the Future), Texas (Texas Immersion Pilot), Virginia (Teaching and Learning Initiative), South Dakota, Michigan, and Minnesota with assistance from state and local funding sources and grants. Because some of the past initiatives were dependent on state and local funding or grants, the longevity of the statewide initiatives seemed to thrive only when the funding sources were able to supply local districts with funding. Many of the past laptop initiatives dissolved because of the loss of funding, whether or not they were prematurely gauged to have a positive impact on student learning.

In 2002, Maine provided laptop computers with integrated wireless access and technical assistance to all seventh- and eighth-grade students and teachers (Silvernail & Lane, 2004). In addition, the state provided professional development for teachers and carefully documented teacher and student use of computers. The initial evaluation report employed teacher, student, administrator, and parent surveys to document laptop use. Teachers reported that they used their laptops to develop instructional materials, conduct research related to instruction, and communicate with colleagues (Silvernail & Lane, 2004). Students used their laptops to find information, organize information, and take class notes (Silvernail & Lane, 2004).

Research results from Maine's 1:1 laptop initiative continue to inform other states and their leaders about the benefits and challenges of the initiative. Years of data from Maine's 1:1 laptop initiative enable the state to monitor the overall effectiveness of laptops on student learning. For example, Maine teachers quickly perceived that students were more engaged in their learning and produced better quality work with the laptop as a new instructional tool (Silvernail & Lane, 2004). Students confirmed this observation;

9th-grade students who no longer had their laptops reported that they were less productive and that the quality of their work had declined (Silvernail & Lane, 2004). Special education teachers reported that the laptop program particularly benefited their students' writing, organization, motivation, and self-esteem (Harris & Smith, 2004). However, a few special education students were distracted by the increased stimuli (Harris & Smith, 2004).

### **Critics of 1:1 Computing**

Research studies conducted across the U.S. have focused on the impacts of 1:1 laptop computing. Results indicate strengths and weaknesses of laptop initiatives. Several studies indicated positive outcomes for both teachers and students. For example, results of one study indicated that use of 1:1 laptop programs increased student and teacher technology use, increased student engagement and interest levels, and increased student achievement (Bebell & O'Dwyer, 2008). Results of another study suggested that, despite implementation differences, there was evidence that the types of educational access and opportunities afforded by 1:1 computing led to measurable changes in teacher practices, student achievement, student engagement, and students' research skills (Bebell & Kay, 2008). In another study that examined the effects of a 1:1 laptop initiative on student achievement, the authors concluded:

Using hierarchical linear modeling, we found that teacher-level implementation components (Immersion Support, Classroom Immersion) were inconsistent and mostly not statistically significant predictors of student achievement, whereas students' use of laptops outside of school for homework and learning games was

the strongest implementation predictor of achievement. (Shapley, Sheehan, Maloney, Caranikas-Walker, 2008, p. 4)

Yet another study examined the effects of 1:1 laptop-computing initiatives on advantaged and disadvantaged students. The Metiri Group (2008), a consulting firm specializing in education technology, 21st century learning, and the evaluation of PreK-12 learning, reviewed the impacts of 1:1 computing initiatives and discovered that over half of the initiatives had been implemented in districts serving significant numbers of disadvantaged students. This finding is particularly noteworthy in light of a mounting body of evidence that 1:1 learning not only advances the technology skills of individual students but also, and perhaps more importantly, improves their capacity as technology users (Metiri Group, 2008).

While the *digital divide* is narrowing in respect to access to technology, it still exists. Some recent data from the United States Census Bureau indicates that 68.7% of American households have Internet access. This is in comparison to only 50.1% in 2000 and only 18% of American households in 1997 (U.S. Census Bureau, 2009). Other studies have indicated that, even where there is a computer in the home, less-advantaged families are likely to be more intimidated by the technology and are less likely to use it as a powerful source for information (Fox, 2005). In addition, these homes are less likely to have a variety of software on their computers and are less likely to have access to cutting-edge technologies such as video editing, sound production, and videoconferencing (Fox, 2005). One-to-one laptop initiatives can help level the technology playing field for disadvantaged students.

There also are many critics that object to the costs of 1:1 laptop initiatives. The use of computers across different content areas and classrooms always will be variable. When computer use is sporadic, it calls into question the buy-in of teachers and the effect they have on a viable curriculum. When computers receive limited use or inconsistent deployment across classes, it makes little sense to expect any kind of return on the investment in technology, especially in relation to student achievement (Weston & Bain, 2009).

Another concern about 1:1 laptop initiatives is that they often simply replace what is already in place rather than change the way that instruction takes place altogether. Critics mention computers replacing books, paper, and filing systems rather than being utilized to transform how teachers teach and students learn. In other fields, the experience has been different:

Technology has had a stunning, paradigm-shifting influence on core activities. An eye surgeon uses a laser to correct vision in minutes; structural engineer uses computer-assisted-design software to simulate the stresses on a bridge; and a sales manager uses contact relationship management software to predict future inventory needs. In each of these examples, technology profoundly changed the way individual professionals perform the core. (Westen & Bain, 2009)

Westen & Bain (2009) also raised concerns about the lack of teacher collaboration regarding effective uses of technology in the classroom. Participation with new technologies by professionals in other fields happens because the new technologies were adopted at scale. In other words, the use of technology that improves performance scales

up to become the professional standard of practice of most, if not all, professionals. Ignoring or avoiding technological innovations, in some circumstances, is construed as negligence (Westen and Bain, 2009). This is not the case in education.

Other scholars (e.g., Weston & Bain, 2008) go beyond criticisms of 1:1 laptop initiatives and offer suggestions for reframing the conversation of using technology to improve education all together:

Why single out laptop computers and 1:1 initiatives from other attempts to improve education? May it be that this special treatment has more to do with change, innovation, and reform than with laptop computers and 1:1 initiatives? By missing the forest, techno-critics have diverted attention from the real problem of improving the totality of education for all students. However, for techno-critics a 1:1 laptop computer initiative is such a visible, expensive and labor intensive effort that it stands out in a forest of reforms. Therefore, when a 1:1 initiative fails to deliver the much-hyped results, it is much simpler to start sawing on a tree than it is to cut down the forest and start replanting. Then, like so many problems in changing venerable institutions, it is often easier simply to protect the status quo and blame the innovation or the innovator. (p. 9)

Maintaining the status quo in education may no longer be an option with both federal and state initiatives to improve schooling. Many schools in Iowa and across the country are investing in 1:1 laptop initiatives as a catalyst to improve education.

### **One-to-One Computing in Iowa**

During the 2008-09 school year, 6 Iowa schools engaged in a 1:1 laptop initiative. During the 2009-10 school year, that number increased to 14 schools. During the 2010-11 school year, 44 schools engaged in a 1:1 laptop initiative. During the 2011-12 school year, 90 to 100 Iowa schools adopted a 1:1 laptop initiative. Apple Computer, Inc. (2012) estimates that perhaps as many as another 80 Iowa schools will have a laptop initiative during the 2012-13 school year. This would mean that over 25% of all Iowa schools would have some type of 1:1 initiative implemented. It is believed that Iowa currently is the second state in the U.S. (behind Maine) when it comes to the number of 1:1 laptop initiatives in PreK-12 schools (N. Sauers, personal communication, August 18, 2011). With the lower cost of computers and increased demands for personalized learning, other schools are likely to follow suit in the upcoming school years.

More and more high schools are finding ways to fund 1:1 laptop initiatives. Many Iowa school districts finance laptop initiatives through the Physical Plant and Equipment Levy (PPEL). Other Iowa districts use Local Option Sales Tax (LOST) monies or general fund dollars to support their initiatives. Almost 85% of the Iowa schools have placed Apple computers into the hands of students (Sauers, 2011). Ninety percent of laptop initiatives in Iowa have been implemented with high school students.

The mental model described in Chapter 1 outlined skills and attributes that students may gain by being exposed to a 1:1 laptop initiative while in high school. A main goal of 1:1 laptop initiatives tends to be promoting “college readiness.” If this is the case, we must be able to define what being college ready means for students.

### Defining College Readiness

Obtaining a college education is generally accepted as both a goal and value among students today. By eighth grade, over 80% of students indicate that they will earn at least a college degree and nearly half also expect to earn a graduate or professional degree (Csikszentmihalyi & Schneider, 2000; Noeth & Wimberly, 2002; Schneider & Stevenson, 1999; U.S. Department of Education, 2002). Students indicate that they want to attend college and pursue careers in professional fields such as business, computer science, teaching, and medicine (Hrabowski, Maton, & Greif, 1998; U.S. Department of Education, 2003a; Venezia, Kirst, & Antonio, 2003). The desire to attend college is enhanced for many students as they progress through high school and learn about more college and career options. These educational and career expectations are consistent across race, social class, gender, and student achievement level (Freeman, 1999; Kao & Tienda, 1998; MacLeod, 1995; Tracey & Robbins, 2004). Despite high expectations to attend college, the reality is that many students simply aren't prepared to be successful after their high school graduation.

The term *college readiness* is difficult to define. It is possible to compile very lengthy and detailed lists of the content knowledge that students must know and the key cognitive strategies that they must possess to be college-ready. In fact, a variety of such compilations have been produced over the past decade (Achieve, The Education Trust, & Thomas B Fordham Foundation, 2004; Conley, 2003, 2003a, 2004). Many colleges, educational researchers, and educational foundations in both public and private education have attempted to develop definitions of the concept. The next several paragraphs



provide different definitions of college readiness. Later in this section, common themes of college readiness are exposed and clarified.

To start, the Advanced Placement Index (API) stated that students are *college ready* when they have the knowledge, skills, and behaviors to complete a college course of study successfully, without remediation (Conley, 2008). The API further defined college readiness through multiple measures that include:

- (a) Academic knowledge and skills evidenced by successful completion of a rigorous high school core curriculum (i.e., four years of mathematics, including algebra II; four years of English/language arts; three or more years of science; and three or more years of social sciences/history).
- (b) Success in college-prep and college-level courses taken in high school that require in-depth subject-area knowledge, higher-order thinking skills, and strong study and research skills; e.g., as evidenced by achievement of a grade of three or higher on at least one Advanced Placement (AP) examination.
- (c) Advanced academic skills, such as reasoning, problem solving, analysis, and writing abilities; e.g., as demonstrated by successful performance on the SAT (a score of 1020 in critical reading and mathematical reasoning corresponds to a 90% probability of a Freshman GPA of C or higher and a 50% probability of a B or higher).
- (d) College planning skills, as demonstrated by an understanding of college and career options and the college admissions and financing process.

In a paper prepared for the Bill and Melinda Gates Foundation, Conley (2007)

provided the following operational definition of college readiness: “the level of preparation a student needs in order to enroll and succeed – without remediation – in a credit-bearing general education course at a postsecondary institution that offers a baccalaureate degree or transfer to a baccalaureate program” (p. 5). Further, the term *succeed* was defined as “completing entry-level courses at a level of understanding and proficiency that makes it possible for the student to consider taking the next course in the sequence or the next level of course in the subject area” (Conley, 2007, p. 5). This same report further identified the skills and tasks college ready students would be able to do:

1. Consistent intellectual growth and development over four years of high school resulting from the study of increasingly challenging, engaging, coherent academic content
2. Deep understanding of and facility applying key foundational ideas and concepts from the core academic subjects
3. A strong grounding in the knowledge base that underlies the key concepts of the core academic disciplines as evidenced by the ability to use the knowledge to solve novel problems within a subject area, and to demonstrate an understanding of how experts in the subject area think
4. Facility with a range of key intellectual and cognitive skills and capabilities that can be broadly generalized as the ability to think
5. Reading and writing skills and strategies sufficient to process the full range of textual materials commonly encountered in entry-level college courses, and to respond successfully to the written assignments commonly required in such courses

6. Mastery of key concepts and ways of thinking found in one or more scientific disciplines sufficient to succeed in at least one introductory-level college course that could conceivably lead toward a major that requires additional scientific knowledge and expertise
7. Comfort with a range of numeric concepts and principles sufficient to take at least one introductory level college course that could conceivably lead toward a major that requires additional proficiency in mathematics
8. Ability to accept critical feedback including critiques of written work submitted or an argument presented in class
9. Ability to assess objectively one's level of competence in a subject and to devise plans to complete course requirements in a timely fashion and with a high degree of quality
10. Ability to study independently and with a study group on a complex assignment requiring extensive out-of-class preparation that extends over a reasonably long period of time
11. Ability to interact successfully with a wide range of faculty, staff, and students, including among them many who come from different backgrounds and hold points of view different from the student's
12. Understanding of the values and norms of colleges, and within them, disciplinary subjects as the organizing structures for intellectual communities that pursue common understandings and fundamental explanations of natural phenomena and key aspects of the human condition

These conceptions of college readiness are calibrated against what recent research

findings have come to define as *best practices entry-level courses* as opposed to the stereotypical freshman course (Conley, Aspengren, Gallagher, & Nies, 2006a, 2006b; Conley, Aspengren, Stout, & Veach, 2006c). The college-ready student envisioned by this definition is able to understand what is expected in a college course, cope with the content knowledge that is presented, and take away from the course the key intellectual lessons and dispositions that the course was designed to convey and develop (Conley, 2009). In addition, the student is prepared to get the most out of the college experience by understanding the culture and structure of postsecondary education and the ways of knowing and intellectual norms of this academic and social environment (Conley, 2009). To summarize, this definition of college readiness calls for a student to have a necessary mindset and disposition to succeed in college.

Conley (2008) described four dimensions of college readiness: cognitive strategies, content knowledge, self-management skills, and knowledge about postsecondary education. The first dimension, *cognitive strategies*, was defined as the ability to think analytically and logically, compare and contrast different philosophies, and exercise accuracy as students apply their methods to develop products. The second dimension, *content knowledge*, meant that students have a set of big ideas, key concepts, and organized principals for each subject area. Specifically, the author (Conley, 2008) identified sources that identify the knowledge and skills that college-ready students need:

Several independently conducted research and development efforts help us identify the key knowledge and skills students should master to take full advantage of college. Standards for Success (Conley, 2003) systematically polled university faculty members and analyzed their course documents to determine

what these teachers expected of students in entry-level courses. The American Diploma Project (2004) consulted representatives of the business community and postsecondary faculty to define standards in math and English. More recently, both ACT (2008) and the College Board (2006) have released college readiness standards in English and math. Finally, the Texas Higher Education Coordinating Board (2008), under mandate of state law, developed one of the first and most comprehensive sets of state-level college readiness standards. (p. 1-2)

Conley's (2008) third dimension of college readiness was *self-management skills*. These skills allow students to plan ahead, prioritize tasks, keep track of large amounts of information, and organize themselves to meet deadlines. In addition, students also must be able to know when and where to seek help and support when they need it.

Finally, college ready students should possess some key *knowledge about postsecondary education* (Conley, 2008). For example, students must be able to match personal interests with a college major, understand basic financial aid concepts, register for classes, and understand how the culture of college is different from that of high school (Conley, 2008).

The college readiness gap reflects the disparity between the skills and knowledge that students gain in high school and the skills and knowledge that colleges and universities expect (The National Center for Public Policy in Higher Education, p. 3.). Causes of the college readiness gap include seat time that does not guarantee skills and learning, assessments that do not accurately assess college readiness, teachers not being held accountable for high standards, and colleges not being held accountable for degree completion (Conley, 2008).

In a study by Byrd & MacDonald (2005), first generation college students reported their perceptions of college readiness. In addition to recognized academic skills, participants in this study indicated that (a) skills in time-management, (b) the ability to apply oneself and focus on a goal, and (c) skills for advocating for oneself as a learner were essential for college readiness. Each area was further examined related to college readiness. Participants expounded on necessary academic skills needed for college, which included reading, writing, math, technology, communication, and study skills.

The next identified area of readiness was that of time management skills. Participants discussed the importance of time management for college readiness. Participants expressed the importance of having a goal and applying oneself for college readiness. Self-advocacy also was noted. Participants shared advice or stories about being able to speak up for one's needs and to seek help when necessary. These skills surfaced in the study to be essential for first generation college student's success in college.

For the purpose of this study, the definition of college readiness meant that a student possessed the skills and knowledge to be successful with college level coursework without remediation. Using any definition of college readiness, the bottom line is that many students are not effectively prepared to meet college academic demands. Furthermore, a synthesis of research leads to general themes that emerge around the definition of college readiness. The five themes include cognitive strategies, self-management, content knowledge, knowledge about postsecondary education, and self-advocacy skills.

## **A Synthesis of College Readiness Themes**

The next section further defines the five themes around college readiness that have been identified by the researcher.

### **Cognitive Strategies**

Conley (2008) defined cognitive strategies necessary for college readiness as the abilities to think analytically and logically compare and contrast different philosophies, and exercise accuracy as students apply their methods to develop products. College ready students possess the skills and behaviors necessary to understand what is expected of them and understand how they best learn. Students must understand how they best learn and how they must study to be successful with college level curriculum. The college-ready student envisioned by this definition is able to understand what is expected in a college course, cope with the content knowledge that is presented, and take away from the course the key intellectual lessons and dispositions the course was designed to convey and develop (Conley, 2009).

Students who possess effective cognitive strategies are able to think critically, conduct thorough research, take away key concepts, and effectively compare and contrast ideas. Students tend to be more successful in college if they have a clear understanding of the study skills and habits they benefit from that will make them successful in the postsecondary setting.

### **Self-Management**

Self-management means that a student is not only able to live on her own but also manage her time. Various college readiness research studies indicate that self-management includes both a behavior and mindset necessary for college success.

Specifically students must be able to plan ahead, prioritize tasks, keep track of large amounts of information, and meet deadlines (Conley, 2008). Successful college students are able to apply themselves to learning and living on their own. They tend to also be able to focus on their goals to get the most out of their college classes and experiences.

### **Content Knowledge**

The lack of integration of key learning skills within the college-prep curriculum is primarily responsible for the lack of progress in improving college readiness, even among students who have completed the prescribed and recommended courses (The National Center for Public Policy in Higher Education., 2010). Currently, research supports the lack of college readiness in specific content areas. Approximately 28% of all graduates met none of ACT's college readiness benchmarks, while 47% met between one and three benchmarks. Only 24 percent of all 2010 ACT-tested high school graduates met all four college readiness benchmarks, meaning that less than one in four were academically ready for college coursework in all four subject areas (ACT, 2010).

Students who are college ready have an effective base of fundamental knowledge necessary to be successful with a college curriculum without the need of remedial classes. The Advanced Placement Institute noted that college ready students have solid content knowledge in core areas of reading, writing, math, and technology. The Advanced Placement Index (API) stated that students are *college ready* when they have the knowledge, skills, and behaviors to complete a college course of study successfully, without remediation (Conley, 2008). Students who experience college preparatory curriculum in high school seem to perform better with college-level coursework.



Content knowledge means that students have a set of big ideas, key concepts, and organized principals for each subject area (Conley, 2008). Specific skills such as the ability to think critically, understand key concepts, and understand the big idea are necessary for college success (Conley, 2008). Some states have gone so far as to demand college readiness standardized assessments that students must pass before graduating or being admitted into a postsecondary institution.

### **Knowledge about Postsecondary Education**

College ready students tend to know more about the college setting, culture, and operations than students who are not ready for the postsecondary setting. The element of knowing about postsecondary education starts while students are in high school. Students need to understand what they must do as well as what the system requires or expects of them. They must, first and foremost, understand that college admission is a reasonable and realistic goal that can be attained through planning and diligent attention to necessary tasks (Conley, 2007). Elements of this knowledge include planning on living on their own, understanding the financial aid process, and the ability to match their own personal interests with a college major (Conley, 2008).

College ready students understand the difference in culture from the high school to college setting. One example would be a student understanding that seat time is no guarantee or factor in a college grade whereas seat time and participation would sometimes be factored into a high school course grade.

### **Self-Advocacy Skills**

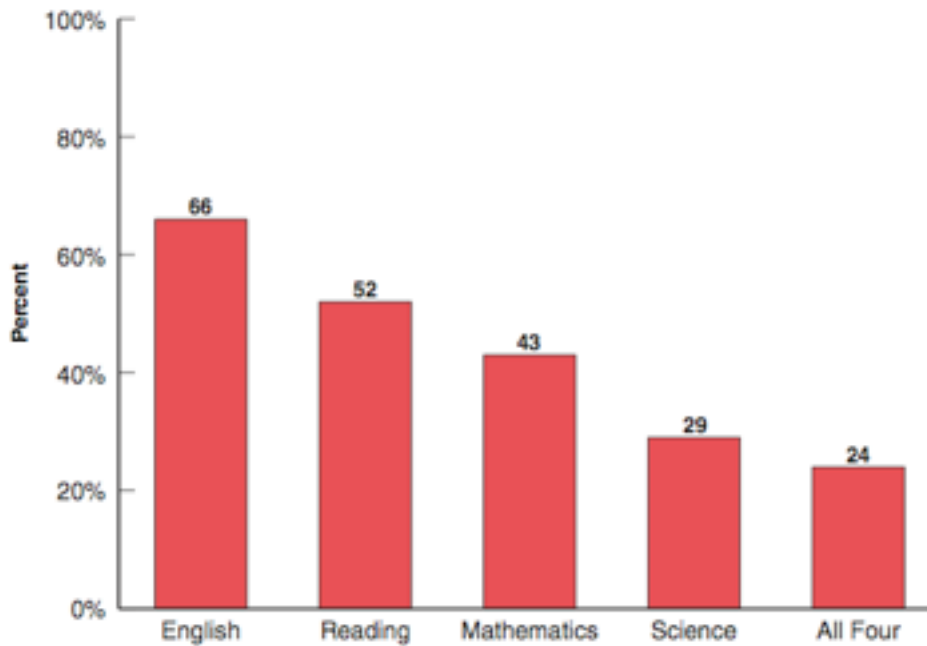
Students who are college ready possess the behaviors and skills necessary to advocate for their personal and academic needs in the postsecondary setting. This would

include when and where to look for personal or academic help. This varies from institution to institution and is sometimes a challenge for first-year college students to navigate. College ready students are able to speak up and advocate so that they are able to get the help they need to be successful. Students also must be able to know when and where to seek help and support when they need it to be truly college ready (Conley, 2008). This is especially important for first-generation college students who do not have the experiences or liberties of seeking advice from a sibling or relative.

### **The Current Reality of College Readiness**

To be successful after high school, today's graduates must be prepared for the ever-increasing demands of not only college but also the workplace. However, research results indicate that more than one third of students require remedial coursework in college and less than half of students at higher education institutions receive a certificate, associate, or bachelor's degree in six years (National Center for Education Statistics, 2008). As noted earlier and below in Figure 4, results from the ACT indicate that only 24% of all 2008 graduates met all four subject-area ACT college readiness benchmarks (ACT, 2008).

**Figure 3. Percent of ACT-tested High School Graduates Meeting College Readiness Benchmarks by Subject, 2008.**



*Figure 4. Adapted from The ACT Condition of College and Career Readiness Report, 2008.*

Between 2006 and 2008, the average ACT Reading score for high school graduates who had completed or had planned to complete a core curriculum remained about the same as the average reading score on the 2008 ACT test but was higher than the average score of graduates who had not completed or had not planned to complete a core curriculum (ACT, 2008).

ACT data are supported by results of other studies that also question the college readiness of many of today's high school graduates. For example, recent high school graduation rates indicate that the public school system is not only losing 30% of all its students before graduation, it is also losing disproportionately more black and Hispanic

students than white and Asian students (Greene, 2003). In addition, statistics on college readiness rates indicate that only 32% of all students - i.e., fewer than half of those who graduate and about one-third of all students who enter high school - leave high school with the minimum qualifications necessary to apply to college (Greene, 2003). Again, black and Hispanic graduates are disproportionately unready for college as compared to their white and Asian peers (Greene, 2003).

Lack of academic readiness for college also results in significant costs for taxpayers. Lack of college readiness is a major cause of low graduation rates, as illustrated by the fact that the majority of students who begin in remedial courses never complete their college degrees (Alliance for Excellent Education, 2011). While one-third of students fail to graduate from high school, there also are many who do graduate and begin college only to discover that they are underprepared for postsecondary work (Alliance for Excellent Education, 2011). Roughly one out of every three students entering postsecondary education will have to take at least one remedial course (Alliance for Excellent Education, 2011), which dramatically increases the odds that a student will not complete postsecondary education. Studies on the effects of remediation on postsecondary outcomes indicate that remediation is a poor substitute for a high-quality high school education (Alliance for Excellent Education, 2011). Compared to peers who are not in need of remediation, students who must take remedial courses are about half as likely to graduate (Alliance for Excellent Education, 2011). Even when students have similar skill levels, the more remedial courses they have to take, the less likely they are to graduate. Further, remedial courses represent a cost that taxpayers must pay twice, first for students to learn material in high school and then again for students to learn or relearn

that material at the postsecondary level. The price tag is not small. It is estimated that, nationally, the cost of remediation in public institutions for students enrolled in the 2007-08 school year alone was \$3.6 billion (Alliance for Excellent Education, 2011. p. 1).

The costs of remediation would be difficult enough for state and local governments to bear but, as states face huge budget shortfalls and tough economic decisions, maintaining this level of spending will prove even more challenging. Even after the infusion of funds from the American Recovery and Reinvestment Act of 2009, states still have had to account for budget shortfalls approaching an estimated \$100 billion in 2011 and more than \$130 billion in 2012 (Alliance for Excellent Education, 2011). This projection has led U.S. Secretary of Education Arne Duncan and others to suggest that reducing the need for remedial education is one significant area where states can see savings in the coming years.

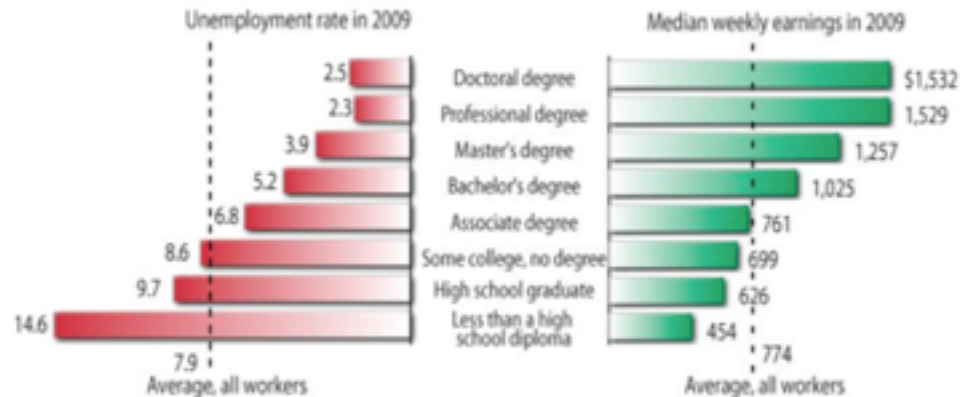
College dropout rates, caused in part by lack of college readiness, also impact businesses. A full 43% of students who begin postsecondary studies fail to earn a degree after six years; one major reason is that students receive inadequate preparation while in high school (Alliance for Excellent Education, 2011). Many jobs now demand that workers have some postsecondary training (Moss & Tilly, 2001; Wilson, 1996). The American Testing Program (2008) predicts that by the year 2018, 80% of jobs will require some postsecondary degree. These changes in the U.S. economy, growing competition across the global market, and increasing demand for a skilled labor force have made postsecondary training essential for those people who strive for a good-paying job to support their families.

Another significant economic impact of college dropout rates is the earnings gap

between college and high school graduates. In 1980, college graduates earned 19% more than those with a high school diploma did but, by 1999, college graduates earned 58% more than high school graduates (U.S. Department of Education, 2003). There is no doubt that more education results in higher earnings. Thus, for young people entering the job market of the 21st century, high school graduation is no longer the finish line but the starting line.

While the national unemployment rate includes individuals of all education levels, those with lower levels of education typically are affected the most (Alliance for Excellent Education, 2011). High school graduates without any kind of postsecondary credential and high school dropouts have unemployment rates that are nearly two and three times higher than college graduates.

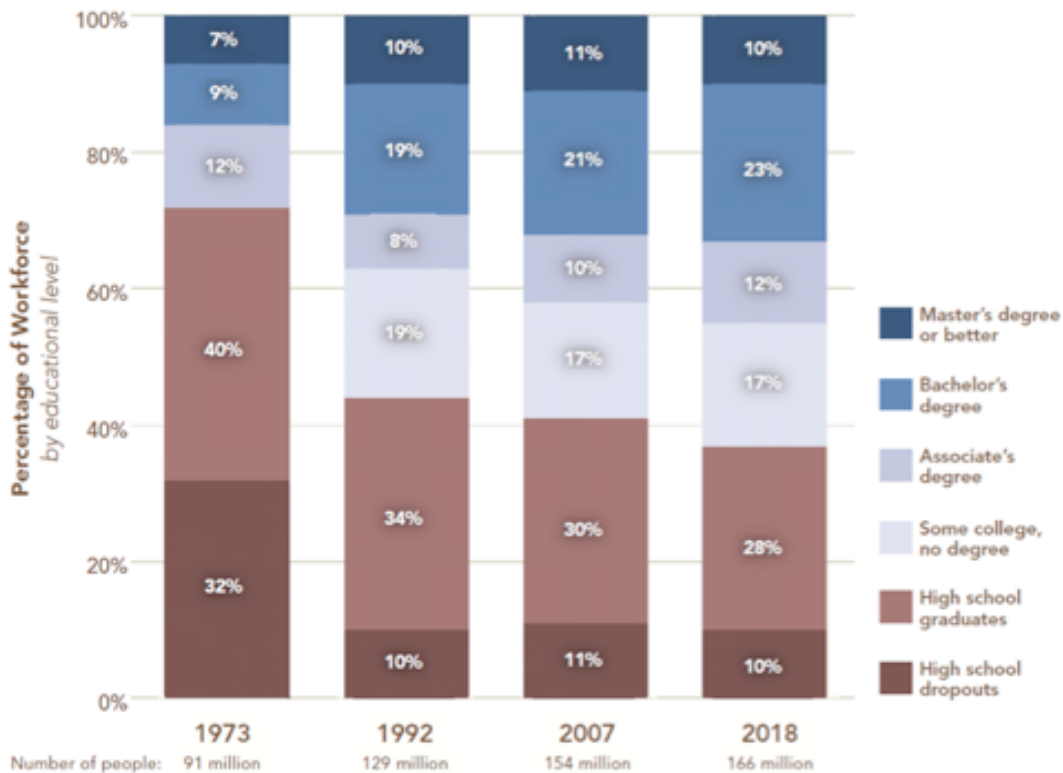
The impact of education level on earnings is illustrated in Figure 5. The 2009 figures visually demonstrate the value of education whether one considers the lower unemployment rate for people with more education or higher wages for those with higher degrees. On average, the difference for people with a Master's degree versus a Bachelor's degree in average weekly income is \$232 per week (Carnevale, Smith, & Strohl, 2008). Moreover, only 3.9% of people with a master's degree are unemployed (Carnevale, Smith, & Strohl, 2008). The value of education is evident whether you consider unemployment rates or average earnings. The value of higher education will continue to be more meaningful as the economy struggles, technology improves, and jobs are lost to workers in other countries.

**Figure 4. Education Pays***Figure 5. Adapted from A. Carnevale, N. Smith, & J. Strohl. (2008).*

Projections by the Bureau of Labor Statistics indicate that occupations that require long-term on-the-job training will see the slowest growth (Ramey, 2008). This is part of a decades-long trend for which the end is uncertain. Between 1973 and 2007, the share of jobs in the U.S. economy that required postsecondary education increased from 28% to 59% (Bureau of Labor Statistics, 2010). According to an analysis by the Georgetown Center on Education and the Workforce (2008), this percentage will increase over the next decade to 62% (see Figure 6). To meet these job market demands, the nation will need an additional 22 million workers with postsecondary degrees. However, the United States is expected to fall short by three million postsecondary degrees (Symonds, Schwartz & Ferguson, 2011). Given these projections, it is essential to improve postsecondary completion rates in order to fulfill future economic demands.

The shifting composition of the American work force by educational level is shown in Figure 5.

**Figure 5. Composition of Workforce by Education Degree**



*Figure 5.* Adapted from A. Carnevale, N. Smith, and J. Strohl. (2008).

The college readiness gap is costly to students, families, institutions, businesses, and taxpayers. Furthermore, the readiness gap is a tremendous obstacle to increasing the nation's college attainment levels. It is apparent that more needs to be done to prepare students for college. Technology initiatives such as 1:1 computing have been effective in various studies that related to student engagement in high school classrooms. Furthermore, research supports increased student achievement via the use of computers, in mathematics and writing in particular. Yet no study has been uncovered that examined the effects of 1:1 laptop computing on college readiness. The purpose of this study was to try to connect student participation in high school 1:1 laptop programs with the concept of college readiness.



### **Factors Around PreK-16 Technology Adoption**

How an organization considers and adopts technology may very well predict its future. Many schools have adopted a 1:1 laptop model as a means to transform their institution while other schools are waiting to make any type of move. What causes some schools to make technology decisions faster than others during tough budgetary times may simply depend on the fortitude of their leaders. Paying attention to past innovations and considering current situations may help school leaders make the best technology decisions for students.

Another key factor to change adaptation is that people (including education leaders) tend to get fatigued by the overwhelming number of new technologies. In PreK-12 and higher education, there are normally more than a handful of revolving new technologies that could be adapted on an annual basis. The confusion has reached a point where a specific predictive cycle has been created to define and help make decisions about which technologies are viable for adaptation. Figure 8 presents the Gartner Group's Hype Cycle that illustrates the phases that technology goes through in all levels of education, PreK-16 (Gartner, 2008).

The Gartner Group is a technology research and advisory firm who develops the Hype Cycle on an annual basis. Since 1995, Gartner has used hype cycles to characterize the over-enthusiasm or "hype" and subsequent disappointment that typically happen with the introduction of new technologies (Gartner, 2008).

**Figure 6. Hype Cycle for Education, 2008**



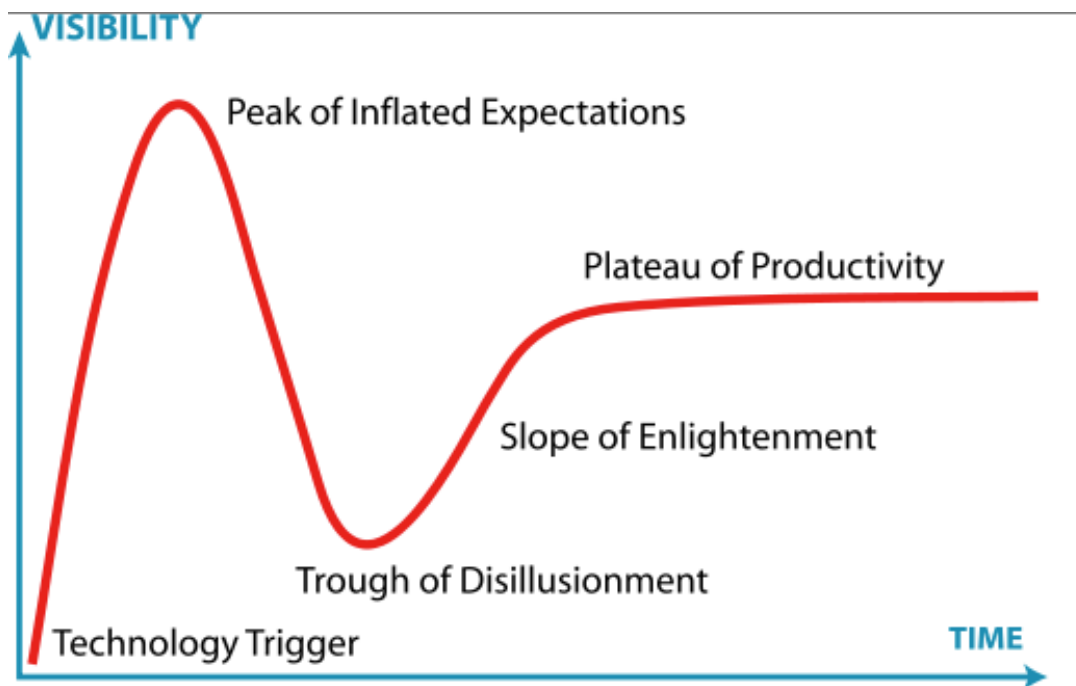
*Figure 6.* Adapted from Gartner, Inc. (2008).

The Hype Cycle is a graphic representation of the maturity, adoption, and social applications of specific technology (Gartner, 2008). According to Gartner, hype cycles aim to separate the hype from the reality and enable organizations to decide whether a particular technology is ready for adoption (Gartner, 2008). For educators, the cycle can offer potential benefits to teaching and learning and can provide education leaders with a snapshot of what innovations are on the horizon.

The 2008 Hype Cycle provides a calculated insight of potential innovations for education leaders (Gartner, 2008). Back in 2008, innovations such as blogs, cloud e-mail, ePortfolios, social media, open-source e-learning, and web and application hosting were all less than two years away from mainstream adoption (Gartner, 2008). Other innovations were further away from widespread adoption but were noted in the “trough

of disillusionment.” These potential innovations included wikis, mass notification software, micro-blogging, and e-textbooks.

The graph in *Figure 7* illustrates how the adoption of an innovation normally happens as conveyed visually through the hype cycle. A technology trigger often sparks the interest of people. This is often done through marketing and advertising of a new product. Because of the high expectations, people or organizations often have the “peak of inflated expectations” results for a short period followed by a short period of disappointment known as the “trough of disillusionment.” The next stages in the cycle occur because of product upgrades and/or changes to marketing, as well as realignment of consumer expectations.



*Figure 7:* Adopted from Gartner Research's Hype Cycle diagram (December, 2007).

The scope of the 2008 Hype Cycle was broad and included both PreK-12 and higher education. This was done strategically to see an increase in the crossover of technologies, services, and methodologies between elementary, secondary and higher education. In fact, vendors of services such as e-learning and ERP solutions that often originated in higher education have adapted and expanded their offerings into PreK-12 education (Gartner, 2008).

Education leaders are facing a multitude of new options for delivering established services while being challenged by completely new technology-based demands from the end users. Their core end users are the students that the leaders serve. Students tend to be leading change in many ways through the adoption of social networking, mobile devices, and user-generated media for educational purposes. However, many educators are finally catching up and are increasingly using these technologies in teaching and learning.

The change among teachers and professors is marked by a decreased dependence on institutionally-delivered technology and services and an increased use of consumerized user-centric technology (Gartner, 2008). This shift of power from the institution to the individual is similar to what has occurred in the media industry, where expensive production tools and highly-controlled distribution channels have been challenged by a ubiquity of inexpensive personal production tools and channels able to generate a high volume of accessible, user-generated content (Gartner, 2009). The end user of many technologies is now a producer of media, as evident in ordinary people sending video to the local news station or others posting their talents to a web site like YouTube to get recognized by a talent agent.

Gartner's Hype Cycle may hold the key to understanding how technology could help transform the climate of PK-16 education and improve college readiness. Many educators truly understand the potential that laptop computers have on teaching and learning. Interestingly, the Hype Cycle predicts that e-Textbooks are two to five years away from mainstream adoption. Most educators in schools that have adopted the 1:1 initiative would never consider going back to a setting without a laptop for every child. With laptop computers in the hands of students and (potentially) paperless textbooks the skills and experiences that students will have graduating from many high schools today are much different than those of students a generation ago.

### **Summary**

The evolution of computers in our world has produced environments in which students' lives are currently filled with technology. The technologies that students have grown accustomed to give them unprecedented access to information and resources. Students are now able to create multimedia content and share it with the world when they choose. Students routinely participate in online social networks where people from all over the world share ideas, collaborate, and learn new things. Outside of school, students are free to use technology to pursue their passions in their own way and at their own pace.

Computers may be the greatest innovation of our time. Education, both K-12 and postsecondary, is behind the curve in effectively leveraging digital technologies to promote learning and to prepare students for college or the real. Education as a whole has not yet understood how the innovation of the computer has transformed society nor has education responded effectively in using the computer to promote learning. However,

some education leaders have promoted learning by adopting 1:1 laptop initiatives for their schools and the benefits are beginning to be very evident for both teachers and students.

Technology provides access to more learning resources than are available in classrooms. Technology also provides connections for students to a wider set of educators outside the classroom walls, including parents, experts, and community mentors. On-demand learning is now within reach, supporting learning that is life-long and life-wide (Bransford et al., 2006). The education system consequently has the challenge of leveraging current technology to engage students in relevant, personal, meaningful learning opportunities. In contrast to traditional classroom instruction, this will require educators to make teaching and learning student-centered. Educators should empower students by being flexible and allowing students to take control of their own learning. When instruction is personal and of particular interest to students, it becomes more relevant and promotes higher levels of motivation and learning.

It is evident by the data presented in this study and other relevant statistics that college readiness is a problem across the country. Too many students are not prepared for the levels of rigor colleges expect. The demands for a highly educated future workforce will be great. If education does not figure out a way to effectively and efficiently educate students, the fear is that jobs will be eaten up by other countries that have a workforce ready and willing to work for less.

The next chapter delves into the methods of gathering feedback from participants in an effort to answer the research questions posed in this study.

## CHAPTER 3. METHODOLOGY

This study, which was based in the constructivist paradigm, used a phenomenological strategy to explain first-year college students' perceptions of the effects of a 1:1 laptop experience on their readiness for college and the uses of technology for instructional purposes by high school teachers and college professors. This chapter describes the research paradigm, approach, and design that were used to achieve the purposes of the study.

### Constructivist Paradigm

This study employed a constructivist paradigm to investigate and understand the meaning of first-year college student's 1:1 laptop experiences. Constructivist researchers focus on understanding and reconstructing the meanings that people (including the researcher) hold about the phenomenon being studied (Guba & Lincoln, 1994). Constructivists create knowledge through interaction between the researcher and participants (Guba & Lincoln, 1994), using dialogue and reasoning as the primary methods of investigation. Finally, constructivist researchers return frequently to the sources of data, asking what they meant to the participant and trying to integrate those with their meaning to the researcher (Rudestam & Newton, 1992). Thus, for this study, in-depth interviews were conducted with fifteen first-year college students. Data were continually scrutinized in an attempt to understand and construct meaning of participants' perceptions of their 1:1 laptop experience. The approach and methods employed in this study were guided by three research questions:

1. What are first-year college students' perceptions of the relationship between their high school 1:1 laptop experiences and their readiness for college?

2. What are first-year college students' perceptions of the uses of technology for instructional purposes by high school teachers?
3. What are first-year college students' perceptions of the uses of technology for instructional purposes by college professors?

### **Qualitative Research Approach**

A qualitative research approach for this study was chosen because qualitative methods are especially useful in discovering the meaning that people give to events that they experience (Merriam, 1998). Specifically, the phenomenological method was used to understand how participants make meaning of the phenomenon being studied; i.e., the impacts of a 1:1 laptop initiative on their college readiness. Phenomenology is effective in studying a small number of subjects – in this case, 15 participants – to identify the core of their experiences with the phenomenon (Creswell, 2003) and to produce patterns and identify relationships of meaning that build new knowledge (Moustakes, 1994).

The qualitative research methods used for this study are described further below and included purposive sampling, open-ended interviewing, and systematic and concurrent data collection and data analysis procedures. Specifically, the *grounded theory* or *constant comparative method* (Glaser & Strauss, 1967) was used to analyze the data and discover the meaning of college freshmen's 1:1 laptop experiences. A review board approved the purpose and procedures for this study (Appendix C).

### **Research Design**

Procedures for selecting study participants and collecting and analyzing data are described in this section.



## Participants

First-year college students who had a minimum of two years experience with a 1:1 laptop initiative in high school and who had completed a minimum of one semester of college were selected for participants in this study since they would be “knowledgeable informants” (Lincoln & Guba, 1985, p. 234). Because the goal of the study was to uncover student perceptions of a 1:1 initiative after their first-year of college, it was important that participants had completed at least a semester of college. The experiences that participants had during this first year of college gave them a basis from which to compare their college readiness to other first-year college students who were not exposed to a 1:1 laptop initiative in high school.

The researcher’s major professor, Dr. Scott McLeod, Associate Professor of Educational Administration at Iowa State University, was enlisted to help with sample selection. He utilized his popular blog (*Dangerously Irrelevant*), the Twitter microblogging service, and other information channels to inform high school administrators across the United States who oversee 1:1 laptop initiatives about the research study and to request their help in identifying participants for the study. To increase the sample size, the researcher also sent a School Administrator Invitation (Appendix D) to principals in 36 high schools across the United States to invite them to supply names of past graduates who might be willing to serve as participants in the study. These high school administrators were contacted directly by the researcher because the high school they served had a 1:1 laptop initiative in place for two or more years. Administrators who were willing to help were given details about the purpose of the study and the needs of the researcher; for example, a list of graduates, the name of the

college that each graduate was attending, and student contact information. The high school administrators routinely relied on school counselors to help identify graduates who met the student selection criteria of the study.

Once potential participants had been identified, an e-mail was sent to them with the Informed Consent Form (Appendix E) that included a description of the research study, research procedures, risks and benefits of participation in the study, participant rights, and protection of confidentiality. Students who signed the consent form became participants in the study and received details about the interview process and procedures along with a copy of the Interview Protocol (Appendix F). Recruitment and interviews of participants concluded when data saturation occurred and the information received from the interviewees began to be redundant (Merriam, 1998). At this point a total of 15 participants attending 13 different college campuses across the United States and Thailand had been interviewed.

### **Role of the Researcher**

In qualitative research, the researcher is the primary research instrument. What the researcher brings to the investigation from his/her own background and identity should be treated as his or her bias (Maxwell, 2005). Since qualitative research is interpretative research, researcher biases, beliefs, and assumptions can intrude into the analysis of data (Strauss & Corbin, 1998). Social researchers should attempt to neutralize or bracket their biases through full disclosure (Altheide & Johnson, 1994; Locke, Spirduso, & Silverman, 1987).

The researcher of the present study acknowledged that his personal and work background could influence his interpretation of data. The researcher's 1:1 laptop

experience during his college years resulted in his belief that the experience (a) increased his self-confidence, (b) increased and his efficiency in completing assignments, and (c) gave him an advantage in the working world.

The researcher also acknowledged that his position as a high school principal that moved his school (consisting of 400 students and 24 teachers) to a 1:1 laptop initiative could bias his interpretation of research results. The researcher also played the role of mentor to another principal who led a smaller school to adopt a 1:1 initiative. In addition, the researcher is currently working hard to help yet another high school implement a 1:1 laptop computer initiative.

To minimize any personal bias on the results of this study, member checks were utilized during and after interviews to increase the credibility, validity, and transferability of the study results (Lincoln & Guba, 1985). During each interview, the researcher also restated and summarized information, questioning participants on the accuracy of the information. After the taped interviews had been transcribed, the researcher asked each participant to review the content of his or her transcript for accuracy. In addition, the researcher consulted resources and faculty advisors throughout the evolution of this study. Direction from the faculty advisor helped the researcher to focus on relevant details that participants offered, which led the researcher to develop themes from the data. Lastly, the researcher included ample and relevant quotes from participants to substantiate the findings of the study (Maxwell, 2005).

### **Data Collection Methods**

While data collection and data analysis activities were intricately woven together throughout this phase of the study, for the sake of clarity they will be described

separately. The primary sources of data for this study were telephone interviews and field notes.

### **Interviews**

For this study, qualitative interviews were the primary method of data collection for three reasons. Qualitative interviewing is appropriately used when “studying people’s understanding of the meaning in their lived world” (Kvale, 1996, p. 105). In fact, interviewing is the best technique to use “to find out those things we cannot directly observe...feelings, thoughts, and intentions” (Merriam, 1998, p. 72). Qualitative interviews result in *thick descriptions* of the subject being studied (Rubin & Rubin, 1995). Interviews also allow for *triangulation* of information obtained from other sources (Lincoln & Guba, 1985).

For this study, all but one of the interviews were conducted by telephone; the remaining interview was conducted over Skype for convenience of the participant. The telephone and Skype served as efficient ways to conduct the interviews, making it possible for students with busy schedules to participate in the study. Further, phone interviews and Skype were the only practical ways for the researcher to connect with participants from across the country and world.

As a first step in the interview process, participants were reminded of the purpose of the study, research procedures, expected benefits, their right to withdraw from the study at any time, and protection of confidentiality. In an effort to develop a good rapport with respondents and to demonstrate familiarity with the topic (Creswell, 1994), the researcher identified himself as a doctoral student at Iowa State University and also as a high school principal from Iowa.

With participant approval, the interviews were audio-recorded to ensure a complete transcript (Merriam, 1998; Rubin & Rubin, 1995). Typed notes were taken during all interviews, enabling the researcher to track key points to return to later in the interview and for use during data analysis.

A semi-structured interview approach was used to carry on conversations that would elicit rich data that could be used in qualitative analysis (Lofland, 1971). Semi-structured interviews give participants more room to answer in terms of what is important to them (Miles & Huberman, 1994; Strauss & Corbin, 1998) and to control the introduction and flow of topics (Mishler, 1986). Although the interviews were semi-structured in the early stages, they became more structured in the later stages of triangulation and member checking (Lincoln & Guba, 1985).

Participants were given the interview protocol (Appendix F) approximately a week before their scheduled interview so that they would have time to think about and prepare their responses to the initial questions. The interviews began with, “Please describe your experiences with having a laptop computer while in high school.” The question was framed in this manner to provide participants with the flexibility and freedom to explore the phenomenon in depth (Strauss & Corbin, 1998). Mostly open-ended questions were used throughout the remainder of the interview to encourage participants to talk freely and respond openly to queries (Bogdan & Biklen, 1982; Kvale, 1996). Probing questions were used, when necessary, to encourage participants to elaborate on or clarify a response (Rubin & Rubin, 1995) or explore root experiences (Seidman, 1991). Furthermore, participants were frequently asked “why” after responding to interview questions. Asking participants “why” was the researcher’s

attempt to provide ample think time so that the participant could fully think about and elaborate on their experiences.

In order to improve the credibility of study findings, participants' experiences were explored in depth during interviews that lasted approximately 45 minutes. The audio recordings were carefully transcribed verbatim in a Microsoft Word document by a hired transcriptionist because accurate transcripts "are necessary for valid analysis and interpretation of interview data" (Mishler, 1986, p. 50).

### **Field notes**

Field notes served as a supporting data source for this study. Field notes were typed during each interview and later analyzed and compared to the interview transcriptions (Maxwell, 2005). Field notes were formatted using suggestions by Bogdan and Biklen (1982). On the first page of each set of notes, the researcher recorded the date and time and a working title that indicated the content of the notes. Topics addressed in the field notes included particular events that participants recalled, the researcher's speculations about emerging themes, points of clarification, and any connections that the researcher detected between or among participants' perceptions (Bogdan & Biklin, 1982). Other topics included in the field notes included observations about the participant's attitude and direct quotes that caught the attention of the researcher. The researcher immediately highlighted quotes from participants in red that caught his attention so that they could be easily found during data analysis.

### **Data Analysis**

Analysis occurred in three phases. First, interview transcripts were reviewed several times, searching for "recurring regularities" (Merriam, 1998, p. 180). The

researcher highlighted quotes and phrases from the interviews that were significant to the study. Using the constant comparative method (Glaser & Strauss, 1967), the researcher went back and forth among transcripts until categories emerged that were consistent, yet distinct (Marshall & Rossman, 1989). The researcher named these categories, coded the transcripts, and placed sections in labeled folders representing each categories (Bogdan & Biklin, 1982; Merriam, 1998). Second, the researcher brought together the coded interviews and field notes and looked for relationships within and across the data sources. A table was developed to compare various coded interviews. As tentative categories emerged, the researcher tested them against the data (Merriam, 1998). The researcher also tested interview data against the mental model presented in Chapter 1. Finally, the researcher integrated and refined the categories until themes solidified (Strauss & Corbin, 1998).

### **Establishing Trustworthiness**

Reliability is an area for which qualitative research is sometimes criticized. In general terms, *reliability* refers to the extent in which research findings can be replicated. Denscombe (2002) emphasized that in social research two main questions need to be addressed when determining reliability: (a) Are the data valid?, and (b) Are the methods reliable?

To increase the trustworthiness of the study's findings, the researcher employed strategies suggested by Lincoln and Guba (1985). The researcher decreased threats to *credibility* (quantitative researchers would use the term *internal validity*) by triangulating data. To increase *dependability* (called *reliability* in quantitative research), the researcher provided an audit trail by describing in detail how data was collected, how categories

were derived, and how decisions were made throughout the inquiry (Merriam, 1998). The researcher used good rich, thick description (Merriam, 1998), thus enabling other researchers to make decisions about *transferability* (known as *external validity* or *generalizability* in quantitative research). To increase *conformability* (known as *objectivity* in quantitative studies), the researcher attempted to control for bias by constantly comparing data, searching the literature for examples of the phenomenon, obtaining multiple viewpoints (Strauss & Corbin, 1998), searching for negative instances of the phenomenon, and checking and rechecking data (Marshall & Rossman, 1989).

Triangulation of data is of critical importance to the trustworthiness of qualitative studies. As the study unfolded and particular pieces of information became known, steps were taken to validate each information item against at least one other source (e.g., a second interview) and/or a second method (e.g., an observation in addition to an interview) (Denzin, 1989; Lincoln & Guba, 1985). Using a second source or a second method can produce more accurate, comprehensive, and objective findings (Silverman, 2006). For this study, interviews and field notes were compared to ensure trustworthiness.

### **Limitations and Delimitations**

Three limitations of this study related to the sample. First, the number of participants in the study (15) was small. A larger pool of participants may have produced different or additional themes. Second, data for this study were collected from first-semester college students with two or more years of exposure to a 1:1 laptop initiative while in high school. The results of the study only apply to the population investigated and should not be transferred to other students. Third, the study focused exclusively on



first-year college students whose high school laptop experiences occurred in 2 states and 2 countries (United States of American & Thailand). Results may be transferred to these states and countries only.

Another limitation is that no validated commercial instrument was available for obtaining participants' perceptions of their laptop experiences; therefore, the researcher developed one. As noted in Chapter 4, the instrument used for this study was not pilot-tested. Results of the study are limited by how participants interpreted interview questions.

This research study also yielded two delimitations that describe how the study was narrowed in scope (Creswell, 2003). The primary delimitations of this study include: (a) the sample consisted of fifteen first-year college students who volunteered to participate in the study; and (b) qualitative data collection techniques included structured, telephone interviews, and field notes.

### **Summary**

This chapter described the methods and procedures used to investigate the perceived level of college readiness of first-year college students who had experienced a 1:1 laptop initiative in high school and the perceived use of technology for instructional purposes by the students' high school teachers and college professors. The study was based in the constructivist paradigm and used qualitative research methodologies. Data sources included in-depth interviews and field notes. The constant comparison method was used to analyze data. The chapter concluded with a discussion of the procedures used to enhance the trustworthiness of the findings. Chapter 4 presents the research findings for the study.

## **CHAPTER 4. RESULTS**

The primary purpose of this study was to understand the perceptions of first-year college students regarding college readiness after a 1:1 laptop experience while in high school. The other purpose of the study was to identify the perceptions of first-year college students regarding their high school teachers' and college professors' use of technology for instruction.

Participants' experiences and feedback added insight to the research questions posed in this study. By listening to and analyzing the experiences of these students, valuable information was obtained about 1:1 laptop initiatives and college readiness as well as students' perceptions of how their teachers, both in high school and in college, used technology for learning and teaching purposes. In this chapter, the three research questions are addressed with supporting evidence, including both quotations and feedback from the participants.

### **Demographics of Participants**

The results of this qualitative study are based on interviews of fifteen college students from two different states and two different countries. All students voluntarily participated in the study. Principals of 1:1 high schools were initially solicited through various social networking outlets. Those principals then contacted some of their alumni, who then subsequently agreed to be part of the study.

The fifteen participants in this study were enrolled in thirteen different postsecondary institutions around the United States and in one university in Thailand. Participants in this study attended five different high schools. Each participant experienced a 1:1 laptop initiative in high school for two or more years. Of the fifteen

total participants, six experienced a 1:1 laptop initiative for all four years in high school, three participants had three years of 1:1 experience in high school, and the other six participants experienced a laptop initiative for two years while in high school. Many of the participants were part of a 1:1 laptop rollout in which they were the first class in their high school to experience the initiative.

The size of high school attended varied by participant. Four interviewees attended a high school in the Midwestern United States of only 434 students. This was the smallest high school in the study. The largest high school that any participant attended was one in the Eastern United States that had 750 students. One participant was a graduate from the Institute for Science and Technology in Thailand and was the only international participant in the study.

Participants interviewed for this study attended a variety of postsecondary institutions. Three participants were enrolled in a two-year community college institution; the other twelve participants were students in four-year universities. The college majors of participants also varied. Five students were education majors, while two were studying engineering. The other majors identified by participants in this study included business, exercise science, religious studies, radiology, accounting, fitness management, marketing, graphics, and economics. More information about the fifteen interviewees is included in Appendix G.

Each participant was interviewed over the telephone. The telephone was an effective and necessary way to communicate with participants because of their location in multiple states and countries. Phone interviews also allowed for convenient transcription of recorded interviews. Recording and transcription of interviews was done through the

NoNotes.com transcription service. Interviews were transcribed within a couple of days of occurrence, after which participants were able to review, change, and/or verify their comments. The interview with the international participant was conducted with the Skype videoconferencing service after multiple attempts to talk by phone failed. This interview could not be recorded. Because it could not be recorded, the researcher took thorough field notes but was not able to transcribe the Skype interview verbatim. Interview times varied and were scheduled at times conducive for both participants and the researcher. The researcher also took field notes during each interview. All interviews were conducted during the months of January and February 2012.

### **Pilot Study**

Yin (2009) recommended the use of pilot studies as a way “to develop relevant lines of questions” prior to conducting the actual study and to assist with the process of refining data collection plans and procedures (p. 92). In this research study, the intent was to locate a first-year college student who had experienced a 1:1 initiative while in high school to pilot the interview questions. However, because participants were more difficult to find than the researcher originally thought, a pilot study was not conducted prior to the actual research interviews. It was known that some interview questions might be modified during the actual interviews. This flexibility supported the semi-structured, qualitative interview methods that had been selected for data collection.

### **Revisions of Interview Protocol**

The initial interview protocol (Appendix F) had a lengthy introduction about the purpose of the study, who would have access to the participant’s responses, the participant’s risks and rights, and when the interview data would be discarded. The intent

was that the researcher would read each participant the introduction verbatim as part of the interview. The researcher orally improvised this introduction many times when talking with participants in order to get the initial interview protocol started in a timely and comfortable manner. All fifteen participants received the initial interview protocol ahead of time, so the researcher felt comfortable hitting the major points outlined in the introduction and asking each participant, “Do you have any questions before we begin?”

Most interview questions were asked exactly as they were written. However, the researcher often followed up the semi-structured questions with open-ended questions such as, “Why?” and “Can you tell me more?” This was the researcher’s way to get at deeper meaning and richer understanding of the participant’s experiences. In the middle of the first interview, the researcher decided to add a question to the initial interview protocol. The question added was, “As a parent in the future, with the choice to send your child to a traditional school or 1:1 laptop school, which would you prefer? Why?” This question was added to get further feedback from participants about the overall value, or lack of value, that they believed they gained because of their 1:1 laptop experiences while in high school. All fifteen participants were asked this question near the end of the interview.

### **Research Questions**

Three primary research questions guided this study:

1. What are first-year college students’ perceptions of the relationship between their high school 1:1 laptop experiences and their readiness for college?
2. What are first-year college students’ perceptions of the uses of technology for instructional purposes by their high school teachers?

3. What are first-year college students' perceptions of the uses of technology for instructional purposes by their college professors?

### **Research Results**

Four distinct themes emerged from the research data. The major themes identified from the results of this study included:

1. Students' 1:1 laptop-facilitated experiences with **online classes** improved college readiness.
2. **Academic skills** necessary to be a successful student were gained from 1:1 laptop experiences.
3. Students who were part of 1:1 initiative rollouts experienced an initial **implementation dip**.
4. High school teachers who were part of a 1:1 program better use **technology for instruction** than college professors.

Themes 1 and 2 answered the first research question; *What are first-year college students' perceptions of the relationship between their high school 1:1 laptop experiences and their readiness for college?* Themes 3 and 4 addressed the second research question; *What are first-year college students' perceptions of the uses of technology for instructional purposes by their high school teachers?* Theme 4 also addressed the third research question; *What are first-year college students' perceptions of the uses of technology for instructional purposes by their college professors?* Each theme is discussed in further detail below.

### Theme 1: Online Classes

Thirteen out of the fifteen participants actually took online classes while in high school. Participant 11 noted that, “Teachers’ high expectations and taking online classes helped me most for college.” Participant 15, who is currently studying to be an engineer, reported, “I actually took four or five online classes. I came in to college with my first semester already completed.” Participant 3 graduated from high school having already acquired 32 college credits. She earned all of these credits by taking online classes during her junior and senior years in high school, utilizing her laptop computer. The student reported using her laptop during study halls in school and at home, sometimes completing multiple online classes each semester. Participant 3 reported, “There is no way I would have been able to get the college credits I did without having the laptop. It saved me from taking quite a few college classes and having to pay for them in college.”

Participants credited their high school’s laptop initiative for their convenient access to online courses while in high school. Having a laptop as a learning tool and taking advantage of formal online courses were two major contributors to multiple students’ perceived readiness for college. “I feel like I was more prepared than my peers for college because of having a computer. The online classes I took in high school were hard but good for me,” said Participant 8. Participant 5, a first-year student at a Midwest two-year college stated:

I think (having a laptop) helped me a lot because I'm [also] now taking online classes. I feel like I knew what to expect with college classes because I was able to take college classes while in high school. I also feel good with my computer and using it for college work.

Participant 12, a student athlete studying at a four-year college, substantiated other students' claims by confirming the importance of online classes. He said, "I know taking the online courses in high school through DMACC (Des Moines Area Community College) really helped me a lot. I mean that really prepared me more for college."

In Chapter 2, five themes were identified regarding college readiness. One of the themes identified was students' knowledge about postsecondary education. Being able to take online college classes while in high school was perceived to promote college readiness by the majority (13 out of 15) of the participants interviewed. Students credited having the laptop to use for their online classes as a major contributor to their initial success as a college-level student. "My freshman year would be different if I didn't have a laptop in high school. It would take more time to find and use online resources in comparison to books. I think trying to figure out how to use new technology would also be more difficult if I hadn't had the laptop experience," said Participant 8.

Participants 2 and 13, the two that did not take an online class while in high school, discussed the reasons why they did not do so. One said, "I had access to online classes but chose not to take any because I heard they were difficult." The other student mentioned that the online classes offered by their high school did not appeal to them because she "did not want to be on the computer any more than she had to." The field notes indicated that these two participants held more critical attitudes about the 1:1 laptop initiative they experienced in high school compared to most of the other interviewees.

With the laptop computer, students were able to routinely and efficiently take advantage of time in and outside of school to take online classes. Having a laptop computer and engaging in online coursework were reported as effective contributors to



college readiness. Participants' ability to engage in rigorous coursework via their laptop helped prepare them for the rigors of college.

### **Theme 2: Academic Skills**

In addition to mentioning access to and benefits from formal online courses, interviewees also discussed in various ways relationships between their high school laptop access and the development of academic skills. The theme of academic skills is described below in nine parts: a) *networking and collaborating with others*, b) *identifying online resources*, c) *keyboarding skills*, d) *note-taking skills*, e) *presentation skills*, f) *organization*, g) *critical thinking*, h) *getting more help*, and i) *responsibility*.

#### **Networking and collaborating with others**

Participants were asked during their interviews if they were able to collaborate with others that they otherwise would not have been able to because they had a laptop computer in high school. Field notes taken during each interview recorded that participants tended to pause before answering this question. The delay in responses to this question seemed to be more about the wording of the question than the responses from the participants. The researcher often provided wait time for the participants to think about this question and sometimes rephrased the question to delve into their experiences in collaborating with others. During one of the interviews, Participant 14 reported, "I almost feel more prepared (for college) than an adult because I feel I could get internships because of the connections I've gained because of the technology and social networking in high school." This participant also mentioned that he thought he could post a question or request and have multiple people in his online 'network' respond to them.

Participant 14 went on to say, “I feel this has given me an advantage over some adults that may have had more years to gain experiences I have not yet had.”

Another student, Participant 15, shared a story about taking online classes and figuring out that he wanted to be a software engineer rather than computer programmer because of what the online class exposed him to. This participant took an online graphics class in high school. He reported that many of the assignments and tasks the instructor asked him to do turned him off from computer programming and excited him about developing and working with software. This is now his college major.

Students do not just socialize or network with their close friends on social networking sites. Being able to get answers to questions and network with others outside their peer network was also a benefit for many students who had a laptop computer with Internet access. Participant 12 said, “I was able to talk with business people, authors, and legislators in high school [that] I never dreamed I would work with.” Other students shared stories about a librarian at their high school who taught a class called Personal Learning Networking. This teacher taught students to reach out using technology to network with professionals around the world to seek their advice and expertise. The participants from this high school (Participants 7, 8, 9, 11, and 12) seemed to vividly reflect on this class in particular and the impact of this teacher on how they learned to use social networking to his or her advantage. Participant 9 noted, “We had a class with our librarian that was very helpful. It was basically kind of a social connecting course, and taught us about different websites and how to connect with different people. We also learned about different websites that would help us study, or find good research and

things like that in that class. It helped a lot I think, so yeah, I would say I am definitely more familiar with online tools because of this class.”

Multiple graduates from another Midwest high school (Participants 3, 4, 5, and 6) also spoke of a popular Spanish class. In this class, students networked with and collaborated with other students in 1:1 schools and states. Participant 3 provided details, saying:

We definitely had a lot of classes [that used] collaboration projects. Our Spanish course we had, actually had multiple projects with another 1:1 school and we collaborated with partners to create projects. And with another (project), we actually talked to kids in Philadelphia and Minnesota and collaborated on projects doing research. These would have been almost impossible without a 1:1 [program].

Students also mentioned connecting with other students that they knew or competed against using social networking. Participant 12 hit on this idea by saying:

Yeah, like I know it goes back to social media, but once you play sports and we play against kids, well then we would sometimes go on Facebook and add them, and you would talk and what not to talk about games, and talk about future opponents. So it opens up knowing people and talking to them you wouldn't have if you had to meet them.

Social media and networking seemed to give some students a voice they felt they would not otherwise have had. Participant 14 reported, “I mean me, personally, I was really quiet before, and I think the ability to talk with people more online makes me

easier to start opening up like emotionally going through high school, and so I think it's, I don't know that that made me more outgoing.”

Every participant talked about using social networking for both school and personal use. Many participants talked about emailing teachers back and forth about schoolwork. However, the email students used was not normally school-supported. Rather, students tended to use free email sources like Gmail, Yahoo, and Hotmail. “Our school tried to implement using email, but it never seemed to work. So, it never really helped me. But everyone does use Facebook and being able to talk with friends and asking them school questions helped more than email did,” said Participant 15. Other participants made brief mention of email but did not speak to whether the email server they utilized in high school was school-supported or not.

Overall, first-year college students reflected positively on their experiences when it came to social networking and collaborating with others. A quote from Participant 12 seemed to summarize the general perceptions of others about networking and collaborating with others: “I think social networking is a good thing. I think you can use Twitter and Facebook in effective ways; especially Twitter is really good for education. I know a lot of times when I had questions I just tweeted them out and I would have followers get back to me with an answer. I think that's an effective way to use social networking...or at least it was for me.”

### **Identifying online resources**

All 15 of the first-year college students interviewed in this study reported that they were able to identify better online resources in college now because of their high school laptop experience. Participant 1 directly stated, “I am better able to identify online

resources because I had the laptop and instruction with the Internet in high school.” Many students actually mentioned that online sites they used in high school were sites they continued to use in college. The most popular web sites cited by students were Khan Academy ([www.khanacademy.org](http://www.khanacademy.org)) and YouTube ([www.youtube.com](http://www.youtube.com)).

Multiple participants reported that high school teachers intentionally made them more aware of online resources simply because they had access to the Internet. Participant 1 responded about her awareness of online resources by saying, “I do, yeah, because using the laptops a lot helped us to find different ways of information or different routes to do research. Having that background knowledge is definitely helpful for presentations and reports in college.” When asked about being able to identify online resources, Participant 3 said:

I think one of the things that some of my teachers tried really hard to do is teach about primary source documents. We were supposed to have a textbook for papers that was more of a secondary source or we had to go online and find primary source documents. So, we actually practiced this and worked with teachers to make sure that our online resources were good enough to be used in our paper. I think my high school teachers did a good job with this because I use what I learned in college on papers now.

Participant 12 talked about being able to conduct efficient and effective online searches for resources, saying, “I know how to effectively use the Internet and Google before I got to college. I don’t have to spend so much time searching for resources.” With computers available to college students, being able to identify the best online resources is a skill. Students can conduct online searches that yield lots of results but identifying the best

resources for the topic they are investigating is important for quality research at the college level.

### **Keyboarding skills**

After completing the fifteen interviews, it was noted that all of the participants reported better keyboarding skills because of their use of a laptop in high school. Students used the terms “keyboarding” and “typing” interchangeably during the interviews. When students reported better keyboarding skills, it was assumed that they meant they were now able to type faster and/or more accurately because of their 1:1 experience. Three participants specifically indicated that they currently take their laptop computer with them to college classes. In class, they use their laptop to type notes. Participant 2 said, “I am pretty sure I can type faster than I can write. I couldn’t live without my laptop in college. I take it everywhere with me and live by it.” Participant 15 reflected on his keyboarding skills by talking about keyboarding being one of the major advantages of a 1:1 initiative. He said, “I’d say I have better computer knowledge and typing ability, but I’m not still not very fast. Once you have a laptop to use like everyday you get used to it by typing with it more and writing papers, and editing sites for your papers. Like sites on MLA format and stuff like that that helps too.” Participant 9 spoke about the benefits of keyboarding, saying:

I would say I have always been pretty good (typing). I mean using it (laptop) everyday made typing second nature. A lot of people (classmates) become really fast. I mean people that I knew who couldn’t type well are now definitely are at the same level as everybody else is.

Other students also reported major improvements to their keyboarding skills because of having a laptop. Participant 12 talked about how his improved keyboarding helped prepare him for college saying, “I guess my keyboarding skills improved a lot. I think it really kind of helped when I do research papers up in college. Participant 2 also said:

Well, I know that my typing skills are really good. I think we would have still used computers almost everyday at school even without the laptops, but I don’t know since we had them (laptops). It helps (better keyboarding skills) in college because you don’t want to be picking at a keyboard if you have a 40-page paper to write.

In summary, Participant 7 responded to the interview question about whether or not having a laptop in high school improved his keyboarding skills by saying, “Definitely. I mean writing papers and just being on the computer 24/7 in high school helps typing. Typing really just becomes second nature.”

### **Note-taking skills**

Many of the first-year college student participants felt that being able to efficiently and accurately take notes in college classes was an important skill that they developed while in high school. “My note taking probably would have been on paper still, and it would take me longer I think without a laptop. I would not be as organized with my notes either because on the computer you can just push save, and that’s all on your computer whereas if you have a notebook you need to flip through all of the pages to find notes.” said Participant 1. Other students also reported improvements to their note-taking skills because of the use of their laptop. For instance, Participant 14 said:

I took notes on it (laptop) a lot for the classes and I think it helped a lot. I think a lot of my note taking is more effective during classes. It lets you study for test and exams, and I don't know but a lot of my research papers are just a lot better because I have all the information to study for papers and exams and so forth.

Participant 9 stated:

They (professors) don't really require you go to class. So, if I actually go I can take notes on my laptop, which is much easier for me. Then, I have a lot of thoughts I can add to my notes and use my schedule and stuff during my class to mark down due dates for assignments. It is so much easier to keep track of everything you have to do.

Participant 7 said:

During discussions in class, you just have to take notes; you just got to do it. They don't really tell you what to do. They don't tell you what's going to be on the test, you just have to know, and that is definitely a challenge. I had to study like every night my first semester. Even with the Word document I had no idea you could take notes all different ways, you can set up notes in a ton of different ways which I had no idea. And now I love it, I use it (laptop) everyday at school.

Three of the participants reported specifically that they take their laptop with them to their college classes and use it for note-taking. Participant 9 began doing this after initially not doing so: "Probably like halfway through the semester when I figured it out, I started using it (laptop) all the time. I now bought my own Mac (similar to the laptop I had in high school) and take to college classes everyday to take notes."



### **Presentation skills**

Fourteen out of fifteen participants responded that they felt they could now create better presentations because of their exposure to a laptop computer in high school. After analyzing field notes, the researcher identified feedback from students from the same particular high school related to creating presentations. The graduates from this high school all identified having to create frequent presentations to share with their classmates. Participant 6 said, “It seemed like we did a presentation every week in one high school class or another.” Participant 8, a classmate, said, “I remember learning how to create different videos in high school. We had to present videos quite often.”

Participants identified various presentation software tools that they used, including PowerPoint presentations, VoiceThread, and online videos. Participant 8, who was attending a four-year institution, credited the multiple presentations he was asked to do in high school for his efficiency in college at creating presentations. He said, “I would say (creating presentations is) a major skill you need for college classes. Last semester I had a PowerPoint for a writing class that had to be like 10 minutes long. Since I had done many presentations in high school it made everything easier because I already knew how to put a PowerPoint together.”

### **Organization**

During one interview, Participant 14 reflected on his high school experience and talked about how unorganized he used to be. He reported that he frequently did not turn in assignments and projects on time because he couldn't “keep things straight.” This young person also admitted he was not a fan of having a laptop computer when it was first given to him, saying, “I hated the laptop initiative at first because I was a paper

person. After the first quarter I really started to use the laptop and appreciating what it could do for me.” The participant credited having a laptop in high school for improving his organization and time management skills, which has helped him to be successful in his first-year of college so far.

Other students also substantiated the claim that laptops can promote better organization. For example, Participant 12 reported:

I used to carry a whole bunch of notebooks and papers that would be all over the place. That could be kind of cluttered going through the halls and stuff like that. I think that with the computer I kind of had everything right there. It’s basically a big electronic folder. You can save all your work and all your notes and everything right there, all your homework and stuff was online, which really helped a lot for organization I guess.

Participant 9 said:

(The computer) taught me organization in a way. I used some of the tools I had on my laptop a lot like the calendar and to do lists. I learned to count on my computer to even tell me what events I had and all that stuff. So (the laptop) helped me get organized when I had tests and stuff.

Participant 8 believed that organization depends more on the individual person than the technology. He said:

I would say it just depends on the student. Some kids can be prepared and organized without stuff, and some people need technology and all that stuff to stay on track with their phone or computer. But the way that technology is going everyone will probably use technology more than other ways to stay organized.

College-ready students possess the skills and behaviors necessary to understand what is expected of them and understand how they best learn. The first-year college students interviewed in this study perceived that they had gained some of these skills. “I feel (the laptop) has got me ready for college more than my classmates,” Participant 15 reported. He went on to say, “I feel (that having a laptop in high school) was a major advantage. I can find better resources because I have experience with the computer. I am also good at bookmarking good online sites and being able to keep them organized in folders.” Participant 12 further talked about how the laptop helped him be more organized and aware of what he published, saying:

It made me more conscious of what I am spelling incorrectly, or what I’m saying or wanted to be said. (The laptop) helped me think about the fact that other people are going to read this. I actually got a lot of attention from someone like you (the researcher) or other teachers from their schools and (the 1:1 initiative) ended up leading to people following me on Twitter, and so it did matter what I said. You know I didn’t want to say something that was inappropriate or that looked stupid or uneducated. It just helped me mature and grow as a person, I think, to have the computers in high school.

Participant 7 concurred, stating:

I just think (the laptop) helped my organizational skills tremendously and gave me some confidence. I didn’t really have much of a problem in high school talking out but I know a lot of my friends who were quiet or shy. They were like the kids who sat back in the class. I think it really kind of gives them an opportunity to speak and then to get more confidence in himself and have their opinions heard.

Another student mentioned getting so used to his computer that he actually wanted the same model for college. Participant 6 said:

I would just feel more comfortable doing everything we did on the computers in high school. We had Mac computers, and once I graduated that was the only thing I wanted to buy was a Mac computer because I wanted to continue to use it and was comfortable with it.

The student went on to say that he used the money he received for his high school graduation to purchase the same Mac laptop computer for college. The participant reported currently taking his laptop to classes for notes and continued to be comfortable with the tools and resources he had grown accustomed to after years of use.

Besides organizational skills, participants also reported benefits to their self-management skills, efficiency using computers, and overall confidence using computers. Fourteen of the fifteen participants reported that having a laptop in high school enhanced their self-management skills. All of the participants reported that they felt more efficient using a computer overall because of their laptop experiences in high school. Every participant also reported being more confident using computers because of the experience and skills they learned by having a laptop during their high school years. "I thought it was a great experience. Not a lot of high school kids can say that they had Mac laptops for everyone and that they could take it home with them. At first people thought the computer was a toy but we found out it was more than that," said Participant 2.

Participant 12 echoed that statement:

Typing a paper in high school we used to have to go to the computer lab and the teachers would have designated time for you to do a paper whereas when we had

our laptop you could do it (papers) at home, you could do it in class, you could do it in study hall, you could do it in free time at some class, or you could do it on the way to a game or something. So, it helped a lot.

Not all of the first-year college students in this study agreed that their laptop in high school helped their self-management skills in college. For instance, Participant 14 said, “I wouldn’t think so. I think that I would perform the same way either way because I would try just the same if I had a laptop or not. I’m not going to put more effort toward something because I had a laptop or not. So, I don’t think having the laptop in high school was related to my quality of work.”

Participants’ responses illustrated that most of them felt that they believed they did gain specific academic skills necessary to be successful students in higher education. The skills that students gained from their 1:1 experiences in high school promoted their readiness for college.

### **Critical thinking**

Twelve of the fifteen participants believed that having a laptop in high school helped them to think more critically. Specifically, students noted that instruction from high school teachers in how to evaluate online information and websites was a direct skill that had helped them in college. Participant 6 said, “The laptop helped to stimulate critical thinking because you got different point of views in using online resources to conduct research.” High school teachers often challenged students to compare resources and make cases for why a publisher is credible. Multiple participants talked about high school teachers not allowing the online encyclopedia Wikipedia to be used as a reference.

Participant 6 reflected on two very different experiences with teachers in high school and the use of the Wikipedia website:

I know of this one instance when a friend or mine used Wikipedia to copy and paste the whole website to put it on a paper. He got like an A on the paper and in the class. The teacher was an old time teacher who should have already retired. He never used the computers for anything so he never had the knowledge of how to really break that stuff down (plagiarism). But our Spanish teacher was very strict on stuff like that. She would always try to watch us when we were trying to type papers for Spanish because a lot of the times students would go to a free translation website rather than getting into their book and trying to do it themselves.

Participants 9 and 2 gave specific examples of teachers using class time to have student's research and report back about various topics they were able to research online. Participant 9 mentioned a high school history lesson that she recalled in which a teacher had students use different online sites for research and reporting. The teacher used the lesson to demonstrate differences in historical perspectives as reported on the sites. Participant 2 experienced and reported a similar high school lesson. Her teacher facilitated a lesson in which students were asked to find three different reputable online resources about diseases in science. The teacher used a compare-and-contrast activity to instruct students how to evaluate the validity of materials they find online. Multiple students reported that because they had a laptop in high school, they were "more aware" of the online resources they used. However, Participant 12 did say, "I wish we learned how to do searches for more credible resources and learned how to produce more formal

writing in high school to be better prepared for college. We could have easily done this on the laptops.”

First year college students appreciated the experiences and skills they seemed to gain from taking online classes during high school. Many participants continue to take online classes and feel they are better able to evaluate online resources because of their 1:1 experiences.

### **Getting more help**

Participants often reported that, in general, they felt that they were able to get more academic help in high school if they needed it because they had a laptop and Internet access. Thirteen out of the fifteen respondents noted this in their interviews. The biggest factor in getting academic help was the ability to email their teachers and get prompt responses on homework assignments and projects. Participant 7 noted:

I would say instead of having to go to your teacher you could just email them and get help that way. I mean there were even a couple of times when they (teachers) would be gone but you could Skype them or email them to continue the class work even if they weren't there.

Students shared multiple stories about emailing teachers and having an answer to their question within minutes. Participant 11 said:

I mean you know I had teachers in high school that you could count on to email you back in the same night. I remember an assignment I was having trouble with once and my teacher emailing me back and forth until 11:00 at night to help me get the assignment done.

Participant 12 also reported the ability to get answers back from teachers quickly through email, saying:

Even late at night or on weekends teachers would get back to me. My high school teachers were amazing. I remember studying for a math test and not being able to figure out an equation. Within a couple of minutes of emailing my math teacher I had an answer and kept studying. I think I passed that test.

Just because students have a school-issued laptop does not mean they have Internet access at their homes. However, all of the participants interviewed for this study did have Internet access at their homes. Participants generally believed that they were also often able to find different online resources because they had Internet access and their laptop. One student (Participant 9) talked about using her laptop at home to find online resources if she needed academic help saying:

Well, there would be certain things like if I would be at home researching for a research project I was limited to the books I had with me or at home. I would go to the Internet. The Internet really helps with research and you can find almost anything on the web.

Getting more help is important for students who run into challenges and questions while learning new information. Participants in this study noted the ability to get more help when academic challenges arose. Most of the help students reported getting was through online resources and the ability to efficiently correspond with their teachers through email.



### **Responsibility**

Some participants gave credit to their laptop for promoting responsibility. “You had to take care of your laptop. Some teachers let it slip. It’s really just being responsible; doing your work, being on time to class, doing homework, and studying when you need to. Once you do those things the rest will take care of itself and you'll be ready,” said Participant 4, noting how responsibility is part of being ready for college. Participant 11 stated, “I actually felt like students had to step up and be more mature when we got the laptops. I mean some students still just messed around but those of us who took high school serious didn’t want to damage our computer and really used it for school a lot.”

Participants’ responses to the interview questions showed that the majority of them believed that access to their laptops and online classes while in high school helped them be more college ready. Most of them also noted that laptop access facilitated their critical thinking and help-seeking behaviors and some even felt that having a laptop in high school facilitated their growth in taking personal responsibility.

### **Theme 3: Implementation Dip**

A third theme that emerged from study participants’ responses pertained to implementation. Specifically, participants discussed various barriers and challenges related to their high schools’ implementation of a 1:1 initiative. These have been collected under the broader idea of an ‘implementation dip.’

Evidence of post-startup implementation dips was reported by a majority of participants, who highlighted instances such as poor uses of the new laptops, teachers who lacked initial confidence and training, students who did not take physical care of the laptop, students who abused Internet web access, and overall confusion about policies

and procedures. For example, Participant 4 said this about the start of his high school's 1:1 laptop initiative:

The first two weeks I got my laptop I hated it. I hated how we did no projects on paper anymore; everything was on your laptop. We took notes on our computer, and I was a paper person, I did everything on paper. And then my Spanish teacher actually taught us to use the podcast feature on our Macs, and we did presentations that way, and we got to record ourselves and put pictures in, and I really enjoyed that.

Participant 12 noted:

I think some of the disadvantages were just because of the first-years of using the laptop. I think we did a lot of things using trial and error. I think some of the courses were a little bit harder to integrate the computers into, so I feel like some of the courses were a little astray sometimes. Besides that there were little, if any, disadvantages to having the laptop in high school.

Participant 13 concurred, stating:

Well, I think that basically the first-year we started using laptops, we were all just getting the hang of it, getting the hang of that computers and stuff, so I feel like we used it for a lot more presentations and we kind of ease into it. So, it seemed to take awhile before we started to use the computer for other things like PowerPoint and other things like that.

Students reported that these implementation dips were noticeable and detrimental to their academic success at times, and often persisted throughout a semester or even an entire year. Since many of the participants experienced the initial rollout of laptop

computers in their high schools, they were able to compare the first year of implementation with later years. For instance, Participant 14 said, “It seemed like it took a semester to get over the distraction of the laptop and have teachers fully use it in different and better ways. It seems like the program was getting better and better over time.” Similarly, Participant 7 stated, “The teachers didn’t seem to be as effective using the laptops the first year. Once schools learn how to use the laptops effectively the laptop is a very good tool.” Students reported that both students and teachers seemed to have real challenges to address once the laptops were first rolled out. Participant 4 offered some advice for educators about these initial implementation challenges:

I feel if a school is going to have a 1:1 initiative they should know how to use them. If the teachers don’t know how to use them it is an issue. Schools need to slowly move students toward using the laptop too so it is not as big of change for them. This would help.

In addition to those already participants raised described, other issues related to implementation. The remainder of this section is discussed in six parts, relating to the subthemes of a) *distractions*, b) *access*, c) *software*, d) *content areas*, e) *goals*, and f) *evaluation*.

### **Distractions from the laptop**

A number of respondents noted that sometimes having a laptop while in high school distracted students. Examples included students working on personal projects during class time, social networking during classes, playing games during school, and looking up inappropriate pictures or content during school. Students exposed to a 1:1 laptop initiative normally are able to take their laptops home with them at night. All of

the students interviewed in this study were able to take their laptop home and used the laptop for both personal and school purposes. Participant 1 said, “There were some distractions with games and videos, but overall I used it for mostly school stuff.”

Participant 3 said, “People just wouldn't pay attention in class or were doing something else. Participant 7 noted, “There were some distractions like games and stuff that distracted me, but I always got my homework done.” Participant 2 said:

I think part of it (1:1 laptop initiative) made a lot of kids lazy. I mean just having the laptop made people distracted, so yeah...they get their work done, but they might not pay attention to the teacher because they would be on their laptop or something else during class.

Participant 6 stated:

I definitely got distracted when I had my laptop. I was definitely on other websites that I should not be on like Facebook and Twitter and emailing. And I feel like if I didn't have my laptop I couldn't do that because our teachers know when you have your phone out. I feel like I wouldn't be as distracted if I didn't have my laptop in front of me with Internet access. I would probably pay attention more.

Participant 8 commented:

I do not personally believe it (laptop) did (cause distractions), but I do have friends or know people that let their grades slipped because they couldn't focus or played games or watch movies. I pretty much became addicted to playing games on it, and kind of that great stuff, but other than that it didn't affect me negatively in any way.”

Participant 11 echoed these statements by saying:

Definitely distractions went on. Like, you could always go on Facebook and people would try to figure out the password for playing games. One of my own issues was that I always wanted to play games instead of pay attention in class or study halls. You could also chat with people that were in your class, or outside of class, which was also a very big distraction for me.

Similarly, Participant 14 said:

I think about two kids every class would get disconnected with the class. It might be the kids that already know and they are just bored. And I think some other kids that just didn't care.

Many of the study participants also mentioned the important role of the teacher. For instance, Participant 5 said, "Teachers that actually cared what students were doing on the laptops during class found a way to monitor students or asked students to keep their laptop lids closed." One comment from Participant 12 hinted at how teachers better effectively integrated the laptops for students as they learned about technology tools and resources:

Well, I think that basically the first-year we started using the laptops everyone was just getting the hang of it. Teachers and students were just getting the hang of the computers and how to use them. So, I feel we used them for notes and presentations more than anything to ease into it. A lot of times we used them for schoolwork, and then some of the teachers would start to use it for tests and other things like that. For my personal I used to check my email and I guess I watch movies. Almost all of my college classes utilize computers. For almost all of my

classes I have to go online to find out grades and for assignments and discussions that I post online.

Participant 12 went on to say:

But when I was in senior, they were getting the hang of it. My brother is a sophomore and is doing a lot more online now. Some of my teachers I still talk to tell me they are now collaborating with other schools. I know Twitter is a big deal now too. It was a big deal when I was a senior so it just sounds like the program is getting better and better.

Other respondents also were quick to talk about the benefits for students in learning how to manage their laptop related to distractions. For example, Participant 3 said, “I feel like, I might have spent a lot more time with Facebook and stuff like games that may be on my computer because I didn’t know, I wasn’t ever exposed to that in the high school, but I also feel like I spent a lot more time just trying to figure out my computer.” Participant 5 also gave credit to the laptop initiative for helping him to be more focused in college saying, “I think the advantages were that the laptop helped us get started for college, and how we would be using them in college. I think the disadvantage was there were websites and games that we used to play during class sometimes and that was a distraction.” Many of these same participants also believed that being able to “play” and utilize a laptop during high school for personal and social entertainment has lead to a more productive first-year of college. For instance, Participant 10 said, “I feel like many college students who get a laptop for the first-year also are distracted by having a computer. I feel like since I had a laptop in high school I am able to better focus and be more productive now.”

Students also gave credit to their teachers and schools for minimizing distractions as they learned about websites and technology integration strategies. Participant 6 was one of these students, saying, “It’s not about the technology but about how the teachers use the technology.” He went on to say:

One disadvantage was sometimes you get off track and maybe play games, but later on our school adopted a firewall thing or something, and it blocked most of those websites. So, they (laptops) became more just for learning and students could not play games as much and mess around. You know like Facebook...they blocked that. They had a system where they could monitor what students are doing and could see the screen of the computer. They could stop it, and blink your screen, and when teachers even have a free period or time on their own in their classroom, they could look at student’s computers in other classrooms. So, if they saw somebody on the game in say like a math class, and they knew they shouldn’t be doing that; they (the teachers) could block them and tell the other teacher.

Yeah it helped a lot.

Participant 10 agreed:

A lot of people thought it (laptops) just for games and iChat, and it was a little bit of a distraction. It took us like a semester to kind of get over that stage of thinking that it was just a toy. I know my senior year people were a lot more mature about it and we started using them (laptops) a lot more for different and better ways. I think even from the teacher's perspective my teachers didn’t really know how to use them at first to make it help us learn better.

Participant 11 also concurred:

With the laptop there are so many things that can distract you. You learn it, and it takes time to kind of be able to regulate yourself. It does take time to realize that you are on like YouTube too much and then to be able to say okay close that. It takes time to kind of realize that for yourself and be able to be like no, I need to pay attention or get my work done. Starting earlier with the computer, as we've been able to do, you kind of learn how to regulate yourself.

The participants clearly recalled experiences and situations in which the laptop or online sites or games that the laptop offered distracted them, and/or their peers.

Participants were also quick to note how teachers and school leaders handled the presented distractions. Some participants went on to offer ideas and suggestions to teachers and school leaders about how to minimize the distractions that the laptops presented.

### **Access**

The one student in this study who did not believe she was more college ready because of having a laptop in high school thought that she would have had a laptop at home anyway. This student, Participant 5, elaborated on her thoughts by talking about the positive aspects of having access to a computer such as being able to type faster, complete schoolwork, and learn software applications. She stated that her home computer had much of the same software that her school laptop had. She believed that, whether or not she had a school-issued laptop, she would have had improved technology skills. The participant did not discuss in detail how high school teachers' instruction might have been different if all students did not have access to a computer, but she did state that it probably would have been different without a 1:1 initiative.



Even though it's 2012, it can't be assumed that every student has access to both a computer and the Internet. There is no doubt that the Internet access that students have is diverse and unique to each student and school. Access to software, Internet connectivity, instruction, and resources seem to be unique to every school and every 1:1 initiative. Participants commented on varying levels of technology access. For instance, Participant 2 talked about using the laptop more in some classes than others, saying, "I used my laptop all the time for English papers and presentations in classes but I never remember using it for math. In college now I use it for a lot of the same stuff, like writing and stuff." Participant 7 noted that, "My high school laptop had software on it because I was in a journalism class and need it for the newspaper and yearbook. I got to use that program to create a video for the basketball program once. Some kids never got to use that program but it was neat. I can't remember the name of it."

A couple of other participants discussed their access to online textbooks rather than print textbooks for classes. Participant 14 said:

We used the laptop like a resource rather than basing all of our classes and stuff on using them. I think the teachers tried to use them as a good resource because you basically have the Internet and all that information basically at your fingertips. I feel like we could get a lot more information and then get a lot more done in our class periods than just having textbooks themselves.

Participant 12 appreciated the online textbook option he had but was cautious about how effective it was for all students, saying:

It really, really depends on the person and how they use it. Some people yes, some people no, some people get distracted. They are trying to study online because

when you have all these study tools that you have you also have many opportunities to be distracted, but for some people that not really helpful, and for some people it's impossible. For like for me personally I get distracted very easily, so I know that studying on the computer is not the best for everyone.

Participant 13 reflected on not having textbooks in high school. Her high school discontinued the use of textbooks as a cost-saving measure once it adopted its 1:1 laptop initiative. She said:

Probably, the communication with our teachers outside of class was the most helpful. You could just email them (teachers), instead of going to their classroom all the time. We just emailed them, and they hopefully messaged you right back, and we were actually saving a lot of paper.

However, Participant 13 also felt as though not having a textbook to read from in high school was a disadvantage when it came to college readiness, reporting:

I just feel that not having a textbook in high school didn't help me get ready for college because in college now they expect you to read two chapters a night in your book. In high school we didn't have textbooks to read out of. And in colleges if you don't read your textbook, you don't get the information that you need.

The access that students had related to software, Internet connectivity, instruction, and resources seemed to be unique to each school and 1:1 initiative. The experiences and feedback from the participants in this study provide evidence of the diverse technology access students that may experience both in high school and college.

## Software

Respondents reported using a variety of different software programs with their laptops. Participants were asked to compare the software they used in high school to the software they are asked to use in college. Participant 5 said, “We used Excel a lot in college, and I never did in high school. No, I never used that in high school at all.”

Participant 7 found fewer differences, stating that, “We had pretty good software in high school and I want to say we use basically the same kinds in college. I think we have Windows 7 in college, and I think we had just the version before that at high school.”

Participant 14 agreed, noting, “All my life I’ve used (Microsoft Word) documents. I don’t think there is a big difference between high school and college with software. I’m feel pretty up-to-date with technology so I mean I could see where it could be a problem but it wasn’t for me.”

In contrast, Participant 9 articulated differences she had experienced with software going from high school to a two-year community college:

The major difference I have is the email base where my high school was a Gmail based email server and now I have Microsoft Outlook. I think it’s terrible. But the basic programs like Microsoft Word, Excel, and PowerPoint are all definitely the same. One major difference though is that the college uses a blackboard system where you have an online section of your course and where you go to get drop boxes and readings for courses, have calendars, and class schedules. We used Moodle in high school for classes and assignments. My chemistry teacher had us use the system similar to how we use the college system, which helped a lot.

Knowing how to use a system for courses in high school is definitely one of the main benefits coming to college.

Software was a subtheme in the research findings under the Implementation Dip theme. In this study, participants reported using both similar and differing software applications from high school to college.

### **Content areas**

Study participants were clear that some high school teachers took advantage of students' possession of laptops better than others. Participant 14 reported using his laptop in high school math class only once in two years: "I think the only time I used my laptop in a math class was to do a PowerPoint, and I'm not sure what the PowerPoint was even about." Other students mentioned that laptops were routinely used in classes such as English, journalism, world languages, social studies, and science.

Multiple participants talked about particular teachers utilizing students' laptops more than others. The librarian at one school taught students various lessons about social networking, social etiquette, and personal learning networks. This educator's lessons left a lasting impression on students. As Participant 11 said,

I would say definitely things like social etiquette and learning how to write a professional email or deal with businessmen through email was helpful. I remember learning things like privacy issues and contract stuff. Learning how to write those formal emails is definitely one of the biggest things because I have to write emails daily to professors and knowing how to phrase those emails is basically extremely helpful.

A Spanish teacher at another school often had her students use the Skype videoconferencing service to communicate with students at another 1:1 laptop high school. Some of the participants in this teacher's class recalled the experience of learning how to use Skype and collaborate with another student to learn a new language.

Participant 12 elaborated on what they learned in this class, saying,

It made me more conscious of am I spelling incorrectly, or am I saying this the way I wanted it to be said, and it did help me think about that, and I was thinking well, other people are going to read this, and I actually got a lot of attention from I mean someone like you or like other teachers from their schools, and it ended up being people followed me on Twitter, and it so it did matter what I said, and you know I didn't wanted to say something that was inappropriate or that looked stupid or uneducated, so it just helped me mature and grow as a person I think to have these computers.

Participants clearly recalled some teachers in content areas who utilized the laptop more than other teachers in other content subject areas. The varying degree of technology integration in different content areas was part of the supporting evidence of an implementation dip students experienced with the 1:1 laptop initiative.

### **Goals of the initiative**

One of the main reasons that students may have experienced implementation dips as part of their high schools' 1:1 initiatives was because the goals of those initiatives often were not clear to students and/or teachers. Participants were asked to identify during interviews why they believed their high school adopted a 1:1 laptop initiative. The responses were both creative and diverse. As recorded in the researcher's field notes, not

a single respondent could address the reason that his or her high school adopted the initiative with any certainty. Answers from participants to this question varied quite a bit.

For instance, Participant 2 stated,

I mean technology is becoming so prevalent and so is how you use it in the workplace. Its just the cost was finally low enough, that they (school leaders) were finally able to do it (adopt a 1:1 initiative in high school). I mean we still had computer labs, but not everyone could always get into the labs when they wanted to.

Similarly, Participant 7 said:

I think the goal was to get the students more aware of the new technologies that are coming out and the features on the laptops. They (laptops) had their advantages in teaching, and for the kids, but I really think it really helped us moving to the next level for most of us.

Participant 6 stressed students' technology fluency in his answer:

I think the reason that the high school decided to get all students laptops was to try to make us more tech savvy. Everything uses a computer these days. Our principal was supportive of technology and brought the laptops to the high school. He thought it would really help us.

Participant 13 thought it had more to do with information access:

I think it was just getting information we needed really quick. If you didn't understand something you could get it on the Internet, or if you had a paper to type and you had your own computer you wouldn't have to go to the computer lab. Just stuff like that made things more accessible and what not.

Participant 14 wasn't sure:

I mean it wasn't necessarily like an initiative. It was more of the school philosophy given that my year was actually the first graduating class of the school that had a 1:1. So, the whole purpose of it (laptop initiative) I guess was to make sure the students had other resources that we got good at. Every resource was available to us in order to do research and for other school stuff. I guess the purpose was maybe to promote digital literacy.

Some students had no idea and/or answer regarding why their high school adopted a 1:1 laptop initiative. Participant 9 believed that there were financial incentives at her high school, saying, "I think we got a grant and that's how we got them. I don't really know." Follow-up with this interviewee's high school principal was done after she mentioned that her high school received a grant because the researcher was interested in what grant the school received. The current high school principal stated that no grant was ever received and that the primary reasons for the laptop initiative were to reduce paper costs, better engage students, and better prepare students for colleges and careers after high school.

A couple of students believed that their high school adopted a 1:1 laptop initiative simply to be one of the first high schools to do it in their local area. Participant 13 said:

I think because the world is now technology. It's like if you don't have a cell phone, if you don't have a computer, then you're just kind of out of the loop. And I think that our school wanted to be one of the first to get it (1:1 laptop initiative) going. There were always people coming in to our classroom and like watching

us, and asking us questions after we had it. I just feel like our school wanted to be the first to see if it would work.

Similarly, Participant 3, who attended a different high school, reported:

I think our school went to laptops to try to save money somehow but I also think they wanted to be the first school around to give every single student a computer. It was pretty cool because I didn't know of any other students around who had laptops in school. But, I guess I don't really know exactly why my high school got laptops the year we got them.

Based on the student's feedback throughout the interviews, participants were not clear on exactly why their high school adopted the 1:1 laptop initiative. Furthermore, participants were not able to articulate any clear goals that their high school established when adopting the initiative.

### **Evaluating the initiative**

A contributing cause to whatever implementation dips were experienced may have related to (non)evaluation of the 1:1 programs. Participants were asked if they knew how the 1:1 laptop programs that they experienced in high school were evaluated for effectiveness. The responses to this question were less confident and more diverse than those given regarding why their high school adopted a 1:1 initiative. For instance, Participant 12 elaborated on his thoughts about how he believed a 1:1 program was evaluated by saying:

Our school has always had good standardized testing scores. I think the evaluation of the initiative in the first two years was a drop in our standardized testing. The first-year we had it (laptop initiative) especially was just trial and error and trying



to get things right. The head of academics, or whatever she is, came into classrooms, and I think a lot of time she would try to find out how effectively the computers were being used. I mean I think they were still determining the way to kind of evaluate us I guess.

Participant 4 simply said, “I think it was pretty effective. I'm not sure if we had an official evaluation, but in my opinion it is really effective.” Participant 10 had no idea: “I don't know how the high school evaluated the 1:1 laptop initiative. Participant 14 didn't either:

I can't say that I know. I really don't know how they would gauge whether it's worth it or not. I think it was personally, but there was no way to tell if we were performing better or not because of the computers.

Distractions facilitated by laptop access, inequitable access, varied software, and differential teacher usage all were barriers identified by respondents regarding effective laptop initiative implementation. Additionally, unclear or poorly-communicated goals and evaluation measures of the 1:1 initiatives that the students experienced were possible reasons for the noticeable implementation dips. Despite these factors, students still overwhelmingly reported being appreciative of and benefiting from their 1:1 laptop experiences.

#### **Theme 4: Technology for Instruction**

In this final section, participants' responses regarding instructors' technology integration awareness and integration are discussed. This section is broken into three parts: a) *high school teachers' use of technology*, b) *professors' use of technology*, and c) *professors' awareness of technological resources*.

### **High school teachers' use of technology**

The overall perceptions of the first-year college students interviewed for this study were very positive regarding their high school 1:1 experiences. Students often credited their high school teachers for making their 1:1 laptop initiative a positive and meaningful one. Some students actually mentioned that they were appreciative that they had a high school experience that included usage of a personal laptop computer that they could take home. Participant 11 was one of these students, saying, "I'm grateful that I went to a high school that had the vision and financial ability to provide all the students laptops. When I was in high school I didn't realize how fortunate I was." Fourteen out of fifteen participants reported that they believed they were more college-ready because of their experience in a 1:1 laptop initiative in high school.

General perceptions of high school teachers' use of technology for instructional purposes were often quite complimentary. Most participants believed that high school teachers worked hard to identify effective ways to integrate technology into instruction, even though many times teachers' learning curves occurred over the course of a semester or even years after initial implementation of a 1:1 initiative. Participant 14 described his high school teachers as "fast learners with technology." Participant 15 described his high school teachers as "learning on the run." In general - and as discussed further below - participants believed that their high school teachers understood and utilized technology more effectively than their current college professors. Participant 14's statements were indicative of this belief: "High school teachers seem to be better trained to use technology than my current college professors who don't ask students to use technology very often."

Participant 1 affirmed the common belief that high school teachers' adoption of certain practices facilitated college readiness:

In high school teachers often made us turn in assignments online. This is similar to what my professors ask me to do now. I think having to do that in high school was good because it made it easier in college. It (papers) has to be in a certain format to be uploaded but it isn't hard to do. Not all my high school teachers used this system but it helped me now that I think back about it.

Participant 3 focused on the use of productivity software:

A lot of what we used the laptop for was typing assignments. I remember in my senior year we didn't hardly ever hand write an assignment anymore. We would type and print almost everything. I mean that really speeds things up. Emailing was a big thing too. Email was a constant use too, as well as doing PowerPoints. I mean honestly we could create assignments, PowerPoints, movies, and stuff like that on our laptops. We did these things pretty often.

So did Participant 5:

It just depends on the class I guess. My first-year we used them (laptops) just for taking notes because they (teachers) didn't like us on them, as if we were going to play games or anything like that, but my composition classes we used them all the time to research and write papers.

Participant 12 was complimentary of how he learned to create online projects in high school, saying:

We didn't do many projects online. We did a video project it seemed like every couple of months in my high school classes or at least in Spanish for sure. My

creative writing class, we actually incorporated videos, and sort of as we didn't write as much we did a video podcast. In high school we did a lot more different things. The first video project I had to do this year in college I'm just starting now in my French class (second semester).

Multiple participants made mention of younger teachers utilizing technology more than other teachers. Participant 12 said, "It seems like the younger teachers are the ones who understand the technology better in high school and college."

For instance Participant 6 talked about a younger Spanish teacher, saying:

She was very active in using the laptop. We would take quizzes, and there were clickers that with you could like click A, B, C or D for the answer. It's supposed to be more interactive learning and a little bit more fun, so it was nice she did that.

Participant 7 echoed this belief:

For school, I mainly used (the laptop) for just one class because there was a young teacher and she was more into the technology. She was more willing to use it and what not. I used my laptop for a lot of personal things and for schoolwork outside of classes.

Participants interviewed were very willing to share ideas and thoughts about how their school and teachers could have made their 1:1 laptop experience even better. Some students also gave advice about how their high school 1:1 initiatives could have prepared them better for college. Participant 13 said flatly, "(The teachers) need more education on how to teach using technology." The researcher's field notes indicated that this student felt that teachers were forced to utilize technology that they were not ready to integrate.

Participant 14 also mentioned that sometimes it seemed that teachers were forced to use technology:

We went from textbooks and books that mean a lot to just the computer. I think that progressed every year. (The 1:1 laptop initiative) started off slow but every year the teachers would learn new things that we could do with the computers. I think teachers were like forced to use the computers. I mean a lot of things were used, and some things we never got to but teachers seemed to feel like they had to make us do some things just to do them.

Participant 2 talked about how his high school teachers utilized the laptop computers for homework. She provided feedback as to how his high school teachers could have even used the computers even more to make homework meaningful. She said:

My first semester you would read something out of the book and write a couple of paragraphs for homework. With some assignments, the teacher would have a couple of people post their work, so I guess that was a little bit of the theme that I feel like I took away from high school classes. The high school teachers could use different variations of assignments and projects more often that would have helped me more for college. I mean with the laptops teachers can have students post assignments more often, work with others online, submit homework to teachers electronically, or even complete online presentations.

Participant 12 gave the following advice:

I just wish I wrote a little bit more in high school. Comparing how to learn how to write and being able to find more credible information through database searches is a big part of the writing process that I could have had more practice

with. I wish we did more of that, that's cool though, but that's one thing I wish I had more of in high school. I just wished we had done a little bit more writing and maybe not so much of the casual writing. I wish we did that a little bit more, and we could have done that on the laptop, and I feel like we just didn't and we didn't use database searches as much as we should have.

The overall feedback and experiences participants shared about their high school teachers' use of technology for instruction was positive. Participants noted that their high school teachers worked hard and quickly learned ways to utilize technology for instructional purposes. Some participants recalled that some of their younger teachers seemed to utilize the laptops more often for instructional purposes.

#### **Professors' use of technology**

As seen below, most of the interviewees did not believe that their college professors fully utilized technology for instruction or learning. Interestingly, at least one participant noted that not every college student wants his or her college professors to fully utilize technology. To illustrate this point, Participant 6 said:

Some college students like when teachers use technology and others don't. When I had one class where the teacher used YouTube videos there was a couple of kids in there that always complained. They just wanted the teacher to sit there and talk, you know an old fashioned based classroom. But a lot of us kind of liked the little difference in seeing videos and being able to discuss the videos. One time some students got up and walked out of the class because they were mad about it. So, I think it just depends on how you feel about things.

However, it was much more common for participants to make comments like “some professors do not allow any technology in the classroom” (Participant 7) and “there is a wide difference between professors in the use of technology” (Participant 15). Participants that did report experiences with their professors’ utilization of technology gave examples of academics using technology to deliver instruction via PowerPoint presentation software, post assignments to a course management system, or posting lectures for students to download and re-watch or listen to outside of class. Participants 12 and 15 reported taking their laptop computer to class daily to take notes but said that this was not something that all professors allowed. Similarly, Participant 7 said, “About half of my professors allow students to bring laptops to class and half of my professors don’t.”

Other comments from students served as insights into first-year college students’ perceptions of their professors’ use of technology. For example, Participant 12 said:

I think professors like incorporating computers when they can. But I think in college you read so much it would be hard to read everything we are supposed to online. In one of my classes all of the text is online and I know students don’t like that unless they can get out a Kindle or something. We like the hard copy still where we can highlight.

Participant 10 noted that college students have more autonomy than perhaps students in a high school 1:1 initiative do:

In college it’s more of your choice if you want to use a computer and how much you wanted to involve it. In high school we definitely were forced to use it a lot

more. In college it seems more of a choice like if you want to write all of your assignments or if you want to get help from the librarian and stuff like that.

Participant 5 found professors' use of technology to be fairly traditional:

Well, when I was coming (to college), I honestly had absolutely no idea how professors would use technology. I had the first big assignment in which my professors made me use technology during my first semester. We had to create a video for class. I did videos in high school, which was really beneficial, but other than writing papers and doing research I have no idea what college professors use it for.

Participant 11 was complimentary of professors' use of technology at her four-year university, saying:

My teachers are very technological people. We have the blackboard system that we use, and as our assignments get turned in, our grades are posted and announcements are posted too. And we do take a lot of quizzes, like in class quizzes on the Internet. A lot our teachers have PowerPoints up that we just take notes from.

Participant 12 noted differences in technology awareness by his professors in different content areas:

I feel like my high school teachers knew the technology better than my college professors. There is problems when they (college professors) don't, they are not as efficient and just don't know as much about things like Twitter. I'm in communications classes mostly in college so they are pretty good about it (using technology), but my business teachers are not as up-to-date with the new



technology and all the different online sites available. My high school teachers seemed to know more about how to teach children with technology and stuff like that.

Participant 8 commented on the vast differences of how professors use technology for instruction in comparison to his expectations for students to use technology outside of class. He stated:

The professors don't really use the technology during class but outside of class as when we are expected to use it. I have many classes where we can't even bring our laptop in the class so it forces us to focus. But, they (professors) expect you to be able to use it to reach the class website outside of class for sure.

The use of technology for instruction by college professors' is unique from professor to professor. Participants reported that some professors do not allow laptops in their classes while others welcome them. Participants also reported, overall, that whether or not they are allowed to bring a laptop to class, most professors expect students to use computers outside of class to write papers, access course management systems, email instructors, and research course topics.

### **Professors' awareness of technological resources**

Expectations for technology use by college professors were understandably high for students who had experienced a high school 1:1 laptop initiative and teachers who were trained and expected to integrate technology on a routine basis. However, students did not believe that college professors were aware of many of the technological resources available to them and their students. A professor who fully utilizes technology to deliver instruction, post and submit assignments, share online resources with students, and/or

allow students to create projects or presentations was never described by participants.

The overall feedback from students was that most professors might not even know what resources are available for them to better deliver instruction or to allow students to create products that conveyed their learning in different ways. Students' examples of professors' use of technology for instruction often centered on the use of PowerPoint and the posting of lectures to online sites.

Participant 8 reported that not all professors are willing to allow students to use technology, saying, "I have many classes where we can't even bring our laptop in the class so it forces us to focus. But, they (professors) expect you to be able to use it to reach the class website outside of class for sure." Participant 12 said that he thought he "knew more about technology than college professors would ever even want to know." Because this student had two years of experience with a laptop computer during high school, he made the claim that he was "more technology experienced than any of his college professors." Participant 9 reported, "College professors are more picky about the websites students use because they want students to distinguish between good and poor professional articles."

Participant 6 noted that professors' knowledge varied by course:

I would say it depends on the class here. You have your more lecture-based classes being social studies major and most of the professors don't like to use any media. But going to other classes this past semester I had a teacher who used a YouTube clip everyday to show us multiple perspectives of a topic. And then others, besides like my history classes, every teacher incorporates a PowerPoint for learning.

Participant 7 stated that differences in technology knowledge between students and professors were generational:

I think most professors aren't as good with technology as all students are because we are still used to it. This isn't their fault because we kind of grow up with it so we know how to use things fairly intuitively whereas a lot of professors are slightly older, and they didn't. They are getting used to use it (technology) so it's like my professors don't know all that is out there.

Participant 8 wished his professors used technology more:

Some issues are too complicated to send out an email with assignments. I think some kids would probably prefer their professors use more technology. Yet some classes use technology more than others. It seems a lot of college classes use PowerPoints and the professor just tries to get through it before the class ends.

Participant 14 saw fewer differences between high school and college:

Let's say that (laptop use) was pretty similar for turning in assignments. They (high school teachers) are pretty similar to what we experience in college. I mean in college, they normally ask us to go to community websites, and when we do, I would say they are pretty similar too the ones we would actually go to in high school.

Although responses of participants varied somewhat, overall the group believed that high school teachers who were part of a 1:1 program better used technology for instruction than their current college professors.

### Additional Findings

In Chapter 1, the author of this dissertation shared his mental model of how he believed that high school students were more college ready and what skills and traits possibly made them more ready for college. After the study concluded, the researcher reviewed and updated his mental model graphic (Figure 8). The following paragraphs explain the model in relation to the findings of this research study.

In Figure 8, the laptop computer screen lists some of the specific activities and experiences that participants reported engaging in on a routine basis during their high school 1:1 laptop experiences. These academic activities included creating presentations, taking online classes, keyboarding, social networking, identifying online resources, getting academic help, using email, and understanding the college culture.

These skills and practices are filtered through college readiness themes. Those five themes are listed inside the arrow in Figure 8. In Chapter 2, five themes were identified around college readiness research. These themes included self-advocacy, self-management, content knowledge, knowledge about postsecondary education, cognitive strategies.

Based on the feedback and described experiences of participants in this study, their exposure to 1:1 laptop programs in high school promoted these college readiness areas. During each interview participants were asked, “Some claim that students who are exposed to a 1:1 laptop initiative in high school are more college ready because they are more organized, efficient, confident, connected, and can produce higher quality school work. Do you agree or disagree? Why?” Participants overwhelmingly agreed with this general idea, citing their confidence in being college ready because they had a laptop



the basic knowledge and communications skills to learn in college” (Participant 4) to “Being college ready means having the motivation and ability to learn” (Participant 8). Another reported college readiness as “being prepared to be on your own for school and focus to get things done without relying on others” (Participant 7). Participant 9 proclaimed that “being college ready means that a student is able to effectively study and prepare for tests.” Participant 14’s definition of college readiness focused on learning: “College ready...I think that means the basic knowledge and communication skills to learn. I mean it’s not just what you know but it’s also how you learn.”

There also were some distinct similarities in responses to how the first-year college students defined college readiness. The majority of college readiness definitions had components of being prepared to handle college level work and a high-level ability to learn. Participants’ definitions of college readiness almost all focused on academic elements such as student motivation, focus, communication skills, or time management skills rather than adaptation to the college lifestyle or living on one’s own.

**No regrets regarding their 1:1 experience.** Despite being subjected to some trials and tribulations as part of their secondary-level 1:1 experience, not one first-year college student interviewed in this study regretted having a laptop in high school. Rather, some students actually said that they wished they had their high school computer back because they were so comfortable with it. Although students were cautious regarding some of the ways that having a laptop can distract students, all participants said that they would prefer that their own children someday be in a 1:1 laptop high school rather than a school without laptops. For instance, Participant 8 said:

I would definitely send them to a 1:1. I think it's taught me so much about different ways of learning. I feel like I'm ahead of my other classmates and I will be definitely more prepared when it comes to working in the workforce when I graduate. I would definitely send them (future children) to a 1:1 school if I had the choice.

Similarly, Participant 12 reported:

I guess it just depends on the grade level. Really you have to learn the basics. In the elementary I wouldn't want my child to have a laptop yet, but junior high definitely because they need to start learning how to be responsible online and how to learn in different ways. But learning is the key and I think every school will be a 1:1 school in 10 years down the road.

Participant 15 concurred:

I feel that's what America is, a place where we use technology everyday all the time. I feel that if my kids grow up with it then they are going to understand it better. For elementary school I will send them to the non-laptop school because I think being so young they need to not be looking on the screen all the time. The middle school I will probably say the same. For high school I would probably send them to one with laptops.

These students' voices appear to support the decisions of leaders and organizations to empower students by putting laptop computers into their hands and by training teachers to fully utilize the capabilities that laptops facilitate. Only one participant reported that she would send her child someday to a traditional school without laptops. Participant 5 supported her decision by saying:

I'm choosing traditional school because I don't know the social aspect of it (the laptop) really. I really think some of the things would be better written down like accounting, math, and so on. I hated those online, and I think it's better on paper.

This research study provided insight into first-year college students' perceptions of their college readiness and their high school teachers' and professors' use of technology. Many high school 1:1 laptop initiatives boast that they will promote college readiness. Participants in this study seemed to agree with this belief.

### Summary

This chapter presented the results from interviews of 15 current college students who participated in a high school 1:1 laptop initiative for at least two years. Findings were presented in four sections that corresponded with the primary themes that emerged from the results. Categories within each theme helped to support and provide insight into the themes.

First-year college students that were exposed to a 1:1 laptop initiative in high school are the only people that can truly evaluate the impacts of a 1:1 initiative on their own college readiness. Participants in this study clearly believed that the formal online classes and other laptop-facilitated learning experiences that they had in high school improved their readiness for postsecondary education. Feedback from participants also supported the notion that their academic skills improved because of their laptop experiences. These improved academic skills included the ability to network and collaborate with others online, identify online resources, improve keyboarding skills, obtain more effective note-taking skills, improve presentation skills, and become better organized. The high school laptop initiatives described by participants, despite some



variations in how well they were implemented, appear to have promoted and facilitated respondents' college readiness.

This chapter also presented findings that students who are part of a secondary-level 1:1 initiative often experience an instructional implementation dip, particularly during the initial rollout period. Challenges identified by participants included the potential distractibility of laptops, inequitable access for students, different software access, and varying use of laptops across courses, instructors, and content areas. Unclear or poorly-communicated goals and evaluation measures were presented as possible contributors to observed implementation dips.

Finally, participants in the study also addressed the use of technology by their high school teachers and college professors when it came to instruction. Students reported that even though high school teachers often had a learning curve themselves when it came to utilizing technology and online resources, they generally tended to develop and utilize effective technology strategies for instruction. Students also typically reported that college professors' use of technology and their awareness of resources was underdeveloped compared to their high school instructors. Many professors did not use technology at all to deliver instruction. Overall, participants believed that high school teachers who were part of a 1:1 program better used technology for instruction than current professors.

Chapter 5 presents a discussion of the results and gives recommendations for future research. Implications for stakeholder groups, including students, parents, teachers, and school leaders, also are presented. The chapter concludes with recommendations for school 1:1 initiatives and the educators who implement them.

## **CHAPTER 5. DISCUSSION, RECOMMENDATIONS, AND IMPLICATIONS**

Chapter 4 provided the results of this study. This chapter includes a discussion of the results and implications for various stakeholder groups. The chapter concludes with recommendations for future research in the areas of college readiness and 1:1 laptop initiatives.

### **Discussion of Results**

In Chapter 2 of this research study, five themes were presented around college readiness. The next section of this chapter describes participants' feedback related to each of the college readiness themes delineated in Chapter 2. The college readiness themes gleaned from the literature included cognitive strategies, self-management, content knowledge, knowledge about postsecondary education, and self-advocacy skills.

#### **Cognitive Strategies**

Conley (2008) defined a college ready student as one who is able to understand what is expected in a college course, cope with the content knowledge that is presented, and take away from the course the key intellectual lessons and dispositions the course was designed to convey and develop. Feedback from participants in this study showed that they perceived that having a laptop computer while in high school helps students develop the cognitive strategies necessary for college success.

Participants in the study recalled unique experiences while taking online classes, specific lessons that promoted critical thinking, and developing skills to analyze online resources - all skills that they specifically gained because of ubiquitous exposure to a laptop computer. For example, Participant 8 talked about being prepared to handle college-level content because of his experiences taking online classes in high school. He

said, “I feel like I was more prepared than my peers for college because of having a computer. The online classes I took in high school were hard but good for me.” Students who take online classes must be self-motivated to understand how to use the online platform that provides their course. Online students also must be motivated and possess the self-discipline to seek online information and meet course deadlines. Additionally, students who take online classes have to be willing to seek help and ask questions if they struggle with a concept or topic. Respondents reported that having a laptop computer and engaging in online coursework allows students to “understand what is expected in a college course,” and “cope with the content knowledge that is presented,” just as Conley (2008) envisioned in a college ready student.

Critical thinking and the ability to analyze online resources were other skills that participants reported gaining due to 1:1 exposure. For instance, Participant 6 said, “The laptop helped to stimulate critical thinking because you got different point of views in using online resources to conduct research.” Because most online courses utilize other online resources, students often have to seek out and evaluate websites for reliability and validity. Having a laptop and convenient access to the Internet provided students with exposure to ample resources that promoted student learning. The Advanced Placement Index (Conley, 2008) defined college readiness through multiple standards. One standard stated, “Success in college-prep and college-level courses taken in high school that require in-depth subject-area knowledge, higher-order thinking skills, and strong study and research skills.” The online courses that students reported taking while in high school seemed to have the components enunciated in the Advanced Placement Index and

appeared to demand those academic skills from students. As a result, study participants felt better prepared for college coursework.

Fourteen of the fifteen participants had favorable responses to being able to find online resources, gain academic skills, and think critically because of their 1:1 laptop experiences during high school. As described in Chapter 4, participants' experiences and feedback supported the notion that they gained cognitive strategies because of their 1:1 laptop experiences in high school.

### **Self-Management**

As stated in Chapter 2 of this study, schools today are given the task of not only educating students with the three Rs of Reading, wRiting, and aRithmetic but also are expected to give students strong backgrounds in science, technology, global studies, and a diversity of so-called "21st century skills" such as critical thinking, collaboration, agility, initiative, oral and written communication, analyzing information, and imagination (Wagner, 2008). Most of the participants in this study specifically mentioned that regular usage of a laptop promoted organization, responsibility, and time management skills. For example, Participant 8 stated, "Without having a laptop in high school I would be taking hand notes in college and not be as organized." Some participants even talked about specific widgets they kept on their computer or file system that helped them to stay organized and to turn assignments in on time. Participant 15 said, "I used the sticky notes app on my computer to remind me of assignments and homework."

Being able to take computers home further expanded students' access and ability to keep their work organized (Apple, Inc., 2005). Participants supported this claim by

discussing improved organizational skills because of 1:1 laptop experiences both at school and home. These students generally talked about developing systems on their computer to organize folders, utilize computer tools, and not having to shuffle papers as ways that laptop usage improved their organization skills. Participant 4 talked about going from being a “paper person” to paperless, saying:

I was really a paper person. After I had my laptop for a while I realized all the features it had that I could utilize to keep me more organized. Eventually, I used widgets as my calendar, sticky notes to stay organized, and folders to collect and organize documents for school.

Multiple participants brought up the idea that they were more responsible because of their 1:1 experiences. Participant 12 directly stated, “I believe we had to become more responsible when we got the laptops.” He went on to talk further during the interview about the exact day on which he received his new laptop computer. He reported that at the high school’s rollout night, his parents listened to various sessions on taking care of the computer. He remembered the advice and tips that the presenters offered to students. Furthermore, he recalled his high school principal checking students’ lockers during the first couple of weeks of the school year to make sure they were locked between periods. He said, “My old principal would take our laptops out of our lockers and keep them in the office until we came and got them if he found our lockers unlocked. I think he was trying to make us more responsible.” The idea that a laptop promotes learning time and responsibility is supported by an earlier meta-analysis of technology studies (Apple, Inc., 2005), which noted, “Technology engages students, and as a result, they spend more time

on basic learning tasks than students who use a more traditional learning approach.” The laptop is a tool that seems to promote academic responsibility.

Research studies on college readiness indicate that self-management includes both a behavior and mindset necessary for college success (Conley, 2008). Specifically, students must be able to plan ahead, prioritize tasks, keep track of large amounts of information, and meet deadlines (Conley, 2008). Participants in this study reported usage of their laptops in high school in ways that promoted their self-management skills, including being more organized, more responsible, and more engaged with learning tasks.

### **Content Knowledge**

During her interview, Participant 13 said, “I did not feel ready to handle college content because I didn’t have a textbook to read from in high school. In college you are expected to read.” She was the only participant that did not feel prepared to handle college level content. Most of the participants credited the laptop that they frequently used in high school for their readiness to hand the rigors of college academics.

According to Wolfe (2003), the original Lotus 1-2-3 and Microsoft Word software applications were initially most popular in business and industry. These software applications eventually underwent mainstream adoption by schools. Today, spreadsheet and word processing tools (and others) are regularly used by educators and students. Not only do students need to be prepared to handle college ready content, they also must be ready to handle college ready software applications. Early versions of productivity software have evolved significantly and new tools appear on the horizon on a regular basis. Students who experience a 1:1 initiative have the opportunity to use and

experiment with software applications that help them with learning tasks. Students in this study generally felt very capable of handling college level content and software.

The Advanced Placement Index (API) stated that students are *college ready* when they have the knowledge, skills, and behaviors to complete a college course of study successfully, without remediation (Conley, 2008). The findings of this study support the idea that students who experience a college preparatory curriculum in high school seem to perform better with college level coursework. Fourteen of fifteen students interviewed took at least one online class in high school. Besides taking online classes, participants reported the ability to create presentations and network with others as benefits of having a laptop while in high school. For instance, Participant 12 noted:

My freshman year probably would have been different if I hadn't had a laptop in high school because I would have struggled learning software and creating presentations. Because I had a laptop in high school and had to do a lot of presentations, I can create one pretty quick and make it good.

The college ready student is able to understand what is expected in a college course, cope with the content knowledge that is presented, and take away from the course the key intellectual lessons and dispositions the course was designed to convey and develop (Conley, 2009). While only 24% of all 2010 high school seniors met all four ACT college readiness benchmarks (English, reading, math, science), the feedback from participants in this study indicate that they believed they were more ready to handle college level content than the average high school graduate.

### **Knowledge about Postsecondary Education**

College ready students should possess some key *knowledge about postsecondary education* (Conley, 2008). For example, students must be able to match personal interests with a college major, understand basic financial aid concepts, register for classes, and understand how the culture of college is different from that of high school (Conley, 2008). Ten out of fifteen participants responded favorably that the laptop initiative they experienced in high school promoted their knowledge about college cultures. In short, these students believed that they had a better idea of what to expect in college because of their high school laptop usage.

The element of knowing about postsecondary education starts while a student is in high school. College ready students tend to understand the difference in culture between a high school and college setting. Most schoolteachers talk to upperclassman about the differences between high school and college but do not go into detail about the differences. Furthermore, there are no statewide expectations or standards that high schools intentionally teach students about the difference between high school and college. Students who have older friends or an older sibling have an advantage in understanding the college culture. Students who lack these fortunate circumstances are left to figure out some of the true differences between high school and college by visiting the college campus, talking to others, and collecting information about colleges online.

Most of the study participants reported being able to find college scholarships, complete financial aid documentation, correspond with college admissions counselors, and learn more about college course offerings because they had access to a laptop and the Internet in high school. Individual students developed much of this understanding on



their own time and through their own ambitions. For instance, Participant 6 talked about social networking with college peers to get an idea of what to expect in college:

Once we got our laptops everybody got Facebook, and everybody became more social in and outside of school. I have never been a very open person, so it kind of opens you up more. Just doing things like that and talking to different people made me more outgoing I think. I was able to connect with some college students from my high school that went to the college I was planning on going to. I talked to them a lot about college.

Students that used their laptops to help understand the financial aspects of college reported using the computer to find and complete scholarships, fill out the Federal Application For Student Aid (FASFA) form online, and research costs of tuition and books for colleges in which they were interested. Six of the interviewees specifically stated that the laptop they had in high school helped them understand the financial aspects of college. “It made it much easier to apply for things like that where I could work on them during my study all of the school that there were I can research scholarships during open periods,” said Participant 4. Participant 14 also talked about how a laptop in high school was of benefit to understanding the college culture, saying:

The colleges that I thought I was going to go to had helpful websites. They (college websites) helped the class schedules and me to understand the classes that you need to take. There is so much information about all of the different colleges right online instead of getting a pamphlet or going to college visits. You can just find that all the information online.

The Advanced Placement Index stated that students are college ready when they have the knowledge, skills, and behaviors to complete a college course of study successfully, without remediation. The definition further described college readiness as expecting high school graduates to have an understanding of college and career options and college admissions and financing processes (Conley, 2008). Because of their anytime, anywhere access to a laptop and the Internet, participants in this study reported increased knowledge about postsecondary operations and cultures.

### **Self-Advocacy Skills**

Students who are college ready possess the behavior and skills necessary to advocate for their personal and academic needs in the postsecondary setting (Conley, 2008). This idea includes looking for personal and/or academic help. Fourteen of fifteen participants reported favorable impressions related to self-advocacy because they had a laptop while in high school. Most of the academic help that students sought came through online resources and websites as well as being able to communicate electronically with teachers more efficiently and routinely. Besides these benefits, participant 6 talked about students using social media to network with others and get help, saying:

A lot of people feel good when they put stuff (feelings) out so it must help them get things out I guess. I know a lot of people who like to express themselves more and put their feelings online. But for me I'm just more of a quiet reserved person so I don't feel the need to do that. I used the computer for the Internet more than anything. Having access to the Internet when I needed help was the most beneficial for me.

Participants reported utilizing web sites to help in various content areas. Specifically, the Khan Academy web site was mentioned by multiple students. Participant 14 said, “I used the Khan Academy web site frequently in high school if I didn’t understand something or needed to see it presented again.” He also mentioned still utilizing the web site today in college to help understand college-level concepts and topics. Participants also mentioned other web sites that they grew accustomed to turning to in the face of challenging content. However, the biggest advantage that students routinely described was having a laptop and Internet access at their fingertips to correspond with teachers on a frequent and convenient basis. Participant 7 reported:

I would say instead of having to go to your teacher you could just email them and get help that way. I mean there were even a couple of times when they (teachers) would be gone but you could Skype them or email them to continue the class work even if they weren’t there.

The responses of participants in this research study supported the notion that laptop usage in high school can aid in the development of students’ self-advocacy skills due to their increased access to teachers and online resources.

### **Implications for Stakeholder Groups**

The results of this study have implications for students, parents, teachers, school leaders, professors, and policymakers. Various school organizations have spent large portions of their budgets on laptops for every student. Other schools are considering the investment. This study, along with other research on 1:1 laptop initiatives, supports the idea that providing every student with a laptop can promote college readiness. The

feedback and experiences from participants in the study also provide meaningful implications for various stakeholder groups.

**Implications for students.** This study investigated college freshmen's perceptions of how usage of a laptop in high school specifically promoted their college readiness. Their meaningful feedback should give current high school students (and parents) confidence to push their schoolteachers and leaders to leverage resources to empower students with laptop computers and other Internet-capable devices. Students may be able to promote their own readiness for college by bringing a personal laptop from home to high school if their school is not providing a full-fledged 1:1 laptop initiative. Many high schools have implemented policies to allow for students to bring their own devices, including laptops. These practices are commonly known as BYOD (Bring Your Own Device).

Prior to bringing their own computer, some students may have to negotiate with their teachers and/or school leaders to allow for them to bring a laptop to school. This may mean talking to a teacher or administrator about when and why the student wants to bring his own laptop. A student should plan out how and whom he will approach to ensure that the response he gets about bringing his own device to class is favorable and positive. A student may have to start with a single class before approaching other teachers to also bring his laptop into their classroom(s). Student also should consider taking an online class and utilizing their laptop computer at school to take the course. This could model and promote productive online learning.

Students also can promote the use of technology by being productive and responsible technology users. Students who are productive and responsible users of their

laptops are easy and visible models for teachers and school leaders. Many educators have the fear that students only want to use technology to play games and surf the Internet. Some educators perceive laptops as distractions in the classroom. When students can demonstrate that they are productive and responsible with their laptops during class time, it may give many teachers the confidence to try new things and eventually allow more students to bring laptops to class.

Students also should advocate for the use of technology to provide a voice for their peers. One student interviewed actually said, “I was really quiet before. I believe being able to talk to people online made me more outgoing.” Other students in the study talked about developing technology etiquette skills because of direct instruction they received from a high school teacher. Technology tools like laptops may provide unintended benefits such as developing students’ personality traits and learning online etiquette. These benefits and others may be good reasons for students to continue to advocate using laptops and other technologies in school.

**Implications for parents.** Parents can promote college readiness for their own children by advocating with schoolteachers and/or administrators to allow for laptops to be used at school. Parents often purchase video games and other technologies for their children that would not be as productive as purchasing a laptop computer. On average, 13- to 18-year-olds spend more than six hours per day using digital media (Metiri Group, 2006). If they are financially capable, parents could first consider purchasing their child a laptop to use for both personal and school use. This may allow for more productive technology use than simply playing games, social networking, and/or watching TV or movies.

Parents should support their son's or daughter's use of technology by promoting the use of technology to complete homework, use online resources, and collaborate with others online. Since most parents are trusted role models for their children, parents should also consider modeling appropriate and effective use of technology for both personal and professional applications. This means that parents demonstrate how they use online resources and social networking with their child. This means that parents monitor the time that they use technology; for example, perhaps they put the computer away when they have a meal with their family. This also means that parents model how to treat costly technology; this could mean making sure their laptop is charged, put in a case, or transported in a responsible and safe way. The positive effect that parents can have on productive and responsible laptop use is very important to the development of students as they grow up, attend high school, and potentially attend college.

Parents also play a major role in helping school staff leverage technology by ensuring their child uses technology in appropriate and productive ways. This includes monitoring their child's use of email, social networking, and online search engines. One barrier often reported by teachers is the fear of students using the laptop for inappropriate reasons. There is no filter that is good enough to block websites that some students may want to explore. Parents and educators must work together to monitor students' Internet usage. In doing so, both parents and educators have the peace of mind of knowing that students are using technology for appropriate and productive reasons.

Elected parents serve as school board members in many communities. Parents, as school board members, have the power to promote 1:1 laptop initiatives to "level the playing field" for all students in their district. Participants in this study reported that they

believed they were more ready for college because of their high school laptop usage. Other students may benefit similarly if they also were able to learn and utilize a laptop during their high school career.

There is no doubt that parents play an important role in the development and education of their children. Purchasing laptops, advocating for laptop use at school, and modeling appropriate and productive use of technology are all ways that parents can promote effective technology use for their children. Also, parents who are school board members can consider “leveling the playing field” and promoting college readiness for all students by leveraging district resources to start and maintain a 1:1 laptop initiative.

**Implications for teachers.** Educators started to use computers for instructional purposes as early as the 1980s. The evolution of the computer over the last 50 years has been rapid and life changing (Schifter, 2008). Technologies have been more life changing for some teachers and content areas than others. The use of the computer by teachers continues to evolve and there are numerous implications from this study for classroom educators.

When computers were first introduced into schools, they were used largely for secretarial tasks and administrative purposes (Schifter, 2008). As computers and Internet access have evolved, so has the use of computers for instruction. Computers can enhance teachers’ productivity, accuracy, and ability to analyze data and thus improve teaching and learning in the classroom (Murdock, 2004).

One major implication relates to the idea of student distraction, a concept that was articulated by almost every first-year college student in the study. Many participants

reported that there was an increased risk of students being distracted because of access to a laptop and the Internet. For example, Participant 15 said:

The biggest issue with having a laptop was that students were often distracted with websites, games, and social media. Students would often get off track that seemed to affect their grades. The school responded with trying to block distracting websites like Facebook, Twitter, and YouTube.

Participants reported that blocking websites that seemed to be distracting students sometimes helped and other times was only a temporary solution that resulted in other distractions. Educators need to consider the ramifications of blocking or allowing gaming sites and social networking sites. Many of the websites that educators consider blocking also have tremendous learning potential in the classroom.

The ‘implementation dip’ that participants in this study reported is a direct result of increased access to technology without concurrent increases in time, training, and experience that teachers need to integrate the new technology in a seamless manner. The quickly changing world of technology makes it difficult for faculty and higher education institutions to be “the experts” (Educause, 2011). This is not the fault of anyone in particular and is exacerbated by tight budgets, limited time for training, and outside pressures on educators to improve schools and learning outcomes, all of which facilitate hurried technology adoption. Perhaps an implication for teachers and school leaders regarding implementation dips is to bring students and teachers along more slowly so that a 1:1 laptop initiative is able to be more productive from the beginning. Participant 4 said:



The first two weeks I got my laptop I hated it. I hated how we did no projects on paper anymore; everything was on your laptop. We took notes on our computer, and I was a paper person, I did everything on paper. And then my Spanish teacher actually taught us to use the podcast feature on our Macs, and we did presentations that way, and we got to record ourselves and put pictures in, and I really enjoyed that.

To manage the implementation dips that various participants described, schools have to create plans to bring both students and teachers along. This would include providing training to students and teachers prior to just the day of the laptop rollout. This may also include providing teachers the same laptops that students eventually get prior to the rollout. This would allow teachers to become more comfortable, more confident, and identify online resources through use of the laptop. Finally, a productive team of students who can assist in technology troubleshooting often can be beneficial for 1:1 initiatives' success. Training a team of students before providing every student with a laptop would allow peers to help each other (and assist teachers) when technology issues arise.

Participants brought up a few other concerns during the interviews. Participant 2 believed that her eyesight got worse because they “stared at a computer screen for hours each day.” She now needs glasses, which she believes was caused by the laptop computer in high school. Another student reported that his handwriting got worse because he typed more often than writing longhand. These factors may be considerations for some when adopting a 1:1 initiative and deciding how often students are asked to use their computer.

Since most schools put newly-leased or -purchased laptops on a 3- or 4-year rotation, ongoing service and upkeep for the laptops is also important. Participant 13 reported:

Many students were frustrated with repairs during the third year with the laptops. It sucked when a computer was slow and they couldn't be fixed or repaired. Tech staff often seemed to be more concerned with new features than repairing old machines for students.

There are multiple implications for teachers based on the feedback and experiences of the participants in this study. Specifically, teachers should intentionally evaluate the use of online websites (including social networking sites) that may be distracting for students. Teachers also should consider the amount of time they expect students to sit in front of a computer screen. Last, teachers should work with technology department personnel to ensure that students have laptops in good working condition so that the laptop can be a reliable tool for learning. After all, "There is no turning back..." (Friedman, 2005, p. 273) when talking about the adoption of technology for schools.

**Implications for school leaders.** Participants in this study believed that their high schools' 1:1 laptop initiatives were worth the investment. The results of this study can be used as encouragement for current school leaders to begin or continue efforts to give every high school student a laptop computer. The students in this study believed that it is only a matter of time before every high school has a 1:1 laptop initiative. One student put a timeline on this idea, saying, "I would assume in 10 years almost every school would have laptops for students." In Chapter 2, Gartner's hype cycle was presented. The hype cycle is a graphic representation of the maturity, adoption, and social applications of

specific technology (Gartner, 2008). The hype cycle provides a frame for thinking about mainstream adoption of laptops in education and other technology. The cycle is designed to enable organizations to decide whether particular technologies are ready for adoption (Gartner, 2008). School leaders should pay attention and consider that laptops are on the cycle toward mainstream adoption, with concurrent implications for their schools.

To meet upcoming job market demands, the nation will need an additional 22 million workers with postsecondary degrees. However, the United States is expected to fall short by three million postsecondary degrees (Symonds, Schwartz & Ferguson, 2011). The results of this study indicate that boosting college readiness may be one of the primary benefits of a 1:1 laptop initiative.

School leaders have a number of factors to consider regarding 1:1 laptop program implementation, including but not limited to purchasing an Apple or a PC computer, training teachers to effectively leverage technology, securing ongoing funding to support 1:1 programming, and expanding the wireless infrastructure of their buildings. Many of the first-year college students interviewed had purchased their own laptop computers for use in college. Sometimes they even purchased the exact same models they had used in high school. One student said, “I have not met a student in college yet that does not have a computer.” However, multiple students mentioned that whether they had an Apple or PC computer was irrelevant. Students tended to feel confident and comfortable using either. One student even said, “A computer is a computer.” School leaders shouldn’t be overly concerned about deciding whether to purchase Apple or PC computers for a 1:1 initiative. Cost, training for teachers, and availability should be part of this decision, but when it comes to college readiness, what is important is simply whether they have a

laptop computer in their hands to utilize on an everyday basis, regardless of whether it is an Apple or PC device.

Participant 10 highlighted other issues that school leaders need to consider, saying, “Financing seems to be a huge issue for schools so that they are able to have up-to-date technology. The school has slow bandwidth, thus slow Internet access speed, which inhibits students from using the technology.” Proper planning should account for the bandwidth issues that this student mentioned. Internet access and speed are critical aspects of effective laptop implementation.

Critics of 1:1 laptop initiatives say, “When computers receive limited use or inconsistent deployment across classes, it makes little sense to expect any kind of return on the investment in technology, especially in relation to student achievement” (Weston & Bain, 2009). Participants in this study had their 1:1 experiences in five different high schools. Each of these students had both meaningful and distracting experiences with having a laptop. However, regardless of the varying degree of implementation and uniqueness of their school laptop programs, all participants reported that they felt more college ready because of their 1:1 experience. Furthermore, nearly all of them (13 out of 15) reinforced the benefits of having a laptop in high school by stating that they would someday send their own child to a 1:1 high school if they had the choice. School leaders cannot expect a 1:1 laptop initiative to be perfect. Responses from participants indicated that leaders do not have to wait to implement a 1:1 initiative until they have full staff support or until all of the details of the program are worked out. Instead, regardless of a school’s level of implementation, students seem to be more ready for college because of the skills and experience they gain through a 1:1 initiative.

School organizations tend to be slower to change than mainstream society. Schifter (2008) mentioned this in his research about technology in schools, noting that, “Computer technology is an ever-changing industry, it has been difficult for schools to keep up with technology advancements.” Nonetheless, it appears that for many schools a 1:1 laptop initiative is no longer a far-off dream but rather an initiative for which to be budgeted, implemented, and supported long-term. To the extent that they have choice, students may, and probably should, choose schools that allow them to create and use up-to-date tools on a daily basis, help students identify the best available learning resources, and prepare them overall for college and life success. As Participant 7 said, “If computers are put to the right use and monitored correctly they are a great resource for students and teachers.” The results of this study appear to support that student’s claim.

**Implications for professors.** It wasn’t until 1967 that many colleges started teaching computer programming (Murdock, 2004). Compared to other sectors, colleges and universities have been fairly slow to adopt computers as learning tools. Many of the participants in this study reported that their college professors do not allow computers in their classes. Professors must understand that technology is not going away and that banning laptops in their classroom is limiting opportunities for student learning. Laptops can and should be leveraged for instruction and learning rather than being banned in classrooms.

Professors should allow and find ways to use student laptops in their classrooms. This includes but is not limited to using social networking sites to communicate with peers, networking with outside professionals, taking notes, and getting information about

concepts and topics presented. All of these applications are positive and productive for learning.

Participants in the study also reported that many of their professors lacked awareness of effective online resources. Technology is changing the resource environment so fast that universities are unable to adequately apprise professors of ongoing changes and updates. Professors must be willing to use their own time to seek online resources on a routine and regular basis. Professors could identify many powerful digital resources simply by asking students. Many students would be quite willing to draw on their high school experiences and personal knowledge to share web sites and other online resources with professors. Professors could then evaluate those resources and find ways to integrate them into their classes if relevant.

Most professors expect students to use technology outside of class time, regardless of whether or not they utilize technology to facilitate classroom instruction. With increased awareness of digital resources, professors could leverage instructional time to engage students and provide timely opportunities for students to dig deeper into course content. Professors also could model effective and productive use of online and other technologies. If laptops were allowed and leveraged for learning in postsecondary classrooms, college professors could use many of the same teaching practices that study participants reported that their high school teachers used.

**Implications for policymakers.** Policymakers in the state of Maine already have made the decision that technology as a learning tool is important. They have made 1:1 laptop initiatives a statewide priority. As outlined in Chapter 2, Iowa currently (2012) has 90 to 100 1:1 laptop schools. This means that approximately 25% of Iowa school districts

are providing powerful learning technologies that allow students to create, collaborate, improve keyboarding skills, enhance note-taking skills, improve presentation skills, and learn social etiquette, among other things. Although schools receive both state and federal funding, much of the school funding is earmarked with strict regulations as to how funds can be spent by the local school district. One example of this is the Physical Plant and Equipment Levy. Schools are limited regarding how they can use this money, especially for technology.

Policymakers have to understand that technology is fundamental to education in the 21st century. Administrators identify limited state funding as an ongoing barrier to offering more online courses (Project Tomorrow, 2011). Anecdotal evidence indicates that inadequate funding and policy barriers are impeding other school technology initiatives as well, including implementation and expansion of 1:1 laptop programs. Legislators must provide ample funding that allows schools to update and stay current with technology. That state and federal funding also must be flexible enough to accommodate districts' unique technology allocation needs.

### **Recommendations for Existing 1:1 Programs**

Outside of school, many students use laptop computers for schoolwork, social networking, and creating online videos, presentations, and other resources. Similarly, inside of schools, laptops have the ability to be efficient and powerful learning tools that help prepare students for college. The following recommendations are for schools that already have adopted 1:1 initiatives and are striving to make their programs as effective as possible.

**Use laptops to promote digital etiquette.** The participants in this study noted that one benefit of having a laptop in high school was gaining digital etiquette skills. Participants 11 and 12 both cited learning how to write formal emails, learning about privacy issues, and being able to collaborate appropriately with people in the business world as benefits of their high school's 1:1 initiative. Participant 11 noted:

I would say definitely things like social etiquette and learning how to write a professional email or deal with businessmen through email was helpful. I remember learning things like privacy issues and contract stuff. Learning how to write those formal emails is definitely one of the biggest things because I have to write emails daily to professors and knowing how to phrase those emails is basically extremely helpful.

As digital communication technologies and social networking tools continue to evolve, teaching digital etiquette skills will be an added challenge for schools. Teaching communication etiquette is a very possible and natural extension of a school's 1:1 initiative.

**Listen to students.** One question that all participants responded to was whether or not, with all else being equal, they would send their own child to a 1:1 laptop school instead of a traditional school. All but one student said that without a doubt they would send their own child to a 1:1 laptop school at the high school level. Some participants reported that they did not think that elementary-age students should have a personal laptop to take home but did believe that middle school and high school students should have a school-issued laptop. Participant 12 went so far as to say, "I think every school needs to be a 1:1 school in 10 years or less. I think allowing students to take the computer



home is essential.” Current students seem to understand that computers will be mainstreamed into education in the near future. Schools planning to adopt 1:1 computing programs should listen to their students and empower them to be part of the adoption process. Their ideas and buy-in will only enhance the effectiveness of those initiatives.

**Adoption of a 1:1 laptop initiative should be thoughtful and well-planned.**

While this study did not take into account the varying types of 1:1 laptop initiatives that participants experienced while in high school, interviewees clearly described differences in their 1:1 programs. Most of the participants also described various ‘implementation dips’ that were experienced by their high schools and teachers. Schools that are adopting 1:1 laptop programs should move thoughtfully – and perhaps slowly – and ensure adequacy of both short-term and long-term implementation. There is much that goes into a 1:1 initiative and schools that “jump” in without enough planning or forethought may lose many of the gains that the initiative is designed to achieve. As Participant 13 said, “I feel if a school is going to have a 1:1 initiative they should know how to use them. If the teachers don’t know how to use them it is a real issue.”

**Maintain the condition of laptops.** Multiple participants commented about negative experiences with damaged or broken laptops. Most of the experiences that students shared happened when the computer was three or four years old. Participant 13 stated:

I guess one thing people were frustrated with in high school was a computer repair. I mean that third year we got the same laptop they were pretty beat up. It sucks when you don’t have it (a laptop) when everybody else has it. And that was

a big thing to not have your laptop. There was nothing you can do and it was frustrating.

Participant 13 also mentioned concerns that teachers had with laptop repairs, saying:

I mean teachers got frustrated with the staff that's supposed to be fixing them, but they were worried about the new things rather than the old things. They don't really care about your broken laptop as much as they should.

Although students and parents often are responsible for laptop damage, such damage is inevitable. In general, participants reported that keeping their laptop in good working condition was very important. When their laptop was not working, it seemed to have a significant impact on the students' academic work.

As research continues around the area of 1:1 laptop initiatives and college readiness, the issue of damage to and maintenance of machines should be taken into consideration. These challenges should be planned for as proactively as possible.

More research will be conducted and made available as 1:1 initiatives move into maturity. The rest of this chapter provides some recommendations for further research related to 1:1 initiatives and college readiness.

### **Future Research**

Truly evaluating a 1:1 laptop initiative is a difficult task. As a matter of fact, evaluating almost any PreK-16 initiative in education is a difficult task because most programs do not occur in isolation of others. Schools are complex organizations that have multiple, ever-changing variables, including but not limited to variability in students, staff, programs, budgets, communities, and political factors.

There also is much that goes into evaluating college readiness. This study examined college readiness in regard to previous exposure to a 1:1 laptop initiative in high school. Further studies in this area should account for the many variances in 1:1 laptop initiatives that occur in schools. Every initiative has different goals and implementation methods. It may be that certain types of programs or implementation models are better at facilitating college readiness than others.

Future studies should investigate in more complex ways the relationship between participation in a high school 1:1 initiative and college readiness. In particular, more robust ways of determining 1:1 programs' effectiveness need to be devised. Future studies may be able to better link effectiveness of individual 1:1 initiatives with participating students' college readiness.

Participants in this study were from two different states, two different countries, and five different high schools and attended thirteen different colleges and universities. Further research in this area may need to ensure greater homogeneity of the research sample. Narrowing the types of participants, settings, or laptop initiatives may better illuminate the relationship between students' college readiness and high school 1:1 laptop program participation.

Further studies could look at retention rates for students who were exposed to a 1:1 laptop initiative in high school in comparison to students who did not have this exposure. As the author of this study was conducting interviews, he could not help but wonder how many of the students interviewed actually would finish college. Statistics demonstrate that less than 50 percent of students who start at a college or university actually finish within six years (National Center for Education Statistics, 2008). It is

possible that students who feel more prepared for college due to exposure to a 1:1 laptop initiative in high school more often complete college. A study of college completion in relation to having a laptop in high school could have powerful potential.

Similarly, students who experience a 1:1 laptop initiative and go on to college may transfer to other postsecondary institutions at less than the average rate. One could hypothesize that students who are exposed to a 1:1 initiative have more information and experiences in high school to select an appropriate college and declare a major. This may mean that they are less likely to transfer from the college they originally selected. This study did not evaluate students' selection of a college or college major. Future research could examine whether students exposed to a high school 1:1 initiative are better prepared to select a postsecondary institution and/or college major.

The varying and often broad definitions of college readiness that have been cited in this paper probably will be the same for years to come. However, 1:1 laptop initiatives that work to promote college readiness will continue to evolve, adapt, and change to meet the needs of students. Current 1:1 schools should develop and effectively communicate the goals and evaluation measures of their initiatives in an effort to continue to promote their programs' effectiveness. Possible ideas to measure college readiness include, but are not limited to, ACT college readiness indicators, instructional practices inventories of classroom instruction for higher order thinking and engagement levels, and alumni surveys that get feedback from students while in college.

Although this study did not evaluate various types of 1:1 laptop initiatives, it is probable that the better the 1:1 implementation at the high school level, the more college ready a high school's students would be. As noted above, further research needs to be

conducted that investigate the linkages between college readiness and scale, scope, or implementation of secondary 1:1 computing initiatives. The state of Maine, which is currently collecting and analyzing data while implementing a statewide initiative, may serve as a model for 1:1 implementation. Lessons from this state may prove to be relevant and meaningful for other states and schools interested in 1:1 laptop programs.

### **Summary**

This chapter started with a discussion of the findings of the study and then outlined implications for various stakeholder groups, including students, parents, teachers, school leaders, professors, and policymakers. The chapter also made some recommendations for future research in the areas of 1:1 laptop implementation and college readiness. Further studies that evaluate these topics will be essential toward promoting and improving 1:1 initiatives and college readiness.

This study concluded that 1:1 laptop programs in high schools do seem to promote college readiness for their graduates, at least from the perspective of the graduates themselves. The first-year college students in this study were able to clearly identify and describe the benefits of having a laptop during high school as they engaged in college-level academics. These students reported overall that they felt better prepared for college and more efficient using a computer than their college peers. These reports were consistent regardless of the level of fidelity of implementation of the high school 1:1 laptop initiative.

This study fills a void in the research regarding 1:1 laptop initiatives and college readiness. However, it is only a start to what hopefully will be a series of ongoing studies that examine the relationship of laptop computers and other digital technologies to

empower and promote student learning. It is probable that the future success of schools and students depends on effectively leveraging the powerful digital learning technologies that now permeate our world.

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## APPENDIX A. INTERNATIONAL SOCIETY OF TECHNOLOGY IN EDUCATION TECHNOLOGY STANDARDS

1. Creativity and Innovation. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students will:
  - (a) apply existing knowledge to generate new ideas, products, or processes;
  - (b) create original works as a means of personal or group expression;
  - (c) use models and simulations to explore complex systems and issues; and
  - (d) Identify trends and forecast possibilities.
  
2. Communication and Collaboration. Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students will:
  - (a) interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media;
  - (b) communicate information and ideas effectively to multiple audiences using a variety of media and formats;
  - (c) develop cultural understanding and global awareness by engaging with learners of other cultures; and
  - (d) contribute to project teams to produce original works or solve problems.
  
3. Research and Information Fluency. Students apply digital tools to gather, evaluate, and use information. Students will:
  - (a) plan strategies to guide inquiry;
  - (b) locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media;
  - (c) evaluate and select information sources and digital tools based on the appropriateness to specific tasks;
  - (d) process data and report results.
  
4. Critical Thinking, Problem Solving, and Decision Making. Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Students will:
  - (a) identify and define authentic problems and significant questions for investigation.
  - (b) plan and manage activities to develop a solution or complete a project;
  - (c) collect and analyze data to identify solutions and/or make informed decisions.
  - (d) use multiple processes and diverse perspectives to explore alternative solutions.
  
5. Digital Citizenship. Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. Students will:
  - (a) advocate and practice safe, legal, and responsible use of information and technology;

- (b) exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity;
  - (c) demonstrate personal responsibility for lifelong learning; and
  - (d) exhibit leadership for digital citizenship.
6. Technology Operations and Concepts. Students demonstrate a sound understanding of technology concepts, systems, and operations. Students will:
- (a) understand and use technology systems;
  - (b) select and use applications effectively and productively;
  - (c) troubleshoot systems and applications; and
  - (d) transfer current knowledge to learning of new technologies.

## APPENDIX B. DEFINITION OF KEY TERMS

Terms used throughout this study are operationally defined as follows:

*Cloud computing*: “a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computer resources that can be rapidly provisioned and released with minimal management effort or service provider interaction” (Mell & Grance, 2011, p. 2).

*College readiness*: “the level of preparation a student needs in order to enroll and succeed, without mediation, in a credit-bearing education course at a postsecondary institution that offers a baccalaureate degree or transfer to a baccalaureate program” (Conley, 2007, p. 5).

*One to one computing (1:1 computing)*: each individual has a computer, which is not shared with others (Jackson, 2009).

*Reliability*: refers to the extent in which research findings can be replicated (Denscombe, 2002).

## APPENDIX C. HUMAN SUBJECTS REVIEW FORM

**IOWA STATE UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

Institutional Review Board  
Office for Responsible Research  
Vice President for Research  
1138 Pearson Hall  
Ames, Iowa 50011-2207  
515 294-4566  
FAX 515 294-4267

**Date:** 10/20/2011

**To:** Trent Grundmeyer  
1514 3rd St NE  
Hampton, IA 50441

**CC:** Dr. Scott McLeod  
N231 Lagomarcino

**From:** Office for Responsible Research

**Title:** The Perceptions of First Year College Students Regarding Technology and College Readiness

**IRB ID:** 11-431

**Study Review Date:** 10/18/2011

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b).

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

**Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form.** A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. **Only the IRB or designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.

## APPENDIX D. ADMINISTRATOR INVITATION LETTER

Dear High School Administrator,

I am a passionate high school principal who is committed to improving college and career readiness for our current students. You have been personally selected because of your leadership in putting technology in the hands of students via a 1:1 laptop initiative. As a doctoral student at Iowa State University, my dissertation is structured around the perceptions of first-year college students regarding technology and college readiness.

The questions I hope to answer in this study are:

1. What are first-year college student's perceptions of the uses of technology for instructional purposes by high school teachers?
2. What are first-year college student's perceptions of the effects of a 1:1 laptop experience on their readiness for college?
3. What are first-year college students' perceptions of the uses of technology for instructional purposes by college professors?

The goal of this letter is to ask for your help in finding participants so that I can work to analyze, publish, and report back with the findings of this research study. The results you will get back from me may be good information for you to share with your community, students, and school board regarding technology and the impact of a 1:1 laptop initiative on college readiness for your students.

I am asking you to supply me with the names of 5-10 alumni who I could contact as potential participants in my research study. You may submit me their contact information in any format including email, excel spreadsheet, or Microsoft Word document. The information I am requesting for 5-10 of your college placed alumni includes:

- Alumni full name
- Alumni email and/or phone number(s)
- The college or university the alumni currently attends
- The city and state of the college or university the alumni attends

Thank you in advance for your time and consideration in passing on alumni names. I will look forward to providing you with my findings if you are able to help me find these vital participants. If you have questions or suggestions please contact me by phone at 515-205-9987 or email at [tgrundmeyer@gmail.com](mailto:tgrundmeyer@gmail.com).

Sincerely,

Trent Grundmeyer  
 Indianola High School Principal  
 Doctoral Student at Iowa State University

## APPENDIX E. INFORMED CONSENT FORM

- Title of Study:** The Perceptions of First-year College Students Regarding Technology and College Readiness
- Investigator:** Trent Grundmeyer, ISU doctoral candidate (with assistance from Dr. Scott McLeod, ISU Associate Professor)

This is a research study. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time.

### INTRODUCTION

The purpose of this study is to uncover the perceptions of first-year college students regarding their exposure to a 1:1 laptop initiative while in high school for a minimum of two years. Furthermore, participants will help the researcher understand the effects that a 1:1 initiative had on their freshman year and evaluate their perceptions of technology use by college professors. You are being invited to participate in this study because you fit the criteria for this study:

1. Exposure to a 1:1 laptop initiative while in high school for two years or more.
2. Completion of your first-year of college.

### DESCRIPTION OF PROCEDURES

If you agree to participate, Trent Grundmeyer will interview you for no longer than six0 minutes. You will be presented with the interview guide ahead of time. The full interview will be recorded. You will be identified by a pseudonym for the study and your information will be protected before, during, and after this research project. During the interview process, you may skip any questions that you do not wish to answer.

Your participation will last for the amount of time that the interview takes. After the interview, the audio recording will be transcribed, and you will be presented with a copy of the transcript for your review. This will be delivered via an e-mail to the address that you provide to me. After that, your participation will be over. At the conclusion of the dissertation research, you will be provided a write-up of the findings from the study.

### RISKS

There are no known or foreseeable risks for participation in this study.

### BENEFITS

If you decide to participate in this study, there are no personal advantages to participation. It is hoped that the information gained in this study will benefit school leaders, college leaders, and students in relation to promoting technology resources to benefit college readiness.

### COSTS AND COMPENSATION

You will not have any costs related to participating in this study, other than the time you spend during the interview and reviewing the interview transcript. The time you spend as a participant in this study is voluntary.

## PARTICIPANT RIGHTS

Your participation in this study is completely voluntary and you may initially refuse to participate or stop participating in the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or detrimentally affect your relationship with the researcher, his major professor, and/or Iowa State University.

## CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality to the extent permitted by law, the following measures will be taken:

1. Your interview will be recorded and transcribed but you will be identified in the transcripts and on tape with a pseudonym.
2. The data will be stored on a password-protected computer in a locked room at all times.
3. The data only will be kept until the completion and publication of the study. If the results are published, your identity will remain confidential.

**QUESTIONS OR PROBLEMS** You are encouraged to ask questions or express your concerns at any time during this study.

For further information about the study, contact primary investigator *Trent Grundmeyer* at 515-205-9987; or *Dr. Scott McLeod*, 707-722-7853.

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, [IRB@iastate.edu](mailto:IRB@iastate.edu), or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 2011.

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## PARTICIPANT SIGNATURE

Your signature below indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given time to read this document, and that your questions have been satisfactorily answered. You will receive a copy of the written informed consent prior to your participation in the study.

Participant's Name (printed): \_\_\_\_\_  
 Participant's Email Address: \_\_\_\_\_



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(Participant's Signature)

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(Date)

## APPENDIX F. INTERVIEW PROTOCOL

### Interview Introduction

Hello (respondent name). Thank you so much for agreeing to speak with me. I know you have a busy schedule and really appreciate your willingness to participate in this project.

As stated in a previous letter, I am a doctoral student at Iowa State University and high school principal from Iowa conducting a study of perceptions of first-year college students regarding technology and college readiness. Today I hope to glean insight into your perceptions of how a 1:1 initiative you experienced while in high school has impacted your college experience as well as your perceptions of your professors' use of technology.

Any information you share will not be attributed to you or used to identify you or anyone else. You will remain anonymous in any ensuing presentations or publications that may stem from this study. As a result of your participation, there should be no risks for you personally or for your school. Your participation is strictly voluntary and may be discontinued at any time during the interview. You may also decline to answer any question during this interview.

For ease of note taking, getting all of your input, and not slowing down the interview, I would like to record our conversation. The recording made today will be kept confidential and in a safe place. The only people that will hear the audio recording will be me and the person who transcribes our conversation. It will be kept in a secure location and destroyed when the study is complete. If at any time you would prefer that I turn the recorder off, please let me know, and I will do so immediately.

Any questions before we begin?

Did you sign the Informed Consent to participate in this study?

Do I have your permission to begin recording our discussion?

### Interview Questions

Research Questions #1: What are first-year college student's perceptions of their 1:1 laptop experiences on their readiness for college?

#### General Questions

1. How many years did you experience a 1:1 laptop initiative in high school?
2. Please describe your experiences with having a laptop computer while in high school.
  - a. For what did you primarily use your computer? Personal? Academic?
  - b. Were you able to take your laptop home from school?
  - c. What was your experience with online classes in high school (if any)?
3. Why did your high school adopt a 1:1 laptop initiative?
  - a. What was the goal of the laptop initiative?

- b. Do you know how the initiative was evaluated for effectiveness? If so, how?
4. What did you feel the advantages and disadvantages were of having a laptop while in high school?

#### Cognitive Strategies

1. Do you feel you are able to identify better online resources because of your laptop experience in high school?
2. Were you able to develop any study skills based on having access to a laptop computer in high school? If so, what skills do you feel you developed?
3. Did the computer help you at all to think critically? If so, how?
  - a. Can you remember any examples of your high school teachers using online resources to help you think critically?
4. How did having a laptop while in high school help you to develop any other cognitive or study skills you feel you would not have gained without the use of the laptop?

#### Self-Management

1. Many educators and policymakers are worried that current high school graduates are not ‘college ready.’ What does being “college ready” mean to you?
2. Do you believe that you have better self-management skills because of having a laptop while in high school? If so, how so?
  - a. Do you feel you are more efficient using a computer because of your high school laptop experience?
  - b. What other skills or knowledge do you feel you have because of having a laptop while in high school?
3. Do you feel you were better prepared for college than other students because of your exposure to having a laptop while in high school? Why or why not?
4. Some claim that students who are exposed to 1:1 laptop initiatives in high school are more college ready because they are more organized, efficient, confident, connected, and can produce higher-quality school work. Do you agree or disagree? Why? Do you see any differences between you and current college peers that didn’t have a laptop in high school? If so, what? If not, why not?

#### Content Knowledge

1. Did you feel ready to handle college level content (or information)? Do you feel that having a laptop in high school contribute to being ready for college coursework?
  - a. Did you have to take any sort of college readiness test to graduate or be accepted into a postsecondary institution? If so, which? How did you do?
  - b. Do you feel you are better at creating presentations because of your laptop experience in high school?
  - c. Do you feel you have better keyboarding skills because of your laptop experience in high school?
  - d. Do you feel social networking and using email in high school had any effect on how prepared you were for college?
  - e. Do you feel the quality of work you are able to produce is better in college because you had access to a laptop computer in high school?

### Knowledge about Postsecondary Education

1. How do you think your freshman year of college would have been different if you had not been exposed to having a laptop during your high school years?
  - a. How did having a laptop in high school help you to understand your college's culture (if any)?
  - b. How did having a laptop in high school help you understand financial aspects of college (if any)?

### Self-advocacy Skills

1. Were you able to get more help academically in high school because you had a laptop? Do you think this helped you at all to be college ready?
2. Were you able to get more help physically or emotionally because you had a laptop in high school? Do you think this helped you at all to be college ready?
3. Were you able to collaborate with others (that you otherwise would not have been able to network with) because you had a laptop computer? If so, how?

### General Questions

1. During this interview so far, I have asked you what impact having a laptop during high school had on your self-advocacy, content knowledge, cognitive strategies, self-management, and knowledge about postsecondary education. Are there other skills that you believe you specifically gained because you had a laptop while in high school? Do you believe that having a laptop during high school took away or had a negative affect on you and your college readiness in any way? If so, how?
2. As a parent in the future, with the choice to send your child to a traditional school or 1:1 laptop school, which would you prefer? Why?"

Research Questions #two: What are first-year college student's perceptions of the uses of technology for instructional purposes by high school teachers?

Research Question #3: What are first-year college student's perceptions of the uses of technology for instructional purposes by college professors?

1. How does your college professors' use of technology compare to that of your high school teachers? Is it the same or different?
  - a. For what did your high school teachers primarily ask students to use technology?
  - b. For what do your professors primarily ask students to use technology?
  - c. What types of software did you use in high school?
  - d. What types of software do you use in college?
  - e. How has the software you routinely use for school changed from high school to college?
  - f. What types of websites did you use in high school?
  - g. What types of websites do you use in college?
  - h. How have the websites you use for school changed from high school to college?
2. What do you think are the perceptions of other first-year college students about their professors' use of technology? How do you know?

3. Do you feel that most students share your perceptions of technology use by your professors in college? Why or why not?

Conclusion:

1. Is there anything that I did not ask you that you would like to share?

Thank you so much for participating in this interview. I appreciate your time and thoughts. After I have reviewed the transcript of our conversation today, may I contact you if I have further questions?

If you have any further questions for me, please do not hesitate to contact me at any time. A written transcript of this interview will be made available to you to verify accuracy of your views and experiences. You will hear back from me in 1-two weeks. As a reminder this information will remain confidential and will be destroyed at the end of the project. Let me confirm your email one more time. Do you have any final comments or questions?

Thanks and have a great rest of the day/evening.

### APPENDIX G. PARTICIPANT LIST

<u>Participant</u>	<u>Sex</u>	<u>H.S. State</u>	<u>Current College</u>	<u>Major</u>
Participant 1	F	Pennsylvania	University of Pennsylvania, PA	Religion
Participant 2	F	Pennsylvania	Community College of Philadelphia, PA	Education
Participant 3	F	Iowa	Clarkson College, NE	Radiology
Participant 4	M	Iowa	Buena Vista University, IA	Accounting
Participant 5	F	Iowa	Kirkwood Community College, IA	Business
Participant 6	M	Iowa	University of Northern Iowa, IA	Education
Participant 7	M	Iowa	Creighton University, NE	Exercise Sci.
Participant 8	M	Iowa	Wartburg College, IA	Fitness Man.
Participant 9	F	Iowa	Des Moines Area Community College, IA	Education
Participant 10	M	Thailand	Kasetsart University, Thailand	Engineering
Participant 11	F	Iowa	Simpson College, IA	Marketing
Participant 12	M	Iowa	Iowa State University, IA	Education
Participant 13	F	Iowa	Iowa State University, IA	Graphics
Participant 14	M	Iowa	Simpson College, IA	Economics
Participant 15	M	Iowa	Iowa State University, IA	Engineering