Why aren't they paying attention to me? Strategies for preventing distraction in a 1:1 learning environment

Author Info:

Jennifer T. Tagsold, Ph.D., jtagsold@peace.edu, 919.702.5552, William Peace University,
15 East Peace Street, Raleigh, NC 27604

Abstract

K-12 education research has become increasingly concerned with technology's impact on students' attention in the classroom, particularly with regard to laptop computers and other mobile devices (Gay & Hembrooke, 2004; Jackson, 2008; Mann, 2008; Kraushaar & Novak, 2010). While this classroom technology has created many positive implications for teaching and learning, few scholars have examined specific, practical approaches teachers use to avoid distraction. Through qualitative data analysis methods, this study examines the strategies used by teachers to avoid distraction in a high-tech learning environment.

INTRODUCTION

Sam had been using his new laptop for two weeks. He appreciated the shiny new tools available to him and got a kick out of watching his teachers figure out how to use technology, but he found himself constantly distracted. "Here Mr. Williams, I'm returning my laptop because I'm not getting any work done; if it's not here to distract me, I will be able to pay more attention to what you say in class."

Mr. Williams enjoyed having total access to myriad teaching tools through the new 1:1 laptop initiative, but he also had to learn to monitor his students. As his teaching became more tech-savvy and more directed at 21st century skill development, Mr. Williams developed a new goal: become more interesting than all the distractions available on his students' laptops. After all, if Facebook was more compelling than his lesson, what kind of teacher was he? Surely he could compete with social networking and other online activities…but how?

As a research assistant on a project that evaluates the 1:1 computing initiative in North Carolina schools, I learned that most students easily adapt to the use of laptops in the classroom and experience positive effects on their entire learning experience due to laptop access (Bebell, 2005; Corn, 2009; Great Maine Schools Project, 2004; Lane, 2003; Lowther et al., 2007; Silvernail & Lane, 2004; Warschauer, 2006). One primary issue that kept arising, however, was that of distraction. This paper seeks to enhance the field of instructional technology by exploring strategies that teachers use to maintain a focus on teaching and learning in a 1:1 environment when so many other options are available to distract the minds of the learners.

LITERATURE REVIEW

Benefits and Drawbacks of 1:1 Learning

Because of digital media's impact on learning styles, researchers must examine the fruits of laptop initiatives and how these help student navigate the non-linear world of the Internet and its similarities to the "associational network of human long-term memory" (Dede, 2005, p. 5). A discussion of the positive and negative components of 1:1 learning will help reveal some of these fruits. Positive outcomes of 1:1 learning include enhanced student learning and engagement (Bebell, 2005; Mitchell Institute, 2004; Lane, 2003; Lowther, Strahl, Inan, & Bates, 2007; Silvernail & Lane, 2004; Warschauer, 2006), motivation (Harris & Smith, 2004; Mitchell Institute, 2004; Silvernail & Lane, 2004), achievement (Cavanaugh, Dawson, White, Valdes, Ritzhaupt, & Payne, 2007; Lowther et al., 2007), attendance (Harris & Smith, 2004; Lane, 2003; Silvernail & Lane, 2004), discipline (Corn, 2009; Silvernail & Lane, 2004;), and 21st century skills (Cavanaugh et al., 2007; Corn, 2009; Lowther et al., 2007; Mitchell Institute, 2004; Shapley et al., 2008). Results from 1:1 initiatives have also shown an increase in students' math and writing skills (Bebell, 2005; Warschauer, 2006). Classroom teachers report benefits of 1:1 learning such as improved technology knowledge and skills, increased assistance with technology questions and problems, and improved classroom management (Fairman, 2004).

Although some results of 1:1 laptop initiatives show improvement in student learning and teacher use, factors other than the distribution of laptops contribute to successful implementation. There is

evidence that laptop initiatives do not increase all test scores, especially when tests are administered in paper and pencil form (Warschauer, 2006; Weston & Bain, 2010). Other drawbacks of 1:1 learning include distraction and reduced attention (Mann, 2008), student misuse (Holcomb, 2009), physical discomfort leading to a need for ergonomics training (Fraser, 2002), and lack of teacher and student technical skills (Corn, Halstead, Tingen, Townsend, & Campbell, 2010). Teacher support, instructional use, technology support, infrastructure, and quality of implementation are influential in the success of a 1:1 initiative (Weston & Bain, 2010). In 1:1 laptop initiatives, students are provided laptops for educational use; however, the schools must have the capabilities and strategies for the laptop use to be effective (Warschauer, 2006). This includes technology support, resources, and strong leadership guiding the programs (Kleiger Ben-Hur & Bar-Yossef, 2010; Maninger & Holden, 2009; Silvernail & Lane, 2004).

Improved Teaching, Depending on …

Teachers' beliefs mediate the way they use technology in the classroom, and if teachers do not support the initiative they are less likely to integrate the laptops into their lesson plans (Antonietti & Giorgetti, 2006; Churchill, 2006; Ertmer, Addison, Lane, Ross &Woods, 2000; Penuel, 2006). In addition to school and district support, teachers should support laptop learning in the classroom and have access to professional development or tools to aid them in integrating laptops into lesson plans (Kleiger Ben-Hur & Bar-Yossef, 2010; Penuel, 2006; Silvernail & Lane, 2004; Weston & Bain, 2010).

Self-Regulation Theory and 1:1 Learning

Self-regulation is defined as "how a person exerts control over his or her own responses so as to pursue goals and live up to standards" (Baumeister and Vohs, 2004, p. 500). A famous study involving children and marshmallows (Mischel, Ebbesen, & Raskoff Zeiss, 1972) helps to shed light on an important component of self-regulation: willpower. Mischel left children alone in a room with a bell and a promise that if they rang that bell before 20 minutes were up, they would receive one marshmallow; if they waited until 20 minutes had gone by, they could have two marshmallows. Mischel et al. found that participants were able to wait when they distracted themselves from the rewards (1972). Metcalfe & Mischel (1999) suggest that willpower consists of a cool, cognitive "know" system and a hot, emotional "go" system which affects the way humans perceive the world; stress, developmental level, and one's self-regulatory dynamics determine the balancing act between hot and cold labels. Students may be experiencing so much distraction in 1:1 initiatives due to tempering certain online activities as hot (i.e. Facebook) and others as cold (in-class assignment). Vohs & Baumeister (2004) assert that managing attention may be the most effective approach to self-regulation. Posner's theory of attention was used to guide the author's understanding of humans' ability to pay attention in learning environments. Posner asserts that the orienting network is the flashlight that directs our focus; the alerting network relates to wakefulness; and the executive network is at the heart of controlling attention (and oneself) (Posner & Boies, 1971; Posner & Rothbart, 2007).

How Students Avoid Distraction in High-Tech Learning Environments

In *Brain Rules*, John Medina suggests that a key brain rule is that humans do not pay attention to boring things (2008). This rule is evident when observing a student being torn between his or her laptop and focusing on the teacher lecturing at the front of the room. In one study, students with laptops spent considerable time multitasking and the laptop posed a significant distraction to users and fellow students; laptop use was negatively related to academic success (Fried, 2008). Another study found that students forced to close their laptops during a lecture were able to recall more lecture content than those who were not. Interestingly, the length of browsing time is extremely important; a lengthy browsing time "appears to be the nemesis of the multitasker; if one is adroit at staccato-like browsing, processing multiple inputs simultaneously may not suffer to the same extent" (Hembrooke & Gay, 2003, p. 59).

Various methods have been employed to help students avoid distraction in high-tech learning environments (Johnson, 2010). Some instructors found that making use of other technologies, like classroom response systems (clickers) and music, reduced distraction (Cole, 2010; Johnson, 2010). Some educators emphasize setting ground rules for wireless use at the beginning of the semester, which include students remembering their role as learners in class, not continually checking e-mail or instant messaging during class, and not handling the "business side" of life during class (*Wireless in the Classroom: Advice for Students*, 2011). Johnson (2010) suggests dealing with distraction by developing rules for laptop usage in collaboration with students; using technology to enhance traditional teaching (e.g., have students create a video instead of writing an expository paper); walking around the classroom periodically to monitor students; and using the technology to restructure the educational process.

Monitoring Software

Numerous schools involved in 1:1 initiatives use monitoring software to ensure that students stay focused on the lesson. Popular types of monitoring software include Eduplatform, E-Chalk, and DyKnow, which offer features such as group chat, teacher viewing of each student's computer, teacher viewing of students while taking tests, and freezing every computer to gain students' attention (Donnalley, 2011). Teachers have commented on DyKnow's ability to hold students accountable, engage students every day, increase teaching time, and energize the classroom (Donnalley, 2011). Some issues occur when monitoring software blocks sites that are useful for teaching and learning.

Instructional Practice

English teachers use their laptops for innovative instructional practices, such as digital storytelling (Lambert, 2002); multimodal texts to enhance reading comprehension (McKenna, 1998); creating student election commercials (Curtis, Merry, & Walker, 2011); and Google Docs for improved writing (Pahomov, 2011). Having digital literacy involves numerous skills, including knowing how to explore the Internet, find necessary information, and share that information with others (Leu, Leu, & Coiro, 2004).

RESEARCH QUESTION AND METHODOLOGY

Research Question

The primary research question under investigation is: How do English IV teachers help students manage distraction when working with technology?

Research Design

Because the researcher seeks to discover ways in which teachers and students manage distraction, a qualitative orientation to the project was preferable over quantitative research and its reliance upon predetermined evaluation instruments. This study follows the multiple-case study design, a commonly used method for "a study of school innovations…in which individual schools [or classrooms within a school] adopt some innovation" (Yin, 2003, p. 46). The primary research question was answered through qualitative methods, including interviews and classroom observations completed on location in the school environment.

Participants

High school students and teachers from one western North Carolina school involved in a 1:1 initiative participated in the study. This school is a recipient of the IMPACT grant, which provides schools with a model for technology integration, with components such as: having a full-time technology facilitator and media coordinator in place; developing a school-wide focus on flexible access to computer labs, mobile computer carts, and libraries; a 1:1 setting in some cases; and collaborative planning (Mollette et al., 2011). Because the chosen school does not use school-based monitoring software, the researcher was able to get a true sense of participants' strategies for managing distraction. At least 20 total interviews (sixteen students, four teachers) and eight classroom observations in both honors and traditional English language arts classes were conducted for this study.

Data Sources and Instruments

The study was conducted in three phases. Phase I and III consisted of classroom observations, using an updated version of the LoFTI (Looking for Technology Integration) observation instrument, and Phase II consisted of interviews. Each teacher was observed teaching twice, and each teacher and student participant was interviewed once. After the final classroom observations were completed, a debriefing occurred with each teacher to ensure member checking of the researcher's interpretations (Miles & Huberman, 1994).

Data Analysis Procedures

Interviews were analyzed using thematic content analysis (Corbin & Strauss, 2008) to answer the research question along with the sub questions. The researcher began with a short list of tentative codes that match text segments (Creswell, 2007) and then organized strategy codes, comprised of methods used to accomplish a goal, into categories (Bogdan & Biklen, 2007). The researcher then utilized the statements that best illustrate these categories to understand how each participant avoids (or helps others to avoid) distraction in a 1:1 learning environment (Hesse-Biber, 2010). The researcher developed codes until the point of saturation was reached (Denzin & Lincoln, 2000).

RESEARCH FINDINGS

How Teachers Help Students to Avoid Distractions

When asked how they help students deal with online distractions at school, teachers reveal several unique solutions. The primary way teachers help their students is to create lessons and assignments that are so engaging that students do not desire any outside

stimulation. Along with keeping the lesson engaging, teachers seek to keep their students so busy that they do not have time to seek distractions online. One key way teachers do this is through deadlines; when a student sees the deadline looming, particularly in discussion boards when his or her peers have already posted their assignments, he or she focuses on the task at hand. Teachers find that walking around the room and monitoring what students are doing helps them to stay on task. One teacher mentions her goal of teaching from "bell to bell," using a system in which students move on to another task if they have completed the first one; when finished, they are permitted to complete homework from other classes.

When asked about the processes students use to complete assignments on their laptops, teachers reveal a variety of methods. Students typically submit assignments to an online drop box, which helps them to stay on task and submit the assignment before the due date. Some teachers allow students to listen to music, which students request and seem to thoroughly enjoy. Teachers also try to help students focus by utilizing the physical space in the classroom; they move the desks around and allow students to spread out. This is interesting, as technology often leads teachers to rearrange the furniture in their class toward a style fit for group learning (Mitchell, 2004). The sample that I observed, however, used a row design for the most part (see Figure 1). Students find incentive to complete assignments by viewing their grade faster through online grading. Because students are continually monitoring their online grades, teachers feel that this method of grading leads to more accuracy when it comes to assessing students. There are numerous creative methods that teachers might employ to help students avoid distraction.

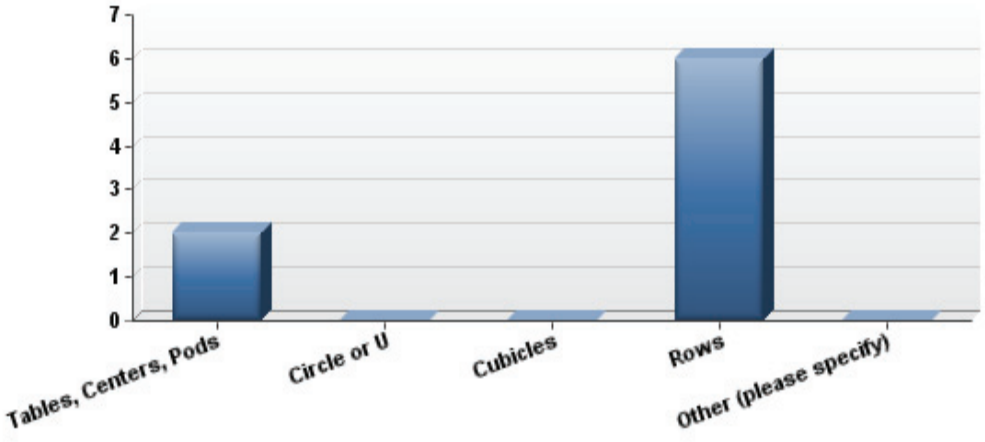

Figure 1. Design of classroom layout (n=8).

How Laptops Help Students Avoid Distractions

When asked if using the laptops has helped their students learn to deal with distraction in general, teachers generally agree that the laptop helps with distraction in multiple, often indirect, ways. One teacher asserts that the block schedule (which includes 90-minute classes) makes for a lengthy class

period in which students might become more easily distracted from the lesson. By having the laptop in class, this teacher notes that students seem more motivated and more interested in the classroom content. Another teacher believes the laptops have taught students "how to multitask and still be effective." Teachers believe the skill of multitasking is one that needs more attention, particularly for males (Wilson, 2005).

Another key way laptops help students avoid distractions is by the types of assignments students may complete using the tool: for example, strict deadlines and peer accountability provide strategic ways for teachers to ensure that students divide their focus in a wise manner. Through tools like discussion boards, Angel makes these strategies easy for teachers to utilize. In this sample, the primary activity for which technology is used is communication. By labeling the activity "communication," the activity could include document preparation, email, presentation, or web development. Fifty percent of teachers and 75% of students use technology to communicate (see Figure 2). The primary way students communicate is through document preparation or e-mail. The next most popular activity for which technology is used is summative assessment. This is illustrated through students having to submit their assignments either through Angel or e-mail. Thirty-eight percent of teachers and 63% of students use the technology primarily for summative assessment (see Figure 2). Finally, the third most popular activity for which technology is used is project-based activities; 25% of teachers and 13% of students use the technology in this way (see Figure 2). Interview data suggests that having students submit assignments through Angel can aid student distraction management.

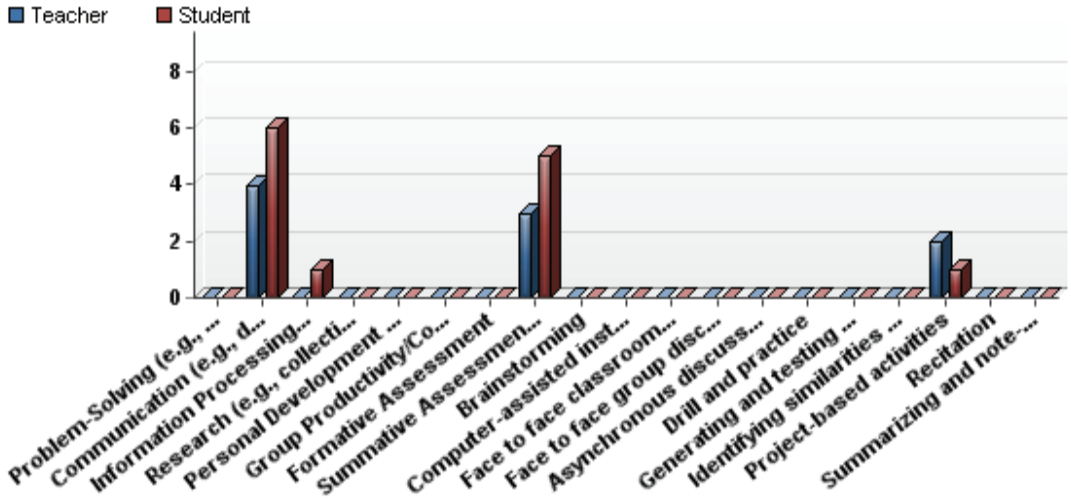

Figure 2 Activity for which technology is used during observations (n=8).

One teacher defines teaching as "a conversation about thinking. And I think it you use the discussion forum…it does open up the possibilities for that." Another teacher comments on the varied activities, such as the quiz or chat feature, that Angel permits. She believes that using multiple features like this helps to keep students guessing (and thus more attentive) about what class activity will occur. By utilizing

the captivating power of technology in class, teachers find that they can pull students' attention toward the lesson and away from distractions.

Online Temptations and the Need to Monitor

All teachers agree that the Internet tempts students to do something non-instructional during class like check personal e-mail or social networking sites. One teacher notes that a student in another class was recently disciplined for attempting to log on to Facebook 12 times in one class period. The school has filters that block sites such as Facebook, but students often use proxies to gain access to their favorite personal websites. Teachers note that when using computers in class, they notice students minimizing windows quickly or trying to hide what they are doing when the teacher walks by. The solution to this problem for most teachers is to keep students so busy that they do not have time to check personal e-mail or social networking sites. Teachers note that "students should be minimizing windows relevant to the course, such as Angel or online research." One teacher likens minimizing windows to his or her own experience: "That's just like when we were in school and people would try to hide their cheat sheets." Teachers understand that students are frequently tempted by the Internet and should be monitored.

Teachers generally feel that most students stay within the parameters of the lesson when using the laptop, whereas there are often a few who like to visit other sites. One teacher likes to have a time in class when laptops are closed and all eyes are on the teacher. This teacher notes that in order to monitor well, "You have to be a vulture. You have to swoop down and you have to make sure that when you say the laptop is down, it's down." This teacher also teaches upper and lower-level honors courses and finds that distraction affects each course in a different way: "It seems to happen more for me with my seniors than with my ninth graders and tenth graders and it may be that ninth graders are fearful that the teacher will catch them; [for] seniors, maybe it doesn't matter so much." This coincides with information from student interviews, which suggests that seniors might feel the need to work on other assignments or check personal e-mail for responses from prospective colleges. When teaching small classes with 10-15 students, teachers have no trouble walking around and monitoring what they are doing; when the class size increases to 30 students, however, teachers have more difficulty monitoring. Teachers note that one method of punishment is confiscating the laptop for 24 hours, but fortunately they do not have to do this very often. It is important for teachers to learn monitoring techniques to help students avoid online distractions in class.

Advantages of 1:1 Learning

Teachers believe that learning to deal with distractions in school is important and will help students in their future endeavors. Teachers see students learning to be responsible, as they are the sole keepers and protectors of their laptops; this develops a sense of ownership for the student. All of the sites students visit online can be checked by the school technician; this fact makes them think twice about viewing inappropriate websites or making unsuitable decisions online. Another key part of being responsible users of their laptops involves bringing laptops to class fully charged, particularly for morning classes. Further, because assignments may be submitted electronically, there is a "no excuses" mentality among students (Corn, Tagsold, &

Patel, 2011). One teacher notes that e-mail has increased his ability to communicate with students "human to human." This teacher can communicate something personal through email, such as a concern over missing work or encouragement during a tough time. Teaching students responsibility is just one advantage of participating in a 1:1 initiative.
Teachers particularly want students to learn that there is a time to check personal e-mail and Facebook and a time to focus on class activities. Teachers assert that students need all the time management training they can get, and they believe that illustrating how to manage their digital lives helps with this skill. Learning these lessons while in a 1:1 environment will help students as they compete in a global economy in the future.

While it can be discouraging when teachers must spend class time managing students' online behavior, one teacher notes, "There was always a slick student before technology that you would have to monitor and pay close attention to." Another teacher expresses sentiments about distractions caused by technology: "Distractions…there will always be distractions. We try to impress upon the kids how important it is to just be responsible for your actions. [We tell them] 'it's your education!'" The table below designates key themes derived from findings.

Table 1
Summary of teacher sentiments by topic.

Topic	**Teacher Sentiment**
How Teachers Help Students Avoid Distractions	Create lessons and assignments that are so engaging that students do not desire any outside stimulation. Keep students so busy that they do not have time to seek distractions online (deadlines, teach from bell to bell).Walk around and monitor. Collect assignments through online drop box. Allow students to move around classroom to work or listen to their preferred music while doing individual assignments. Grade online (more incentive). Emphasize that technology is a tool that can take care of lower-level thinking tasks to free up time for higher-level thinking.
How Laptops Help Students Avoid Distractions	Keep students interested in lesson for 90-minute classes. Teaches how to effectively multitask. Use the Angel discussion boards (strict deadlines, peer accountability).
Online Temptations and the Need	All teachers agree that the Internet tempts students. Seniors try to hide windows more frequently than lower grade levels. Small classes allow for easier monitoring.

to Monitor	
Advantages of 1:1 Learning	Laptops are TOOLS that can greatly enhance learning opportunities as long as students have basic foundational knowledge as well. Laptops teach responsibility. Teachers want students to learn online time management skills.

DISCUSSION

The discussion highlights five themes that emerged from the data: (a) Laptops make learning more fun, (b) Students are less distracted when assignments are challenging, (c) Students are likely more distracted in class than teachers think they are, (d) Teachers and students are developing ways to manage distraction, and (e) Teachers and students understand that technology is here to stay.

Manage Distraction by Incorporating Projects that Students Enjoy

All teachers note the engaging classroom possibilities inherent with 1:1 learning. For teachers with the block schedule, ninety minutes can be a long time for students to listen to a lecture/class discussion, complete a worksheet, or take a test without seeking online distractions. One teacher notes, "I believe [the laptop] has been used as a tool to sort of help what we do, sort of break up boredom with just the regular test." Teachers assert that laptops help students stay engaged for a longer period of time during the 90-minute class. Teachers also find that assessing in multiple ways, such as Glogsters, PowerPoint presentations, or videos, works wonders for making learning more fun for students (Corn, Tagsold, & Patel, 2011). This type of involvement and sharing excites teachers because students perform better when they have a choice in types of assignments they may submit.

Other research notes that the lack of connection between testing and technology is a major problem for teachers who would love to make every class innovative and fun (Corn, Huff, Halstead, & Patel, 2011). Classes assessed by standardized tests are often perceived as more

important than those that are not assessed with such tests (Siskin, 2003). Schoen & Fusarelli (2008) discuss how standardized assessment conflicts with the teaching and learning practices embedded in the 21st century skills movement. For example, the 21st century skills movement focuses more on collaborative, interdisciplinary authentic activities rather than isolated learning and assessment (Schoen & Fusarelli, 2008). The English IV teachers in this study have more free reign with technology than other teachers because their students are not tested through a standardized assessment.

Excellent tools such as FIZZ have been developed based on this concept of providing content to the student outside of class and providing discussion and the opportunity to dive deeper into material during class (Barnhill, 2009). Pecansky-Brock (2011) finds VoiceThread, an online tool which transforms media into a collaborative space through video, voice, and text commenting features, helpful for aligning classes to 21st century learning. These ideas are excellent ways to maintain students' attention. Because students code certain activities as hot (such as social learning in which students connect) and some as cold (being lectured to, completing

dull assignments that are simply "busy work") (see Metcalfe & Mischel, 1999), tools such as FIZZ and VoiceThread are useful for helping students avoid distraction in 1:1 classrooms. Twenty-first century learners have myriad experiences using technology, and teachers would be wise to take advantage of the cultural technology knowledge base shared by many students (what Labbo & Place call *technology funds of knowledge*) (2010).

Manage Distraction by Incorporating Challenging Assignments

Teachers in this sample enjoy creating assignments which challenge students and lead them into higher level thinking activities than a simple Google search could provide. One teacher states, "I want to challenge them... it should be frustrating a little bit. It should cause a little problem. It should encourage them to think." The literature supports this desire for challenging work. Not only does challenging works benefit students academically; it also benefits them by keeping them focused for longer periods of time (Donham, 2011). Relatedly, teachers emphasize the need to remember that the laptop is a tool, and the potential of the tool is only realized when students and teachers desire to learn and work hard to demonstrate their mastery of concepts.

Manage Distraction by Promoting Self-Regulation, Self-Discipline

Fried (2008) found that students who used laptops in a traditional lecture-style university class spent considerable time multitasking and received lower scores on recall tests taken after the lecture. Fried notes that laptops certainly have their place in a classroom specifically designed for their use, but the "unstructured use of laptops in lecture courses is a disadvantage" (2008, p. 912). Fried's research supports the notion that when students pay more attention to the Internet than the lecture, assessment scores decrease; furthermore, this study's outcomes reflect the multitasking myth.

The Multitasking Myth

A traditional teacher believes the laptops have taught students "how to multitask and still be effective." In *Brain Rules for Baby*, Medina (2010) asserts that the best predictor of academic success is not IQ, but self-control. The human brain chooses relevant stimuli from other options, and executive function allows the brain to stay on task and avoid unproductive distractions. Students from this sample would agree with Medina; they feel that reminding themselves of future goals and considering the rewards and punishments involved with seeking outside distractions is the key to staying on task during class.

Ever since the first human found himself learning to survive on this earth, human beings have experienced the double-edged sword that is distraction. When that early human, for example, was reverently watching a beautiful sunset, he would not survive if he did not also hear a hungry lion approaching. Today, this might look like a student who is putting together a beautiful PowerPoint presentation in class who loses his focus when a peer laughs loudly in the hallway. His attention shifts for a moment, and he must bring it back. We give continuous partial attention all the time, and it can be difficult to focus on one task for a long time (Jackson, 2008). In this sample, most students treat online distractions as rewards rather than as the loud laughter in the hallway that might distract a student for just a few seconds. Hembrooke & Gay (2003) find that students who keep their laptops closed during class have higher test

scores on content taught during that class. They note, however, that the key factor for those who keep their laptops open during class is the length of browsing time.

There are different types of multitasking; one type involves doing more than one thing at exactly the same time, such as driving and listening to the radio, or cooking dinner while talking to one's spouse. The other type occurs when people rapidly change from one task to another; an example of this would be found in someone writing an essay for one class and then quickly reading Facebook messages. The first type is called parallel processing, and the second type is called task-switching (Gasser & Palfrey, 2009). Gasser & Palfrey (2009) find that the first type of multitasking (parallel processing) may increase efficiency, while the second type (task-switching) "can decrease efficiency, especially if those tasks demand more challenging cognitive processes" (p. 17).
Students and teachers must understand (and many already do) that parallel processing is a great skill to learn in school (e.g., let a file download while reading the day's assignment). Students should be advised that task-switching, however, can be hazardous to their mental health (Fried, 2008; Kraushaar & Novak, 2010). Teachers in the sample already do a great job of helping students to avoid task-switching through lessons that involve challenging assignments, strict deadlines, and engaging material that keeps students so engaged that they do not have enough time to become bored and seek online distractions. School administrators are also wise to have filters that block websites that typically distract students, such as Facebook and Twitter.

Another idea that emerges from the analysis is that of teaching students not only information and literacy skills, but also how to self-regulate when it comes to online distractions. Teachers report that altering the assessment style from paper and pencil tests to ExamView, an electronic testing system, helped one student because the software presented her with one question at a time, thus helping her focus better (Corn, 2009). Differentiated assessment practices may become the norm as their advantages become apparent over time.

Carr (2010) asserts that the activity of allowing one's mind to focus on irrelevant information rather than that which is meaningful and relevant signals "a reversal of the early trajectory of civilization: We are evolving from cultivators of personal knowledge into hunters and gatherers in the electronic data forest" (p. 2). Researchers, educators, and policy makers must consider what exactly is lost when students are not taught skills to help them manage online distractions.

Teachers are Developing Ways to Manage Distraction

This study reveals numerous methods that teachers use to manage distraction. I received intriguing responses during interviews, and the methods teachers use are as nuanced as the individuals themselves. The literature cites various methods used to help students avoid distraction in high-tech learning environments (Johnson, 2010), including: classroom response systems (clickers) and music (Cole, 2010; Johnson, 2010); setting ground rules at the beginning of the semester for wireless use, including a once-per-class period "no laptop time" (*Wireless in the Classroom: Advice for Faculty*, 2011); and using monitoring software which involves a range of benefits and drawbacks (Corn, 2009; Robinson, Brown, & Green, 2007). Teachers in this sample made use of each method except for

classroom response systems and monitoring software (although the sample school does utilize school wide filters for certain websites).

Manage Distraction by Illustrating the Relevance of Technology

Teachers recognize that the world is much flatter now that most of its inhabitants are connected through the World Wide Web (Friedman, 2005). Glimps (2008) recognizes the need for American schools to better prepare children with physical and health disabilities for a globalized workplace. She points out the need for students to learn about a global world. This may be done particularly through social studies courses, which have traditionally taught a blend of disciplines, including geography, civics, history, and anthropology. Glimps recommends adding more comparative religion and foreign language courses to the curriculum to aid with the 21st century concern of globalization, which aligns with two NETS*S components: Communication/ Collaboration and Digital Citizenship.

This study illustrates how 1:1 learning can help students prepare for the myriad distractions that are available to them in college and beyond through five major themes (see Table 2). Data supports the first theme, "Manage distraction by incorporating project that students enjoy," through reminders to make learning hands-on and reflective of the 21st century skills. Students enjoy it when teachers utilize new technologies for class, even if the teacher needs help from students to make the technology work correctly.

Table 2
Themes and lessons learned.

Theme	**Lessons Learned**
Manage Distraction by Incorporating Projects that Students Enjoy	Make learning hands-on; utilize new technologies for class. By personalizing assignments, students instantly become more interested and engaged.
Manage Distraction by Incorporating Challenging Assignments	Use students' love of socializing to your advantage; have them collaborate on documents or complete problem-solving activities as a group.
Manage Distraction by Promoting Self-Regulation, Self-Discipline	While filters and monitoring software can aid distraction, the best way to keep your students focused is to engage them. Have an open discussion with students about how you define online distraction; recognize that minimizing windows or viewing outside resources might be aiding student learning rather than hindering it. Consider allowing students to listen to music while working on individual assignments and discussing self-regulatory techniques with them, along with why these skills are important for the future.
Teachers are Developing Ways to Manage Distraction	Make work challenging; use deadlines to your advantage; utilize the online grading feature available in most course management systems (such as Angel, Moodle, or Blackboard).
Manage Distraction by Illustrating the Relevance of Technology	Understand that you are teaching during a pivotal moment in history; learning is changing and continuous professional development and the courage to try new teaching methods is imperative.

LIMITATIONS

As the primary instrument of data collection, the researcher had to maintain a constant awareness of her own perceptions and beliefs throughout the research study (Merriam, 1998). The data is self-reported and there is no comparison group; further, due to the small sample size, descriptive data from classroom observations may appear inflated. Because interview data constitutes the primary data source for this study, participants could have responded in a less truthful way fearing punishment. Limitations also include a lack of generalizability due to all participants being from North Carolina high schools.

CONCLUSIONS

As educators look toward the future of 1:1 learning and the many distractions that will be available to students simultaneously, they must learn to utilize data-based distraction avoidance methods in their classrooms. The study helps to move this area of inquiry forward by gaining a thorough understanding of strategies teachers use to manage distraction in 21st century classrooms. By entering a school system that has been provided with high-tech classrooms, informed leadership, and appropriate professional development, this study expands the field of instructional technology and increases the effectiveness of teachers and students so they may excel in school. By employing the techniques that educators say work best for avoiding distractions, teachers can hypothetically prepare students for a lifetime of uninterrupted learning.

REFERENCES

Antonietti, A. & Giorgetti, M. (2006). Teachers' beliefs about learning from multimedia. *Computers in Human Behavior 22*, 267–282. doi:10.1016/j.chb.2004.06.002

Barnhill, C. (2009). FIZZ: Web 2.0 Comes to the Classroom. Featured story, North Carolina State University.

Baumeister, R. F., & Vohs, K. D. (2004). Self-regulation. In C. Peterson & M. E. P. Seligman (Eds.), *Character strengths and virtues: A handbook and classification* (pp. 499–516). Washington, DC/New York: American Psychological Association/Oxford Press.

Bebell, D. (2005). *Technology promoting student excellence: An investigation of the first year of 1:1 computing in New Hampshire middle schools*. Boston: Boston College. Retrieved from https://www.center.uoregon.edu/ISTE/uploads/NECC2005/KEY_6592566/Bebell_BebellNECC2005_RP.pdf

Bell, B. & Kozlowski, S. *(*2002*)*. Adaptive guidance: Enhancing self-regulation, knowledge, and performance in technology-based training. *Personnel Psychology, 55,* 267–307.

Bogdan, R. C. & Biklen, S. K. (2007). *Qualitative research for education: An introduction to theories and methods* (5th ed.) Boston: Allyn and Bacon.

Carr, N. (2010). Author Nicholas Carr: The Web Shatters Focus, Rewires Brains. *Wired Magazine*. Retrieved from http://www.wired.com/magazine/2010/05/ff_nicholas_carr/all/1

Cavanaugh, C., Dawson, K., White, S., Valdes, N., Ritzhaupt, A., & Payne, D. (2007). *Leveraging Laptops: Effective Models for Enhancing Student Achievement. Project Research Report 2006-07.* Florida Center for Instructional Technology. Retrieved from http://etc.usf.edu/laptops4learning/resources/reports/Final_Report.pdf

Churchill, D. (2006). Teachers' private theories and their design of technology-based learning. *British Journal of Educational Technology, 37*(4), 559-576. doi:10.1111/j.1467- 8535.2005.00554.x

Cole, S. (2010). Quit surfing and start "clicking": One professor's effort to combat the problems of teaching the U.S. survey in a large lecture hall. *History Teacher*, *43*(3), 397-410.

Corbin, J. & Strauss, A. (2008). *Basics of qualitative research: techniques and procedures for developing grounded theory*. Los Angeles, CA: Sage.

Corn, J. (2009). *Evaluation Report on the Progress of the North Carolina 1:1 Learning Technology Initiative (Year 2)* (NC State Board of Education Report). Raleigh, NC: Friday Institute for Educational Innovation, North Carolina State University.

Corn, J.O., Halstead, E.O., Tingen, J., Townsend, M., & Campbell, B. (2010, December). *North Carolina 1:1 learning initiative evaluation interim report.* (Vance County Schools, Golden Leaf Foundation Report). Raleigh, NC: Friday Institute for Educational Innovation, North Carolina State University.

Corn, J. O., Huff, J.D., Halstead, E.O., & Patel, R.K. (2011, January). *Examining issues critical to a 1:1 learning environment: Student learning outcomes*. *Evaluation report on the progress of the North Carolina 1:1 learning technology initiative (Year 3)* (NC State Board of

Education Report). Raleigh, NC: Friday Institute for Educational Innovation, North Carolina State University.

Corn, J. O., Osborne, J., & Halstead, E. (September 2008). *Initial report: Evaluation study of the progress of the North Carolina 1:1 learning initiative (Year 1)* (NC State Board of Education Report). Raleigh, NC: Friday Institute for Educational Innovation, North Carolina State University.

Corn, J., Tagsold, J., & Patel, R. (2011). The tech-savvy teacher: Instruction in a 1:1 learning environment. *Journal of Educational Research & Practice 1* (1).

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches*. (2nd ed.). Thousand Oaks, CA: Sage.

Curtis, R., Merry, L., & Walker, M. (2011). *Can you win? Inside a student-led war room!* Poster presented at the annual meeting of the International Society for Technology in Education, Philadelphia, PA.

Dede, C. (2005). Planning for neomillennial learning styles: implications for investments in faculty and technology. In D.Oblinger & J.Oblinger (Eds), Educating the Net generation (pp. 15.1–15.22). Boulder, CO: EDUCAUSE. Retrieved March 31, 2006, from http://www.educause.edu/educatingthenetgen

Denzin, N.K. and Lincoln, Y.S. (2000), "Introduction: the discipline and practice of qualitative research", in Denzin, N.K. and Lincoln, Y.S. (Eds), *Handbook of Qualitative Research*, Sage, London, pp. 1-28.

Donham, J. (2011). Assignments worth doing. *School Library Monthly, 28* (2): 5-7.

Donnalley, J. (2011). *Practical DyKnow: 10 easy ways to engage students*. Session presented at the annual meeting of the International Society for Technology in Education, Philadelphia, PA.

Ertmer, P. A. Addison, P., Lane, M., Ross, E., & Woods, D. (2000). Examining teachers' beliefs about the role of technology in the elementary classroom. *Journal of Research on Computing in Education, 32*, 54-72. Retrieved from: http://www.iste.org/content/navigationmenu/publications/jrte/issues/volume_321/number_1_fall_1999/examining_teachers_beliefs_about_the_role_of_technology_in_the_elementary_classroom.htm

Fairman, J. (2004). *Trading roles: Teachers and students learn with technology.* Maine Learning Technology Initiative (Research Report #3). Maine Education Policy Research Institute, The University of Maine Office, Gorham, Maine. Retrieved from http://usm.maine.edu/cepare/Reports/MLTI_Report3.pdf

Fraser, M. (2002). Ergonomics for grade school students using laptop computers. Proceedings of The XVI Annual International Occupational Ergonomics and Safety Conference, Toronto. Available online at: http://education.umn.edu/kls/ecee/pdfs/ErgonomicsForGradeSchoolChildrenUsingLaptops_Fraser.pdf

Fried, C. (2008). In-class laptop use and its effects on student learning, *Computers and Education, 50*, 906–914.

Friedman, T. (2005). *The world is flat*. New York, NY: Farrar, Straus & Giroux.

Gasser, U & Palfrey, J. (2009). Mastering Multitasking. *Educational Leadership*, *66* (6), 14.

Harris, W. J., & Smith, L. (2004). *Laptop use by seventh grade students with disabilities: Perceptions of Special Education teachers.* Maine Learning Technology Initiative. (Research Report #2). Maine Education Policy Research Institute, University of Maine Office. Retrieved from http://usm.maine.edu/cepare/Reports/MLTI_Report2.pdf

Hembrooke, H., & Gay, G. (2003). The laptop and the lecture: The effects of multitasking in learning environments. *Journal of Computing in Higher Education*, *15* (1), retrieved April 2, 2005, from http://www.hci.cornell.edu/LabArticles/Multitasking_Hembrooke.pdf.

Hesse-Biber, S. (2010). Qualitative approaches to mixed methods practice. *Qualitative Inquiry, 16* (6), 455-468.

Holcomb, L. (2009). Results & Lessons Learned from1:1 Laptop Initiatives: A Collective Review. *TechTrends*, *53*(6), 49-55.

Jackson, M. (2008). *Distracted*. Amherst, N.Y.: Prometheus Books.

Johnson, D. (2010). Taming the chaos. *Learning and Leading with Technology*, 38(3), 20-23.

Kleiger, A., Ben-Hur, Y. & Bar-Yossef, N. (2010). Integrating laptop computers into classroom: Attitudes, needs, and professional development of science teachers-A case study. *Journal of Science Education Technology 19,*187-198. doi:10.1007/s10956-009-9191-1

Lambert, J. (2002). *Digital storytelling : capturing lives, creating community*. Berkeley, CA : Digital Diner Press.

Lane, D. M. M. (2003). *Early evidence from the field: The Maine learning technology initiative: Impact on students and learning*. (Occasional paper #1). Center for Education Policy, Applied Research, and Evaluation; University of Southern Maine. Retrieved from http://usm.maine.edu/cepare/Reports/MLTI_Impact_Students_Learning.pdf

Leu, D., Leu, D., & Coiro, J. (2004). *Teaching with the Internet*, 4th edition, Norwood, MA: Christopher Gordon.

Looking for Technology Integration (2010). *SERVE Center at UNC-G*. Retrieved from http://www.serve.org/lofti.aspx

Lowther, D., Strahl, D., Inan, F., & Bates, J. (2007). *Freedom to learn program Michigan 2005-2006 evaluation report*. Memphis, TN: Center for Research in Education Policy. Retrieved from http://www.memphis.edu/crep/pdfs/Michigan_Freedom_to_Learn_Laptop_Program.pdf
Maninger, R. M. & Holden, M. E. (2009). Put the textbooks away: Preparation and support for a middle school one-to-one laptop initiative. *American Secondary Education, 38*(1), 5-33. Retrieved from http://www.ashland.edu/academics/education/ase/index.html

Mann, D. (2008). *Documenting outcomes from Henrico County Public School's laptop computing initiative*. Retrieved from http://jcots.state.va.us/2008 Content/Materials/Open Ed/Henrico Laptop Report.pdf

Medina, J. (2008). *Brain rules.* Seattle, WA: Pear Press.

Medina, J. (2010). *Brain rules for baby*. Seattle, WA: Pear Press.

Metcalfe, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review, 106*(1), 3-19. doi:10.1037/0033-295X.106.1.3

Miles, M.B. *&* Huberman, A.M. *(*1994*).* Qualitative data analysis: An expanded sourcebook *(*2nd ed.*)* Thousand Oaks, CA*: Sage Publications.*

Mischel, W., Ebbesen, E. B., & Raskoff Zeiss, A. (1972). Cognitive and attentional mechanisms in delay of gratification. *Journal of Personality and Social Psychology, 21*(2), 204-218. doi:10.1037/h0032198

Mischel, W., Shoda, Y., & Peake, P. (1988). The nature of adolescent competencies predicted by preschool delay of gratification. *Journal of Personality and Social Psychology, 54*(4), 687-696.

Mitchell Institute (2004). *One-to-One Laptops in a High School Environment. Piscataquis Community High School Study Final Report*. Retrieved from http://www.projectred.org/uploads/Piscataquis_One-to-One_Laptops_Report.pdf

Mollette, M.J., Overbay, A., Corn, J., Townsend, M., & Townsend, L. (2011). *IMPACT Continuation – Annual Report (2009/2010).* Raleigh, NC: Friday Institute for Educational Innovation, North Carolina State University

Oliver, E, Markland, D, & Hardy, J. (2010). Interpretation of self-talk and post-lecture affective states of higher education students: A self-determination theory perspective. *British Journal of Educational Psychology 80* (2): 307–323.

Pecansky-Brock, M. (2011). How and why to "Flip your Classroom" with VoiceThread. Webinar. Retrieved from http://www.teachingwithoutwalls.com/2010/02/voicethread-effective-design-strategies.html

Penuel, W. R. (2006). Implementation and effects of one-to-one computing initiatives: A research synthesis. *Journal of Research on Technology in Education, 38*, 329-348.

Posner, M. & Boies, S. (1971). Components of attention. *Psychological Review, 78*, 391-408.

Posner, M.I. and Rothbart, M.K. (2007) Research on attention networks as a model for the integration of psychological science. *Annu. Rev. Psychol. 58*, 1–23.

Robinson, L. K., Brown, A., & Green, T. (2007). The Threat of Security: Hindering Technology Integration in the Classroom. *Learning & Leading with Technology, 35*(2), 18-23.

Schoen, L., & Fusarelli, L. (2008). Innovation, NCLB, and the fear factor: The challenge of leading 21st-century schools in an era of accountability. *Educational Policy*, *22*(1), 181-203.
Shapley, K., Sheehan, D., Maloney, C., & Caranikas-Walker, F. (2008). *Evaluation of the Texas technology immersion pilot: Outcomes for the third year (2006-07)*. Retrieved from http://www.etxtip.info/

Silvernail, D. L.. & Lane, D. M. M. (2004). *The impact of Maine's one-to-one laptop program on middle school teachers and students. Phase one summary evidence.* (Research Report #1). Maine Education

(Research Report #1). Maine Education Policy Research Institute, University of Southern Maine Office. Retrieved from http://usm.maine.edu/cepare/Reports/MLTI_Report1.pdf

Siskin, L. S. (2003). Outside the core: Accountability in tested and untested subjects. In Flinders, D.J. & Thornton, S.J. (Eds.). *The Curriculum Studies Readers* (3rd Edition). New York, NY: Routledge.

Vohs, K. D., & Baumeister, R. F (Eds.). (2004). *Handbook of self-regulation: Research, theory, and applications*. New York, NY: Guilford Press.

Warschauer, M. (2006). Going one-to-one: The experiences of cutting-edge schools suggest the whys, the why nots, and the hows of laptop learning programs. *Learning in the Digital Age 63*(*4*) 34-38. Retrieved from http://pdonline.ascd.org/pd_online/tis_tb/el200512_warschauer.html

Weston, M.E. & Bain, A. (2010). The end of techno-critique: The naked truth about 1:1 laptop initiatives and educational change. *Journal of Technology, Learning, and Assessment, 9*(6). Retrieved from http://escholarship.bc.edu/jtla/vol9/6/

Whitcraft, T. & Ibanga, I. (2007). Give 1 Get 1: Closing the Digital Divide. Retrieved from http://abcnews.go.com/GMA/TenWays/story?id=3640025&page=1

Wilson, G. (2005). Abuse of technology can reduce UK workers' intelligence: *HP calls for more appropriate use of always-on technology to improve productivity*. UK. Hewlett Packard study

Wireless in the Classroom: Advice for Faculty. (2011). Computing at UW-Madison Division of Information Technology. http://www.doit.wisc.edu/network/wireless/advice_fac.asp

Wireless in the Classroom: Advice for Students. (2011). Computing at UW-Madison Division of Information Technology. http://www.doit.wisc.edu/network/wireless/advice_stu.asp

Yin, R. K. (2003). *Case study research: Design and methods* (Vol. 5). Thousand Oaks, CA: Sage.