THE EFFECT OF TECHNOLOGY INFUSION ON AT-RISK HIGH SCHOOL STUDENTS' MOTIVATION TO LEARN

A Dissertation
by
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ABSTRACT

THE EFFECT OF TECHNOLOGY INFUSION ON AT-RISK HIGH SCHOOL STUDENTS' MOTIVATION TO LEARN
(May 2011)

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Faced with the difficulty of educating at-risk students, one possible solution links success to motivation. By using instructional technologies (ITs), school systems are attempting to increase student motivation, hoping that when students are given a say into how and what they learn, they will feel more invested in their learning and improve their achievement outcomes. Because of this, individualized instruction and innovative school improvement plans using interactive technologies are becoming increasingly pervasive. The 2004 National Research Council and the Institute of Medicine report on fostering high school students' motivation to learn argued that motivation is a key factor in the success or failure of education. At the forefront of technological shifts in curriculum is the premise that students want to use computers and are motivated to learn because technology is more engaging than conventional approaches. Increasingly, school reform programs include expensive technology initiatives, yet most current research surrounding these approaches involves little more than comparing test scores and teacher satisfaction surveys. By examining at-risk high school students' perceptions of their motivation when using instructional technologies, this study offers a shift away from the traditional voices currently dominating research on this

topic. It also hopes to offer a better understanding of the link between students' perceptions of their motivation and the road blocks that impede motivation. Additionally, this study seeks to bring to light the frequently overlooked perspective of students who are often marginalized, unsuccessful, and in danger of failure.

By combining the work of Brophy (2010) and Dede (Dede, 2007; Clarke-Midure & Dede, 2009; Clarke-Midure & Dede, 2010), a two-fold framework converged to form three key questions in this study. Student interviews and survey data provide insight about the degree to which at-risk high school students feel that instructional technologies help contribute to or hinder their academic success. The survey tool, classroom observations, and student interviews specifically reveal how feelings of autonomy, extrinsic and intrinsic goal orientation, and task value are related to increased motivation among at-risk students and how certain management practices and road blocks can impede success. Additionally, the data collected were used to better understand what role the perceived value of digital literacy as a 21st Century job skill plays in motivating at-risk high school students when using technology in the classroom. Implications for teachers, administrators, and policy makers, as well as suggestions for further research are also presented.

DEDICATION

With love and gratitude to my husband, my mother, and my daughters

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I would like to thank my chair, Dr. Sara Olin Zimmerman, for the kindness and support she showed me throughout this process. I would also like to thank committee members Dr. Les Bolt and Dr. Melanie Greene for their professional insight.

I am also grateful for the opportunity I had to learn from the innovative educators at the case study site and the NCDPI Media and Technology Division.

Lastly, a heartfelt thank you to my Cohort 16 colleagues who continue to inspire and encourage me and to my dear friend, Melanie Honeycutt, whose unwavering friendship and loyalty serve as a real-life example of leadership in action.

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Foreword

Position of the Researcher

In order to better understand the impetus of the study, mixed methods research includes the personal background of the researcher and is considered significant in understanding the perspective and sensibilities driving the study.

In this case, eight years ago, my husband and I moved to the tiny town of Drexel, NC. We found out about Drexel from an on-line job posting and after a series of positive phone interviews, we visited Drexel for the first time. That early visit left a lasting impression. We were moving from central Texas, where I-35 runs straight up into Dallas and straight down into Mexico. The North American Free Trade Agreement (NAFTA) had rejuvenated the I-35 corridor and seemed like a miracle for Texas businesses big and small. However, my trip to North Carolina revealed a side of globalization that I had not understood, but would soon live with on a daily basis. Drexel had been the home to Drexel Heritage Furniture. At one time, the now vacant factories bustled with activity, jobs, wealth, and opportunity. The formerly booming town lost its industry and identity almost overnight as Drexel Heritage closed each of the plants and moved all of its operations to China. In this town, globalization is equated with greed, loss, abandonment, and hopelessness.

My husband accepted a position in Drexel in March of 2003. We live about a mile from the old furniture plant. Surrounding it are the factory houses that are now in disrepair. Trailer parks have crept into fields that were sold off so old home-places would not be foreclosed. The primary and elementary schools that were once the pride of Burke County

now have the second highest poverty rate and are among the lowest performing in the system.

As I started this research project, I also visited the local elementary school as a point of reference. The old Drexel High School building had been serving as the third through fifth grade center for years. The classrooms are large, with enormous windows and cinderblock walls. Those that I visited had one computer, located on or next to the teacher's desk. These computers were at least five years old, and some still had zip drives and no USB ports. There were several classrooms still using overhead projectors. The school houses two computer labs that are filled with standard Dell desktops. Students can take reading tests as often as needed and have computer "class" about once a week. I saw no laptops, no document cameras, no interactive smart-boards, no flat screen TVs, or mobile laptop labs.

Selfishly, the most troubling part of what I saw was that my own daughters were zoned to this school. How could I possibly send my girls to a school that looked the same as it did 10 years ago and may in fact look the same in another 10? Will the students in my county be ready for the demands of the 21st Century workplace or those of most university professors?

Walking those halls, I reflected on the five years I had spent teaching English language learners at these local schools before starting on my doctoral work. Each day, I battled limited resources and the ignorance and misconceptions encompassing the recent history and the reality of the future in Drexel. It is not easy for this once proud town to accept, nurture, and welcome the poor and migrant who have begun to settle in. The local leaders approach curriculum, instruction, and school environment the same way they did twenty years ago, and this approach is not working or valid anymore. Lack of funding by the

county commissioners is no longer supplemented by boosters or bake-sales. Inadequate teacher training, instructional materials, and technology are not overcome by educated parents whose kids come to school already reading and writing. The demographics have changed. The reality of this town has changed, but the kind of education we are practicing has not.

Like Drexel, the town in this study is known for its furniture, and like Drexel, it went through the same decimation when free trade agreements lifted tax and import restrictions. For many years, the schools were among the worst in the state. To this day, they are classified as a low-wealth system by the North Carolina Department of Public Instruction (NCDPI). However, the schools in this town, in the past four years, have undergone a radical transformation by using a federal technology grant to institute the IMPACT model for technology infusion and district-wide collaboration. The juxtaposition between my own town and the struggles our schools are continually facing and the overwhelming success of students in a school system eerily familiar yet far more innovative drew me to this case study site and has provided a rich backdrop which informs this study in academically relevant and deeply personal ways.

Chapter One

Introduction

Recent concern over our current system's ability to educate students effectively enough for the U.S. to remain both globally competitive and financially solvent has prompted an increased desire for school reform using instructional technologies (Kolderie & McDonald, 2009; Carneiro & Draxler, 2008; Schank & Jona, 1999). This concern coupled with the inclusion of digital literacy and information systems in the accountability standards of *No Child Left Behind* (*NCLB*) spearheaded the technology revolution in U.S. schools. While the shift from the information age to the technological age is pervasive, using technology infused curricula in public K-12 education is still seen as controversial. Proponents argue that technology tools can provide students with more options and input into their educational experience (Lisenbee, 2009). Web 2.0 and e-learning 2.0 are changing the very fabric of the way students learn, collect, and share information (Dillon-Marable & Valentine, 2006; Levine, 2005; Prensky, 2009).

Web 2.0 technologies, most commonly the use of blogs and wikis which promote social exchanges of information in small, visual based 'bytes,' can provide multimedia-based instructional strategies that foster content interaction and feedback by replacing the traditional use of the classroom computer as tutor or typewriter. The computer then becomes a tool for socially constructing knowledge (Swanson & Legutko, 2008). The social-interactive aspects of Web 2.0 tools coupled with technologies that provide the cognitive practices of thinking, problem solving, and learning (Jonassen & Reeves, 1996) combine to create technology infused curriculum. However, using technology without employing appropriate instructional strategies or theories can lead to disenchantment (Cuban,

Kirkpatrick, & Peck, 2001). Therefore, technology infusion is not about simply placing the curriculum on the internet. Rather, it is using technology as a vehicle for cognitively engaging instruction (Jonassen & Reeves, 1996).

The generation of students born after 1992 has been dubbed the 'net gen,' because the internet has been connecting the planet during their entire lives (Oblinger, 2005). The implications of this ubiquitous technology are startling. Students of this generation often simultaneously text message, watch TV, download music, update their social networking site, and do their homework. They are always connected and constantly on (2005). These students learn through experience and hands-on activities. They value collaboration, social-networking, and having input into how they learn (Ramley & Zia, 2005). Unlike students before them, they often type their names before they can print. They look for digital information paths (such as Google) rather than traditional texts (encyclopedias or dictionaries) (Weiler, 2003). Their ability to read visual and visual-spatial images is highly attuned due in part to video game play (Oblinger, 2005). Their desire for connectivity, instant feedback, and constant interaction creates a dichotomy between how teachers want to teach and how this generation wants to learn (Oblinger, 2005).

Background of the study

The world is in the midst of a "massive and wide-ranging shift in the way knowledge is used and disseminated and learned" (Weiler, 2003, p.73). Schools are no exception. Not since the innovation of the printing press has a technological device borne such implications for the learning process (Bork, 2004). It is no longer viable for teachers to view literacy through the traditional lens of reading and writing. The advent of digital literacy, widely understood to mean the ability to locate, organize, understand, evaluate, and create

information using digital technology, has moved to the forefront of curriculum design. Teachers must deliver relevant (Slaughter, 2009) and authentic (Peacock, 1997) materials, which changes the role of the teacher dramatically (Schank & Jona, 1999). No longer are teachers the lone keepers of knowledge; instead, they are increasingly called upon to facilitate the use of information and create collaborative learning environments that intersect student motivation and accountability standards (Schank & Jona, 1999).

Instructional technology (IT) is slowly replacing the chalkboard as the primary way for teachers to engage their students in meaningful learning experiences (Brown, S., 2000). Teachers are repeatedly placed in the uncomfortable position of having to relearn their craft, relying heavily on peer support to navigate each new wave of instructional technologies. Administrators, businessmen, and policy makers alike urge all educators to rethink the idea of learning and to reflect on the possibilities that IT presents because technology infusion allows students to engage in their ideal way of learning by creating innovative avenues for customizable lessons and collaboration (Brown, J.S., 2002).

Although computers are dynamic tools (Lee, 2006), providing students new opportunities to develop the cognitive skills that the 21st Century global economy requires, the demands of digital literacy are widening the achievement gap among white and non-white students and creating a phenomenon known as the digital divide (Lonergan, 2000). Many schools have outdated equipment, provide limited access to advanced technologies, and have not properly trained teachers to use the IT that is available (Lee, 2006).

Students already identified as at-risk are particularly vulnerable to the digital divide. The term "at-risk" is used to describe students who are in danger of not meeting educational goals such as graduating from high school or acquiring the skills necessary to become

contributing members of society (Cardon, 2000). They tend to exhibit disruptive behavior that interferes with their learning and their background characteristics may place them at or below the poverty level; they may also speak a language other than English at home (2000). Other characteristics include low grades and tests scores, abundant absences from school, feelings of alienation and isolation, and the inability to form healthy social attachments (as cited in Cardon, 2000). Often, at-risk students have experienced family instability and personal tragedy and have siblings who have dropped out of high school (Edmunds & Li, 2005). At-risk students are usually overwhelmed by the content covered in high school and may also have learning disabilities that make reading and writing difficult (Boon et al., 2007).

The statistics are sobering. Students who live in poverty are more likely to drop out and the same is true for students who lack a role model at home (Boon et al., 2007). Additionally, school districts whose students are predominately racial or ethnic minorities graduate 20% fewer students (Slaughter, 2009; Njuguna, 2010).

Statement of the Problem

Technology and the powerful place it holds in our global economy can influence the future success or failure of at-risk children. Using instructional technologies has the potential for raising achievement and increasing success among our most vulnerable student groups (Brown, J.S., 2002; Slaughter, 2009; Lee, 2006). By using tech-talk with at-risk students and empowering them with the language and the cognitive ability to navigate the technology industry, educators can better equip these students for the future and aid in their academic success (Young, 2002).

U.S. high school dropout rates are as high as 50% in some areas, with half of those who drop out pointing to boredom and lack of interest as a reason for leaving school (Slaughter, 2009). Faced with the difficulty of educating at-risk students, one possible solution links success to motivation, which studies show contributes to positive attitude and lessened anxiety (Young, 2002). By using technology infused curriculum, some school systems attempt to increase student motivation, hoping that when students are given a say into how and what they learn, they will feel more invested in their learning and improve their achievement outcomes (Kolderie & McDonald, 2009). In an attempt to increase student achievement through motivation, individualized instruction and innovative school improvement plans using interactive technologies are cropping up across the country (2009).

This study addresses the problem educators face in raising achievement among at-risk students and the impact on achievement that using technology driven instruction has on increasing at-risk students' motivation to learn.

Purpose of the Study

The National Research Council and the Institute of Medicine (2004) report on fostering high school students' motivation to learn argued that motivation is a key factor in the success or failure of education. At the forefront of technological shifts in curriculum is the promise that students want to use computers and are motivated to learn because technology is more engaging than conventional approaches. Motivation is traditionally defined as learner-interest, persistence, attention, action, and enjoyment (Peacock, 1997). Educators are "painfully aware that students will only seek information and learn if they are motivated to do so" (Weiler, 2003, p. 73).

A rural, high poverty, high minority school system in North Carolina has made significant gains in achievement since the implementation of a large scale technology infusion model called IMPACT which was developed by the North Carolina Department of Public Instruction's (NCDPI) Media and Technology Department and includes 1:1 laptop rollout. The model is often funded at the local level by a federal grant. While the model can be used without the grant, the initial funding by the grant specifically allows high-poverty systems to purchase technology and train its teachers and staff. The model was developed to meet guidelines set forth by "the national standards for media and technology programs, the International Society for Teacher Education's (ISTE) National Educational Technology Standards, and a growing body of school library media and instructional technology research" (NCDPI, 2006).

IMPACT's pedagogy asserts the importance of information and digital literacy – the ability to find and use information. At its core, the IMPACT model is a collaborative approach to information and digital literacy and uses technology that is seamlessly infused into classroom curriculum. Collaborative planning among teachers and administrators is also crucial to the model, as is student collaboration and self-assessment, outside evaluation, and staff development and training.

Implementation of IMPACT takes place in phases. The first three involve building support among faculty, staff, students, parents, and the community, assessing school readiness, and designing a comprehensive collaboration schema. The middle phases involve the training of administration, teachers and support staff in the model implementation and evaluation. The final phases occur as the collaboration takes place within the school and

ultimately moves beyond the classroom into a collaborative effort at the local, state, national, and international level.

NCDPI (2006) published these points on their website about the success of the IMPACT model based on outside evaluations that used student assessments, student and teacher surveys, and thousands of interviews with faculty, staff, and students:

- In the first year, students in *IMPACT* Model schools had stronger growth than comparison school students, and for particular subgroups, there was substantially stronger growth, varying from small differences to about half a grade level of extra growth, depending on the outcome and grade level.
- *IMPACT* students often started lower than their comparison school counterparts, but caught up within one school year.
- There was no significant difference in score growth based on race.
- In general, the most challenged *IMPACT* students showed the most growth in achievement.
- Students in *IMPACT* schools showed more comfort and enjoyment with computer use than did comparison school students
- Students in *IMPACT* schools showed more confidence in their computer skills than comparison school counterparts (NCDPI, 2006)

The data collected by NCDPI suggest that among at-risk subgroups tremendous gains in achievement have occurred because of the implementation of the IMPACT model. NCDPI's findings, however, do little to link students' perceptions of their motivation to learn to the achievement gains reported on standardized state tests. The above information provided by NCDPI claims that the largest gains in achievement during the implementation of the

IMPACT model occur among students who are "most challenged" to begin with. This assertion led the researcher to an IMPACT school as the case study site in an attempt to better understand how technology implementation led to increased student motivation.

Methodology

This study includes classroom observations, student interviews, researcher's sketch and field notes, and the use of a modified version of the Motivated Strategies for Learning Questionnaire (MSLQ) with the students at a rural, high poverty, high minority high school in North Carolina. The purpose of the questionnaire, student interviews, and classroom observations is to better understand the link between students' perceptions of their motivation to learn while using instructional technologies and an increase in achievement. The researcher's sketch and field notes allow the process of triangulation for emerging themes to become more transparent as researcher subjectivities are openly shared. The high school participating in the study uses the IMPACT model of technology infused curriculum that is funded by a federal grant in partnership with the North Carolina Department of Instruction's Media and Technology Division. The school system utilizes the model in order to increase student achievement by aligning state content standards with technology rich classroom instruction, including 1:1 laptops, interactive smart boards, flip video cameras, Mp3 players, blogs, wikis, and various instructional software tools. For the first three years of the IMPACT model, teachers at this school completed approximately 25 hours of technology specific professional development per year. Before the start of the 2010 semester, teachers also spent 12 days over the summer specifically preparing for 1:1 laptop rollout.

Significance of the Study

Administrators, directors, department chairs, and classroom teachers have traditionally designed and assessed curriculum plans. Increasingly, those strategies include expensive technology initiatives like IMPACT, yet most current research surrounding these approaches involves little more than comparing test scores and teacher satisfaction surveys. A recent survey about the impact of forty years of technology on learning explains:

> More than 60 meta-analyses have appeared in the literature since 1980, each focusing on a specific question addressing different aspects such as subject matter, grade level, and type of technology. Although each of the published meta-analysis provides a valuable piece of information, no single one is capable of answering the overarching question of the overall impact of technology use on student achievement. (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011, p. 5)

By examining at-risk high school students' perceptions of their motivation to learn when using instructional technologies, this study seeks to contribute to the absence of research specifically connecting instructional technology use to student achievement. Additionally, research in the area of cognition, learning, and technology use is needed to better understand the role of motivation and student achievement (Ross, Morrison, & Lowther, 2010). A better understanding of the link between students' perceptions of their motivation and instructional technology may ultimately lead to increased achievement among our schools' most vulnerable students. Doing so offers a shift away from the traditional voices currently dominating research on this topic. Therefore, this study seeks to bring to light the frequently overlooked perspective of students who are often marginalized, unsuccessful, and in danger of failure. By purposefully positioning the perceptions of

disenfranchised students, whose voices have long been on the outside of research, into the center of its examination, the agenda of this study becomes not only one of the exploration of power differentials but also one of emancipation – an attempt to move closer to equality. Through the lens of critical theory and informed by the work of Brophy (2010) and Dede (Dede, 2007; Clarke-Midure & Dede, 2009; Clarke-Midure & Dede, 2010), the key questions in this study are:

1. To what degree do at-risk high school students feel that instructional technologies help contribute to their academic success?
2. To what degree are feelings of autonomy and goal orientation related to increased motivation among at-risk students who are taught using technology-driven instructional models?
3. What role does students' perceived value of digital literacy as a 21st Century job skill play in motivating at-risk high school students when using technology in the classroom?

Definition of Key Terms

1:1 laptops – a laptop for every student in an educational setting.

Autonomy – an individual's sense that he or she has a choice in his or her actions and that he or she is the initiator of those actions.

Digital divide – the achievement gap between white and non-white students created by the advent of digital literacy.

Digital literacy – the ability to locate, organize, understand, evaluate, and create information using digital technology.

EOC – the End of Course exams given to secondary students in core content subject areas by the North Carolina Department of Public Instruction.

Extrinsic goal orientation – the motivators that focus on social comparison such as grades, rewards, or praise.

Intrinsic goal orientation – the desire within students to want to learn for learning's sake; the cause of an individual to complete a task because he/she finds the task interesting or enjoyable.

NCDPI – the North Carolina Department of Public Instruction is the state agency governing public K-12 education in North Carolina.

Student motivation – the degree to which students invest attention and effort in various pursuits.

Technology infusion – the social-interactive aspects of Web 2.0 technologies coupled with instructional technologies that provide the cognitive practices of thinking, problem solving, and learning.

Value – the degree to which students find that the tasks that they are doing are relevant to them and matter in their future success.

Web 2.0 tools – digital tools that promote social exchanges of information through multi-media based content in ways that foster interaction and feedback.

Chapter one provides an introduction to the research on this topic. Chapter two offers an overview of relevant literature on the topic of student motivation to learn, at-risk student achievement, the role of multicultural education and student-centered technology-driven curriculum, and the theoretical framework of the study which takes a two-fold approach by combining the work of Brophy and Dede. Chapter three details the methodological strategies

that the researcher used to conduct the study. Chapter four provides the results of the data collection. Finally, chapter five utilizes a narrative model to discuss results, conclusions, implications, and limitations of the study.

Chapter Two

Review of the Literature

The purpose of this chapter is to review and summarize the existing body of literature as it relates to at-risk students' perceptions of their motivation to learn using technology infused curriculum. The review of the literature is divided into four sections: 1. the role of instructional technologies on student motivation, 2. at-risk students' motivation and achievement, 3. technology driven multicultural education, and 4. the theoretical framework that informs this study.

The technology movement currently spreading across U.S. schools is not being debated here. Rather, the link between student achievement and student motivation in relation to technology infused curriculum is being explored. This study is primarily concerned with how students perceive their own motivation to learn when technology is used to deliver content aligned curriculum. Although the role technology plays in the education process is still a highly debated topic, the purpose of this research is to acknowledge the ubiquitous presence of technology as it already exists in U.S. schools and to examine its relationship to motivation among at-risk students.

Student Motivation

The literature encompassing motivation theory is expansive, with its roots firmly in the foundations of psychology. Student motivation, according to the seminal work of Brophy (2010), is "the degree to which students invest attention and effort in various pursuits, which may or may not be the ones desired by their teachers" (p. 3) and is primarily subjective. Brophy urges educators to focus on cultivating in students *motivation to learn* which he defines as "the intention of acquiring the knowledge or skills that learning activities are

designed to develop" (p. 3). While the literature is broad, the voices of Brophy, Deci, and Dweck have been instrumental to the development of key definitions of motivation as it relates to education.

Brophy's theories of motivation explain that teacher expectations which develop over long periods of time can be a powerful external motivating factor in student achievement (Brophy & Kher, 1985; Brophy, 2010). Brophy's early work included various behavior strategies that teachers could use to positively, rather than negatively, influence student outcomes. He stressed the need to cultivate within students the desire to want to learn for learning's sake. Brophy's research solidified the notion that student motivation is directly correlated to success. Motivation, then, is an acquired competence developed through modeling, communication of expectations, and direct instruction. Paramount to Brophy's theory is the separation of intrinsic and extrinsic motivating factors. Teachers are encouraged to offer students choice when possible and to help students understand the value related to the tasks they are given. Brophy found that low-achieving students are often concerned with finishing a task— not understanding the content of the task. Strong emphasis is placed on the teacher's ability to create an optimistic environment for all students and for the teacher to incorporate various motivating strategies to increase success.

Brophy's most recent edition of *Motivating Students to Learn* (2010), provides an overview of the motivation theories that have developed since his early work, including behavior models, need theories, goal theories, and social contexts. While his primary purpose is still to encourage teachers to "foster learning goals and success expectations" (p. 20), he also continues to rely heavily on teacher personality, encouraging educators that "you – your

own personality and behavior in the classroom- can become your most powerful motivational tool" (p. 23).

Additional views associated with motivation theory in education stem from Deci and Dweck's exploration of cognition, task achievement, and the learner's intrinsic learning orientation and extrinsic performance orientation (Dweck, 1986). Deci and Ryan (1987) define intrinsic motivation as an internal state that influences behavior. Intrinsic motivation leads an individual to complete activities because he/she finds them interesting and enjoyable.

According to Deci and Ryan (1981, 1985), learning orientation emphasizes meeting fundamental needs while performance orientation examines what can be accomplished. Theories of intrinsic motivation, sometimes called task orientation or mastery, focus on the mastering of goals, the development of increased competency and knowledge, the idea that learning is an end in and of itself, and the gradual improvement of academic performance with appropriate effort. Also inherent is personal commitment to academic success and value in the quality of the academic experience (Deci & Ryan, 2000).

Performance motivation, also called goal theory or ego orientation, focuses on social comparison processes where one student wants to be better than other students and has a desire to be well thought of and praised over his or her peers (Deci & Ryan, 2000). Studies have shown that external motivators such as grades and rewards can undermine achievement (Deci, 1971). Mastery goals and achievement goals which exist when a student wants to outperform others can create perilous outcomes for a student's sense of identity because negative feedback (bad grade or test score) can be internalized as incompetence (Kaufman and Dodge, 2009).

Intrinsic and extrinsic motivational factors seem like polar opposites, but they are actually non-correlated or even slightly positively correlated. For many high achieving students, elements of both performance and learning theory are at work, and effective classrooms utilize both orientations and maximize the benefits of each in order to use them as complements (Heyman & Dweck, 1992).

Self-determination theory (SDT) is a widened explanation of intrinsic motivation and expands its definition by exploring various contexts that increase a student's sense of autonomy, competence, and relatedness. It also encourages teachers to employ goal setting strategies to increase students' awareness of their own motivation (Vanstenkiste, Lens, & Deci, 2006). Autonomy in this sense refers to individual's desire to feel as if they have a choice in their actions and that they are the initiators of those actions (Kaufman & Dodge, 2009). Autonomy is positively related to task interest, conceptual understanding, grades, and psychological well-being (Kaufman & Dodge , 2009). By extending the definition of intrinsic motivation, SDT delineates between autonomous motivation which is based on volition and choice and controlled motivation which results from feeling pressured and coerced (Vanstenkiste, Lens, & Deci, 2006). Having documented decreased drop-out rates, deeper learning, greater creativity, enhanced well-being, and greater achievement, SDT also offers insight into how to motivate reluctant learners (Vanstenkiste et al., 2006).

Deci, Hodges, Pierson, and Tomassone (1992) studied 450 students from non-mainstream (self-contained) classrooms who had handicapping codes of either learning disabled (LD) or emotionally handicapped (EH), researchers examined the effect that limiting students' autonomy and sense of competence has on motivation. While definitions for LD or EH vary greatly, students involved in this project are classified as such "simply on

the basis of their having been labeled by the school system and placed in a special education program" (Deci et al., 1992, p. 458). The study grew out of previous research done in regular education settings and supported the idea that achievement among lower performing students is tied to the students' sense of autonomy and feelings of competence. Students were given questionnaires that evaluated their self-perceptions and how they perceived their parents and teachers. Responses were then compared with the students' scores on achievement tests which were made available through student records. Findings concluded that students with learning disabilities, because of often experienced frustrations and failures with school work, need tasks that increase feelings of competence. Because students identified as emotionally handicapped are less likely to experience frustrations academically but are more likely to experience negative feedback based on self-regulation, they desire a greater sense of autonomy.

Albrecht, Haapanen, Hall, and Montonya (2009) also found that students who exhibited decreased motivation to learn evidenced by negative classroom behavior and overall disengagement from the learning process showed a significant increase in intrinsic motivation when they were given a greater amount of choice and took a more active role in their education. These researchers collected data using motivation surveys and observations at four school sites before instituting instructional interventions that targeted student autonomy, goal-setting, and teacher reinforcement. After each of the five weeks the interventions were in place, data were compared to students' grades. These researchers noted that students experienced a shift from extrinsic to intrinsic motivation as a result of interventions that increased student autonomy through choice and goal setting and feelings of competence through positive teacher feedback.

Recent discussions regarding learning theory and the study of motivation include an even broader view of the learner than what Brophy or Self-Determination Theory offer, specifically in terms of value and identity. Brackett (2007) discusses five factors, derived from early motivation theory, that combine to add to the definition of student motivation: varied instructional strategies, autonomy, authentic materials, collaboration, and the ability of instructors to see through the lens of their students' perspective. Brackett elaborates on the motivational psychology that first came into fashion when Maslow proposed a theory, "in which internal and intrinsic motivating forces and affective processes lead to personal, social, and academic well being" (as cited in Brackett, 2007, p. 226). She cautions that while motivation has been discussed for "eons," there is still no clear understanding or model that shows how to perfectly achieve it.

Early studies of motivation, according to Brackett (2007), focused on goal setting and placed the impetus for motivating students squarely on the shoulders of the instructor's ability to be an optimistic cheerleader of sorts. Brackett (2007) instead points to the need for students to be given "various learning strategies" and to feel that "they're in charge of their own intellectual growth" (p. 227). Students must be invited to engage with authentic materials that are relevant to them and cause them to self-reflect and self-identify their needs. Through positive feedback, students should be able to develop a sense of autonomy and power. She stresses the importance of sharing power and decision making with students so that motivation is not solely tied to the instructor's ability to remain "positive" and "optimistic," which can cause instructors to feel that they have failed if their students are not motivated. Rather, "student response results in a mixture of efforts on the part of both actors in the classroom drama" (p. 229). Finally, Brackett says, teachers must be willing to see the

world the way their students do, to "move past time-bound preferences and check today's view through the lenses of [their] students" (p. 230).

How, then, can an instructor value the lenses of students, as Brackett (2007) would suggest, and create a greater sense of deep autonomy and competence supported by self determination theory? Many educators have found success through instructional technologies that are used to offer innovative forms of scaffolding, instant feedback, and sound cognitive practice in a way that engages this generation of students' preferred form of communication and learning. Several small scale studies have recently been conducted to find out how students are utilizing technology and whether greater use of technology leads to a similar increase of students' perceptions of their motivation.

Given the need for newer theoretically expressed understanding of student and teacher experiences with classroom technology, Fitzpatrick (2001) examines student interest in two eighth-grade math classes when an interactive learning system called Destination Math was implemented. Using observations, interviews, and data analysis findings indicate that Destination Math increased students' experience of learner control because of the variety of choices offered by the software. Students also reported an increased interest in math compared with students in regular math classes.

Jones, Connolly, Gear, and Read (2001) explore the use of a web design project on students' motivation and achievement. Jones used motivation and student attitudes questionnaires, interviews, and achievement tasks to discuss the advantages and disadvantages of web site design. The study was based on three theoretical frameworks: learner as designer, intrinsic motivation, and constructivism. Students from two biology classes were instructed for 55 minutes over the course of 10 days on the subject of ecology.

One class used traditional methods while the other utilized a web site design project. Both groups of students were expected to learn the same content material. Findings indicated that students were more motivated to learn using the student-as-designer model and reported a desire for more hands on work opportunities like the web-design project. They also enjoyed the collaborative environment created by the project and felt that the experience using computers was valuable for work-place expectations. The study reported that both classes' achievement goals were similar but 75% of all of the students expressed a desire to work on a web design project in the future.

Wang and Reeves (2006) also reshape traditional views of motivation theory and build upon it by linking Malone and Leppers (1987) four motivational strategies (1. challenge, 2. curiosity, 3. control, and 4. fantasy) to the use of a specific web-based curriculum in order to increase motivation and consequently increase achievement. Like many at-risk students, the learners in this study were characterized by their science teacher as having low motivation and learning problems. The teacher contacted the Department of Instruction at the University of Georgia and asked them to create a web based learning environment (Web-LE) in order to enhance and sustain the motivation of his students when studying fossilization. Through the use of motivation-themed surveys, student interviews, and observations, the study's findings overwhelming supported the use of the Web-LE. Students reported an increase in feelings of control over their learning and the teacher observed a dramatic increase in student engagement.

Also relying on Malone and Lepper's (1987) theory of fantasy and student motivation, a study by Papastergiou (2007) aimed at assessing learning effectiveness and motivational appeal of computer gaming for learning computer memory concepts in a Greek

high school's computer class explores the disconnect between young people's interest in video gaming as opposed to their lack of interest exhibited in formal education. "In fact, the challenging world of games shapes students' cognitive abilities and expectations about learning, making scholastic content and practices seem tedious and meaningless and creating a dissonance between formal education and the digital, informal learning environments that students experience outside school" (Papastergiou, 2007, p. 43).

Papastergiou's (2007) study compares motivation and achievement among two computer classes. One used gaming and the other used a non-gaming application. Although both classes used technology to facilitate instruction, gaming most closely mirrored strategies found in motivational theory: student involvement, interaction and a high degree of student control, scaffolding levels of difficulty, clear but challenging goals, and immediate and constructive feedback. While the other form of instruction was delivered via a computer it was very much in keeping with traditional instruction consisting of thematic units and quizzes. The study's findings indicated significant increases in both achievement and motivation among the students who used the gaming software.

Swanson and Legutko (2008) examine the use of Web 2.0 technologies during reading instruction in one third grade classroom in suburban Pennsylvania. A *t*-test for dependent samples measured motivation scores before and after the use of the web to enhance performance and social connections. They found a statistically significant improvement in motivation scores which indicated that using interactive technologies with young children can boost motivation relative to reading activities. Additionally significant to their findings, students who exhibited the greatest increase in motivation were those who also had concomitant small motor deficits and reading comprehension deficiencies.

Torff and Tirotta (2010) explore student motivation and the use of Interactive Whiteboard Technology (IWB) among third, fourth, and fifth grade math students at a suburban school in NYC. Their research was prompted by the substantial body of research pointing to the increase of student motivation when IWB was used in classroom. Torff and Tirotta (2010), however, found that because these studies had not used a control group, perhaps the results were exaggerated. They also chose a district that had been using the IWB technology for three years in order to avoid higher results based on novelty. They found that students exposed to IWB- assisted lessons reported a slightly higher level of engagement in math classes than the control group and teachers' attitudes about the IWB were associated with slightly higher levels of motivation. However, Torff and Tirotta found the motivation-enhancing effects of the IWB were weak in relation to its cost and professional development requirements. Their findings concluded that, "Studies are needed examining the extent to which classroom use of the IWB is associated with differences in test scores and performance assessments in a variety of subjects" (p. 383).

Additional studies focused primarily on at-risk students and technology find promising links between instructional technologies, motivation, and achievement. Cardon (2000) examines why enrollment in high school technology education courses among at-risk students is pervasive throughout the country. Using a case study model, Cardon used participant observations, interviews, and document evaluation to triangulate for patterns and themes. Findings indicate that the at-risk students in the study preferred hands-on learning opportunities and the positive outcomes they had experienced when working with instructional technologies. Several of the students also indicated that working with technology was the reason they chose to remain in school.

Edmonds and Li (2005) investigate teachers' perspectives and approaches when using technology with at-risk learners. After collecting reflections from nine female teachers who worked closely with technology and at-risk students in a Canadian school district, the study concludes, "It was evident that the use of technology contributes to the increased success rates for at-risk learners" (Edmonds & Li, 2005, p. 4). The study also offers several positive attributes for using technology with at-risk learners including choice, diverse curriculum, and customization. The authors, however, do warn that the teachers involved in the study, although positive about technology use, also cautioned that this type of instruction is not for everyone, noting that some students view technology as an additional barrier to an already frustrating educational experience.

Lee (2006) examines elementary and secondary English as Second Language students increase in positive outcomes when using technology infused student-centered pedagogy. The author observed two classrooms from Indian River Central School District in New York. She notes the uniqueness of the emphasis on technology funding in these schools and acknowledged her concern that many schools do not have the access that these students had. Lee observed several instructional technologies used in the classrooms and concludes, "There is no doubt that educational technologies infused with constructivist pedagogy allow ESL students to think, create, and visually demonstrate their work" (p. 92).

Student Achievement

As promising as research in the area of instructional technology seems, additional research exploring how students are using technology, why achievement gains seem linked to technology infusion, and why at-risk students appear to be particularly impacted by the use of technology is still needed. Very few comprehensive studies examine technology in

conjunction with at-risk students. Consequently, achievement outcomes have been primarily reported in terms of the roles that teachers and school administrators play. Up-to-date research is also needed that examines the current wave of instructional technologies schools are employing. Studies done more than a decade ago focus on word processing and assignment production. Today's ITs can be fully infused into core curriculum and used as knowledge-making tools not simply re-configured typewriters. Research examining achievement gains in terms of students' perceptions of their motivation to learn and achieve is especially lacking in studies examining system-wide technology initiatives. Many studies analyze school improvement plans in terms of test scores and the occasional teacher or administrator survey.

By 1989, at least 50% of all school systems were implementing some form of school improvement plan (Stringfield & Herman, 1997). These efforts have become even more widespread since the advent of *No Child Left Behind* (Cullen, Brush, Frey, Hinshaw, & Warren, 2006), but there is still a problem within these movements as educators and researchers continue to struggle to create pragmatic, research-based, replicable, and content specific models for improving achievement among at-risk students (Stringfield & Herman, 1997).

Most of these models rely heavily on teacher perception and/or test scores to determine success. In *NCLB Technology and a Rural School* (Cullen et al., 2006), a team of researchers examine one rural school's use of federal grant money to reform its current curriculum practices and school environment by integrating specific technology strategies in order to increase student achievement and meet *NCLB* guidelines. The case study provides excerpts from teacher interviews and notes from observations done in two of the classrooms

with participating teachers. Ultimately, the researchers concluded that their research "relied heavily on teachers' perceptions of student success as formative assessment" (Cullen et al., 2006, p. 15). While the researchers made other conclusions about the implications of technology integration, it is specifically relevant to this argument that the researchers lean heavily on teacher perception but did not consider student attitudes or opinions about the technology initiative.

In 2000, the Southern Regional Education Board (SREB) published a detailed case study of Los Fresnos High School in the lower Rio Grande Valley of south Texas. In 1994, the state classified Los Fresnos as a low-performing school. A comprehensive school improvement plan soon followed. The case study details various changes made, including a supportive learning culture, more rigorous graduation standards, career pathway programs, improved career and technology programs, more professional development, an increase in technology infusion, and a ninth grade transition academy. The Board recognizes that "the teachers play a large part in leading school improvement at LHS" (Southern Regional Education Board, 2000, p. 8) and credits the success of professional learning communities that facilitated shared responsibility. Additionally, the SREB concludes that "LFHS leaders and teachers believe that student achievement is related directly to teacher performance" (p. 8). Nowhere in the SREB's study are student attitudes considered or is motivation explored through the eyes of the students. The researchers in this case, and in most cases, fail to consider the implications of leaving out such critical information when performing case studies of this magnitude.

Wright and Lesisko's (2008) study of a rural Pennsylvania school system took an entirely different approach, offering quantitative data that clearly support the practice of

providing laptops to teachers for both personal and professional use as a way to increase their comfort level with technology and therefore increasing the amount of technology that is incorporated into classroom curriculum. This study bears much in common with the previous studies, which purport to be more qualitative in nature and yet still rely heavily on student test performance. Like the previous case studies, the Pennsylvania school system is interested in employing a high quality technology program. Through strict survey analysis and heavy reliance on teachers as the "primary participants," the authors conclude that with proper in-service training and administrative support, secondary teachers who use a home computer are much more likely to smoothly integrate technology into the classroom.

Wright and Lesisko's study provides a strong argument for purchasing every secondary teacher in the country a laptop, except that it never tells us why! What is the benefit of technology infusion? Why should a district spend its limited resources on staff development, personnel, training, and hardware? Is there a significant overall benefit to both student achievement and student readiness?

Peck, Cuban, and Kirkpatrick (2002) begin to answer some of these questions by unraveling the myth that student achievement and student perceptions are the same. The study examines "a typical day for a typical student in our two typical high schools" (Peck et al., 2002, p. 477). While the aim of the study is to debunk the myth that the average American high school is technology rich and properly preparing students for the 21st Century marketplace, the authors also expose the incongruities that exist between the technology students are using at home, the technology they want to be using at school, and the lack of cohesion between their desires and what they are offered at the "typical" high school, regardless of their test scores. Even though the Silicon Valley high schools in this study have

abundant resources, the implementation of the technology fails to meet student enthusiasm and expectations for a variety of reasons.

Peck, Cuban, and Kirkpatrick's study finds that if students at these Bay area high schools are ready to enter the workforce, the technology skills they need come from home and not from school. This finding has huge implications for high-poverty school systems where students have little or no technology access away from school. It shows us that school improvement plans that use technology infusion must look at more than student achievement in terms of test scores; they also must consider how ready students feel that they are to work and learn in the 21st Century- especially after being exposed to a school-wide technology based improvement plan.

A multiple-school case study released in 2004 examined technology use at high-minority, high-poverty, high-performing schools across the country. Sweet's (2004) *Case studies of high-performing, high technology schools: final research report on schools with predominately low-income, African-American, or Latino student populations* involves 144 teachers and 52 administrators, 152 classrooms, and 345 teacher-returned technology inventory surveys. While the study reports that teachers notice an increase in motivation among students resulting from technology use, the students are never asked or included in the research process.

In summation, each of the above case studies fails to consider student attitudes and motivation when engaging technologies designed to help them succeed in the 21st Century workforce (or higher education learning environments). Research aimed at benefiting students must take into account how the students are directly affected. If school improvement plans are only interested in raising test scores, our actual work of preparing

students with the necessary cognitive abilities to contribute positively to society is being neglected. Students are not merely a population to be acted upon; they are partners in the work of education. They must have a voice in research, telling us how our programs, plans, and strategies are actually equipping them to live life post K-12. Adults rarely ask students to reflect on their own learning. Educators, researchers, and policy makers need to include student voices in their plans and assessments of instructional technologies (Watson, 1998).

Multicultural Education and Technology

The theoretical framework often associated with technology initiatives in education is a constructivist student-centered pedagogy (Duffy & Cunningham, 1996). Here, instruction shifts from the adult-run model to a learner driven approach, where it revolves around the individual needs of the individual student (Edmunds & Li, 2005).

Maclellan (2008) examines the implications student-centered learning in higher education has on the construct of motivation:

> The theoretical underpinnings of student-centered learning suggest motivation to be an integral component. However, lack of clarification of what is involved in motivation in education often results in unchallenged assumptions that fail to recognize what motivates some and alienates others (Maclellan, 2008, p. 411).

Maclellan's findings are mixed, agreeing that too much tutor/teacher input limits students' need to think and that too little guidance turns education into "nonsense." Instead, the study concludes, "Student interest is critical to the continuation of learning tasks but needs to be managed through appropriate help-seeking" (p. 418).

Researchers particularly interested in student motivation and at-risk students, however, move beyond using interactive technologies as a balance between too much teacher

direction and too little classroom structure. Rather, the idea of student-centered curriculum acknowledges that there are valid perspectives that are located outside of the dominant hegemony (Gorski, 2004).

Sensitive to the effects of the digital divide and the history of gaps in achievement among white and non-white students, researchers in the area of multicultural education and at-risk students have been wary of studies that attempt to apply findings from regular education settings to the needs of diverse students. In the introduction to Gorski (2004), Sleeter writes, "For many young people today, the computer is a given. The question is not whether to use it, but how?" (p. xvii). Gorski warns that technology is not an instant salve; rather, it must be used in conjunction with a critical eye toward multiculturalism and equity.

Butler-Pascoe and Wiburg (2003) offer twelve attributes of successful technology-enhanced language learning environments that can be applied to using technology infusion among all marginalized student groups (p. 15-19):

1. Provides interaction, communicative activities, and real audiences.
2. Supplies comprehensible input
3. Supports development of cognitive abilities
4. Utilizes task-based and problem-solving activities
5. Provides sheltering techniques to support language and academic development
6. Is student-centered and promotes student autonomy
7. Facilitates focused development of English language skills
8. Uses multiple modalities to support various learning styles and strategies
9. Supports collaborative learning
10. Meets affective needs of students

11. Fosters understanding and appreciation of the target and native cultures

12. Provides appropriate feedback and assessment

Gorski (2004), as well as Butler-Pascoe and Wiburg (2003), offers educators guidelines for using technology as a way to both foster achievement and remain culturally and critically aware of the dangers of relying on technology to cure all of the education system's current ills.

Erben, Ban, and Castañeda (2009) present a practical handbook for incorporating interactive technologies in a critically sensitive and academically powerful way. Relying heavily on Vygotsky's foundational theories as related to differentiated instruction and constructivist pedagogy, the authors offer tangible best-practice approaches that can help any classroom teacher use technology to foster English language development among ELL students. Erben, Ban, and Castañeda also supply a helpful continuum for understanding the degree to which teachers use technology as a learning tool (p. 74):

Table 1
Nine point continuum of IT use by teachers and students

IT for teaching	1	**Teacher-only use (technology as a tool)** Electronic equipment: smartboard, TV, etc
	2	**Teacher-only use (managing)** Virtual learning environments: Nicenet, Ning, etc.
	3	**Teacher helper (instructing)** Presentation tools: PowerPoint, Internet, etc.
	4	**Teacher-made resources for students** Exercise and web page builders: guia, googlepages, etc.
	5	**Student-only use** Internet research and web browsing
IT for learning	6	**Student helper (facilitating)** Online quizzes, exercises, games, and videos
	7	**Student helper (practicing)** Listening and writing tools: k7.net, writeboard.com, etc
	8	**Student helper (generating)** Webpage building, e-portfolio building
	9	**Student-made resource (creating)** Audio and video podcasting, blogging, moviemaking

On one side of the continuum, teachers may use technology solely for teaching content. The other end of the continuum represents ways in which teachers can use technology to facilitate learning. By continually moving along the continuum, a teacher creates an environment rich in active learning.

While Erben, Ban, and Castañeda (2009) offer a pragmatic look into the application of technology driven multicultural education, Muffoletto and Horton (2007) detail a more ideological struggle between using computers to deliver the "official" curriculum in controlled ways and using computers as a vehicle for changing the curriculum though innovation and creativity so that power shifts from those who impose information to the students who are given the opportunity to co-create knowledge:

> Living in a digital culture allows the possibility of developing a new sense of community. In this manner, digital culture begins to redefine community, knowledge, and practice by broadening perspectives and reconstructing the subjectivity of the individual and community. In short, an education that is multicultural within a digital culture has a potential to redefine that culture. Thus, the individual's identity becomes redefined within a much broader sense of the social world. (p. 2)

If, as Muffoletto and Horton suggest, instructional technologies are useful in empowering marginalized students who are otherwise in danger of being failed by a system that previously took power away from them, then educators can begin to move closer to an enlightened view of technology infused curriculum – not as a demi-god of globalization but as a tool capable of increasing achievement among at-risk populations.

Theoretical Framework

An innovative development on an approach to instruction that combines the elements of behavioral, cognitive, and constructivist ideology called *situated learning* has recently reemerged in the work of Dede (2007) and serves here to combine the principals of motivation theory, at-risk student achievement, and multiculturally sensitive education. Situated learning is defined by Dede as "embedded within and inseparable from participating in a system of activity deeply determined by a particular physical or cultural setting" (p. 22) and "requires authentic contexts, activities, and assessments" (p. 23).

Dede finds that the primary obstacles in instituting information and communication based technologies (ICT) in the classroom "are not conceptual, technical, or economic, but instead psychological, political, and cultural" (Dede, 2007, p. 12). Dede argues that interactive technologies now available in educational settings can allow situated learning environments into the classroom in a way that was not possible before which may provide "the missing piece in the puzzle of how to teach 21st Century skills"(p. 23).

While Dede explains that schools have successfully incorporated technology in ways that effect traditional forms of instruction such as email, information accessing, and word processing, he elaborates that "none draw on the full power of ICT for individual and collective expression, experience, and interpretation – core life skills for the 21st Century" (p. 12). Our inability to harness the full potential of technology in the classroom has profound implications on our future, Dede says, specifically in terms of motivating students who are in danger of not graduating from high school:

> Unfortunately, at a time when sophisticated reasoning is becoming an entry-level skill for as desirable job, the rate at which high school graduates are going on to postsecondary education is falling, not rising. Our country is losing vital talent because our current educational system neither engages many students nor helps them succeed. Failure to address our drop out crisis will lead to dismal economic results in the years ahead. Why are we throwing away so much human potential? A substantial part of the explanation is that we use far too narrow a range of pedagogies in schooling students. (p. 14)

Ultimately, in the face of this new digital age, Dede (2007) believes that knowledge is shared across communities and is no longer far removed or kept apart for only a few elite individuals. He advocates three primarily modes in which knowledge sharing is most effective in K-12 education: 1. World-to desktop interface in which students share knowledge via web 2.0 communities; 2. Emerging MUVE interfaces in which multi-user virtual environments house culturally relevant inquiry based problem solving communities; and 3. Augmented reality (AR) in which students carry mobile computing devices into real world situations in order to add to their knowledge base in a way that infuses digital resources into real word settings (p. 24). These modes allow educators to teach students how to "think with data – using diverse forms of data, information resources, tools, and services in many different fields of study to support making a broad range of decisions" (p. 33). For Dede, this is the essence of 21st Century learning and is the full picture of what it truly means to realize the full potential of technology in the classroom.

Pivotal to Dede's concept of 21st Century learning is the idea that assessment must also move beyond traditional formats. Dede (Clarke-Midure & Dede, 2010) clarifies that,

"Despite almost three decades of advances in information and communications technology (ICT) and a generation on cognition and on new pedagogical strategies, the field of assessment has not progressed much beyond paper-and-pencil based tests whose fundamental model was developed a Century ago" (Clarke-Midure & Dede, 2010, p. 309). In short, using technology to deliver traditional forms of assessment is inadequate for testing 21st Century skills and becomes a "weak observation of whether they [students] have mastered a sophisticated skill involving advanced knowledge" (p. 310).

Dede and Clarke-Midure (2010) claim that high-stakes assessments which are mandated by most US states, are actually fueling the advancement of "weak but rapid instructional methods such as drill-and-practice, to race through the glut of recipes, facts, and test-taking-skills they [teachers] are expected to cover" (p. 312). In light of the recent push toward technology reform with added emphasis on 21st Century skills, this form of instruction and assessment simply cannot accurately capture student progress, authentic behavior, the ability transfer knowledge to real-word situations, or students' capacities to use tools, media, and applications in effective ways (2010). "In other words," say Dede and Clarke-Midure, "the effects from technology usage (what one can accomplish without tools) are measured, but the effects with technologies essential to effective practice of a skill are not" (as cited in Clarke-Midure & Dede, 2010, p. 313).

Dede and Clarke-Midure performed a case study in 2009 in which they utilized mixed methods inquiry to interview, survey, analyze outcomes, and observe students and teachers. At the time the study was published, 15,000 students and 250 teachers had participated in the River City multi-user virtual environment curriculum throughout the US and Canada. The purpose of the study was to try and adapt "a locally successful innovation to a wide variety of

settings- while maintaining its effectiveness, affordability, and sustainability" (Clarke-Midure & Dede, 2009, p. 353).

Teachers in the study either taught using River City, a technology-based middle grades science curriculum, or a paper-based control that was similar in content but instead used traditional hands-on experiments. The study utilized a design based framework where the researchers performed an "iterative process where we engage in design, implement it in classroom settings, research the learning context, refine our theories of learning, engage in re-design and continue the cycle of implementation" (p. 358). The main objective of the study was to compare the paper-based control to the MUVE based curriculum. The study's findings indicated that the MUVE group who participated in the computer-based design achieved 16% higher scores on the posttest in biology than did the control group. Additionally, students "who entered the project with low-levels of self-efficacy did, on average, significantly better with River City than the students who participated in the control group" (p. 358).

Dede's work (Dede, 2007; Clarke-Midure & Dede, 2009; Clarke-Midure & Dede, 2010) establishes a framework for examining the effect of technology use in schools in terms of its ability to harness the capacity of the tool and create authentic settings where knowledge is both shared in communities and augmented by digital resources only to then be assessed in such a way that 21st Century skills are formatively captured and observed so that students can authentically demonstrate what they know. In light of that framework, this project takes a two-fold approach to technology infusion and at-risk high school students' motivation to learn. By joining together Brophy and the wealth of literature that classifies student motivation into the categories of intrinsic and extrinsic goal orientation, autonomy, and task

value with Dede's approach to harnessing the full potential of ICT, this study seeks to understand how technology effects students' motivation to learn in light of Dede's definitions of ICT potential and 21st Century assessment. The chart below demonstrates the key principals from Brophy and Dede with which the data comprising this study were examined:

Table 2:
Framework for examining technology infusion and its effect on student motivation

Brophy	Dede
Motivation Subgroups:	Fully Realized ICT :
Extrinsic goal orientation	MUVE situated learning environments
Intrinsic goal orientation	Digitally augmented instruction
Autonomy	Web 2.0 knowledge creation
Value	Authentic 21st Century Assessment

In conclusion, this chapter examined the importance of understanding what motivates students to learn, be it extrinsic or intrinsic factors, autonomy, or task value. Several small scale studies have shown an increase in student motivation to learn when content is delivered via instructional technologies. However, because technology is an ever-evolving field, there is only a small amount of current research that examines recent technological advancements in software, web 2.0 tools, and other cutting edge devices in the classroom. While schools are racing to stay current and technologically relevant, little empirical data beyond test scores link technology infusion to increased motivation and thus increased achievement.

Another significant component of this chapter examined how instructional technologies particularly impact the achievement of at-risk students. Again, some promising research points to increased motivation and achievement among at-risk students when instructional technologies are present in content delivery, but there are still many questions

about the availability and cost versus the benefits of this type of curriculum design. This study seeks to explore the connection between at-risk students' perception of their motivation to learn, technology infused curriculum, and increased feelings of autonomy, competence, and value which lead to gains in achievement.

Finally, the theoretical underpinnings of this study assert the value in hearing from students who otherwise have had very little say in their educational process. Adopting a critical emancipatory approach to research and evaluating it through Dede's concept of fully realized ICT potential and 21st Century assessment, allows the ideas and perspectives of a diverse student population to surface and add to the knowledge base that informs educators how to use technology driven instruction in effective ways.

The following chapter will explore the methodology used in this study, including procedures for site and participant selection, data collection, and data analysis.

Chapter Three

Methodology

The design and methodology for better understanding at-risk high school students' perceptions of their motivation to learn while using instructional technologies, where the school is the unit of study, are explored in this chapter. The design of this study, procedures for site and participant selection, data collection procedures, and the role the researcher will play in the study are described.

Methods

A mixed methods approach to inquiry was conducted in this study. A mixed methods approach is understood to mean the blending of both quantitative and qualitative methods. The complexity of understanding how students perceive their motivation to learn when using instructional technologies lends itself to a broad strategy of data collection and interpretation. Empirical data were collected using a modified version of the Motivation Strategies for Learning Questionnaire (MSLQ). In order to gain the unique perspectives of the students involved, student interviews were conducted. Finally, to capture the unspoken language of engagement and enjoyment, classroom observations were performed. Therefore, for the purposes of this study, mixed methods data, including student surveys, classroom observations, and student interviews, were triangulated in order to corroborate findings and identify convergent and congruent themes (Greene, 1989; Greene & McClintock, 2005). The researcher also kept field notes throughout the research process in order to provide additional connections between the methods.

In an attempt to develop sufficiently deep and qualitatively rich data, a case study model was chosen. The case study can provide a holistic view of a complex environment

(Cashman & McCraw, 1993) and is used to test a hypothesis (Lincoln & Guba, 1985). Creswell (2003) elaborates on the definition of a case study by explaining that the researcher "explores in depth a program, an event, an activity, a process, or one or more individuals […] and researchers collect detailed information using a variety of data collection procedures over a sustained period of time (p. 15)."

This case study utilizes a variety of data sources in order to explore how students feel in the midst of a system-wide technology initiative. Unlike case studies performed in schools that often focus on teachers, administrators, and test scores, this study decentralizes that hierarchy by addressing the perceptions of the students who are most affected by the educational reform program being implemented at their school. This case study specifically afforded the researcher the opportunity to examine the following questions:

1. To what degree do at-risk high school students feel that instructional technologies help contribute to their academic success?
2. To what degree are feelings of autonomy and goal orientation related to feelings of increased motivation among at-risk students who are taught using technology driven instructional models?
3. What role does students' perceived value of digital literacy as a 21st Century job skill play in motivating at-risk high school students when using technology in the classroom?

Site Selection

The researcher chose to use a high school that follows the IMPACT model as the case study site for two reasons: 1) the combination of high minority and high poverty students provided a rich sampling of at-risk students, and 2) the implementation of the federal

technology grant allowed for an optimum technology rich environment that is difficult to find among schools with predominately at-risk populations. Based on information from the 2008-2009 NC School Report Card (NCDPI, 2009), the school system participating in this study is 50% female and 50% male. Among the 1,906 students enrolled district-wide, 48% were African-American, 25% Hispanic, and 1% Asian/Pacific Islander. The percentage of white students was twenty-six, less than half of the state average. In addition, the school system has been classified as a high poverty system by NCDPI, meaning that there are 55% or more students from low-income families. In this study, the town in which this school resides was identified as Town A and the school was called Town A High School.

Data Sources

Motivational Survey

As part of an ongoing evaluation initiative, students at Town A high school were asked by their school system to complete a modified version of The Motivated Strategies for Learning Questionnaire (MSLQ). The school system shared the results of the survey with the researcher.

The MSLQ was developed by researchers in 1982 from the National Center for Research to Improve Postsecondary Teaching and Learning and consists of 26 items that are rated on a 7-point Likert scale from "not at all true to me" to "very true to me." The questionnaire has been translated into twenty different languages and has been used by hundreds of researchers (Artino, 2005). The entire instrument contains 81 self-report questions that cover five components including: 1) the student's perceptions of why he or she is engaging in a task, 2) extrinsic motivating factors, 3) the student's perceptions of how useful, valuable, and interesting the task is, 4) the student's understanding of how his or her

efforts will yield positive achievement outcomes, 5) the student's expectations of how well he or she will perform and be self-efficient while completing the task.

The questionnaire has 15 subscales that fall under two primary categories: six within the motivational section and nine within the learning strategies section. According to Artino, the survey is "completely modular, allowing a researcher, instructor, or student to use the scales together or individually, depending on their specific need" (Artino, 2005, p. 4):

Table 3
Components of the MSLQ

Part 1: Motivation Scales

Scale	# of Items
1. Intrinsic Goal Orientation	4
2. Extrinsic Goal Orientation	4
3. Task Value	6
4. Control of Learning Beliefs	4
5. Self-Efficacy for Learning and Performance	8
6. Test Anxiety	5
Total number of items	31

Part 2: Learning Strategies Scales

Scale	# of Items
1. Rehearsal	4
2. Elaboration	6
3. Organization	4
4. Critical Thinking	5
5. Metacognitive Self-Regulation	12
6. Time/Study Environmental Management	8
7. Effort Regulation	4
8. Peer Learning	3
Total number of items	50

The MSLQ was specifically designed to measure student motivation and learning strategies and has been used primarily to assess students' motivation and study strategies. Although no norms have been developed, "scores from the MSLQ have been used

extensively for empirical research in the areas of motivation and self-regulated learning" (Artino, 2005, p. 6) The MSLQ has shown itself to be reasonably valid (Garcia & Pintrich, 1993) and has undergone several statistical tests for confirmatory factor analysis and predictive validity (Artino, 2005).

Students were given questions specifically from the motivation section of the questionnaire (See Appendix A). Because the questionnaire was developed before the onset of technology infused curriculum, slight changes to the language of the questions were made to provide a clear measurement tool for assessing students' perceptions of their motivation when using instructional technologies as learning tools. However, only superficial changes were made so that the integrity of the questionnaire in terms of how the question related to the four motivation subgroups was not comprised (See Appendix B). A Cronbach Alpha test for reliability was also run to strengthen the validity of the results.

The data from the survey were analyzed using descriptive statistics (mean, standard deviation, and percentages) in an attempt to identify emerging patterns based on frequency of response and distribution. A *t*-test was also performed to determine whether the average response from males and females could be reliably compared against one another. The researcher utilized descriptive statistics because they correlate more fluidly with the descriptive nature of the other data sources, including interviews, observation, and researcher narrative. Descriptive data from the survey were used to provide an introductory understanding of student perception, not as a vehicle for detailed causal analysis.

Student Interviews

The second measure used in this study was interviews with students. Interviews are one of the richest and most important data sources in case study research (Hays, 2004).

Interviews were guided and designed to elicit authentic and candid responses from students as they were given the opportunity to express how they perceive themselves to be motivated by the technology they use at their school according to Brophy's four motivation subgroups (See Appendix C). Interviews were recorded. The taped recordings will be destroyed after the research is complete. Student names are not included in the data reporting and all transcripts and identifying information were kept in a locked filing cabinet in the researcher's office.

All student participants were required to submit signed informed parental consent (see Appendix D) and were selected for interviews randomly. The researcher sent a letter to the parents of twenty randomly selected male students and twenty randomly selected female students. Interviews were conducted with the first five female and the first five male students whose informed consent letters were mailed back to the researcher with a parent signature and permission for the student to participate. Students were also given a student assent form which informed them about the research and of their rights as participants, specifically their right to withdraw from the study at any point without penalty (See Appendix E). Full IRB approval for all data collection procedures was granted in August of 2010.

Observations

The researcher also randomly conducted classroom observations. The principal of the school used in the case study provided the names of eight core content area teachers, two representing each level from ninth through twelfth grades. The researcher contacted the teachers and asked permission to observe their classrooms at any point during the duration of the study. The observation protocol was based on Newmann's levels of engagement (Wang & Reeves, 2006) which examine: 1) observable behavioral responses, 2) covert cognitive

responses activated during learning, and 3) interest. Wang and Reeves explain that, "Newmann (1992) suggested that levels of engagement must be estimated from indirect indicators such as the amount of participation in academic work, the intensity of student concentration, the enthusiasm and interest expressed, and the degree of care shown in completing the work" (p. 607). Lee and Brophy (1996) used Newmann's levels of engagement to examine the motivation of 6th graders learning about science. Wang and Reeves (2006) also used Newmann's levels of engagement to observe high school students' motivation to learn using the internet. In keeping with the previous studies cited, classroom observations in this study were rated based on behavioral engagement, cognitive engagement, and interest to learn the content material presented (See Appendix F).

Observations were randomly conducted in eight core content area classrooms across grade levels. The observations were based on how students were outwardly responding to the instruction and cognitively engaging in their class work and with their teacher. The researcher noted any active listening, participation in class discussion, hand-raising, note taking, assignment completion and student behavior that represented engagement. The presence of technology infused curriculum and its possible affect on the levels of engagement within the classroom were also noted.

Researcher's sketch

Creswell (2003) defines a mixed method approach as containing both qualitative and quantitative modalities. Because emergent themes were triangulated across data sources in order to corroborate findings, the researcher sought to include an additional lens with which the process of triangulation could be made more easily visible. In an attempt to invite future readers of this study into the process of how the layers of information that were collected and

observed were filtered through the researcher's own experience during the research process, an autoethnographic component was employed in Chapter four to enhance the data collected during classroom observations.

Mizzi (2010) defines autoethnography as a way of connecting the personal self to the social context in such a way that it enlivens "the representational richness and reflexivity of qualitative research" (as cited in Mizzi, 2010, p. 1). Mizzi also explains that "authoethnography finds a place and presence for the researcher's life experience that would otherwise be overlooked" (p. 2). As a former K-12 classroom teacher, it was particularly important for the researcher's subjectivities to be made visible during that phase of data collection.

Mizzi employs a multivocal approach to autoethnography that provides space for the "plural and sometimes contradictory *narrative voices* located within the researcher. To shed light on these narrative voices means to provoke a deeper understanding of the silent tensions that lie underneath observable behaviors" (p. 2). Mizzi also represents the inner tension of the researcher by using vignettes set aside from the rest of the text in a way that clearly demonstrates how the author is utilizing his voice in an autoethnographic way. In this study, the researcher's vignettes will be titled *Researcher's sketch* and will be in block quotes under the reported observation data.

Validity, Reliability, and Analysis

The coding system used to analyze classroom observation data and the survey instruments employed were developed according to previous research. The primary strategy, adapted from Greene and McClintock (2005), used to increase the reliability of the study is

the implementation of triangulation techniques which enhance consensus among survey data, interviews, researcher's sketch, field notes and observations.

The researcher analyzed survey data based on frequency and percentage of response. Observation data were coded and examined based on the observable behavioral and covert cognitive levels of engagement present in core classroom settings. The researcher was particularly interested in whether levels of engagement were affected by the presence of technology infused curriculum and the active use of technology within the classroom. Student interviews were coded based on the four key elements of this study: autonomy, extrinsic and intrinsic goal orientation, and value. The researcher's journal was used as a data source and was intended to support or contrast key points revealed by the other data sources. Finally, the researcher sought to discover any emerging themes or congruence that emerged from the triangulation of the four descriptive data sources utilized.

Role of the researcher

Significant to the validity of the data collected, the researcher used field notes to capture the essence of the experience and to search for subjectivities that could both bias and enliven the findings. Additionally, field notes are used in qualitative research to record daily observations, analyze, and construct meaning through the act of reflecting on the research process (Donham, Heinrich, & Bostwick, 2009). The researcher employed these methods of reflection to ensure that the any subjectivities that might influence the findings were considered in the triangulation process. The following chapter provides a detailed overview of the findings from the data collection.

Chapter Four

Findings

Although Town A is located in a rural county thirty minutes outside of a major city, it remains a separate entity from the county school system and is one of only a handful of independent school systems left in the state. Demographics from the 2000 census place Town A's total population at 19,788 people and contains the following subgroups (U.S. Census Bureau, 2008):

Table 4
Town A Demographics

Ethnicity	Percentage of total population
White (non-Hispanic)	69.630%
Black or African-American	23.910%
Hispanic or Latino American	6.930%
Asian American	0.830%
Native American	0.450%
Native Hawaiian or Other Pacific Islander	0.001%
Reported two or more ethnicities	1.350%

Because of manufacturing opportunities available at the few remaining furniture factories, most recent estimates place Town A's current population at closer to 26, 000 residents (Muni Net Guide, 2010). The average household income in Town A is $36,236, well below the national average of $60,374 (Muni Net Guide, 2010). The median age for residents is 36.8 which is older than the national average and may explain why the school system demographics paint a much different picture than those city-wide.

Town A High School is classified by the North Carolina Department of Public Instruction as a high poverty, high minority school and has been nationally recognized as a 90-90-90 school which indicates that 90% of students qualify for free or reduced lunch, are non-white, and are achieving the state mandated required progress on all standardized tests –

a feat very few schools across the nation achieve. The data comprising this case study were collected in four primary ways: unscheduled classroom observations of eight core content area teachers throughout the fall semester, ten student interviews conducted with five female and five male students, an online voluntary student motivation survey which garnered responses from 375 students, and the researcher's journal which captured the informal narrative of daily school operations and atmosphere. The primary data collection period for the case study began in August of 2010 and ran through the end of December 2010 and coincided with the high school's implementation of 1:1 laptops as part of the IMPACT instructional model.

Observations

Town A, accessible only by the rural back roads of central North Carolina is a welcome reminder that poverty, foreclosure, racial injustice, and economic disparity do not have to equal failure at the school level as well. In fact, in this town, difficult circumstances forced school leaders to take a radical approach that by all accounts has been highly successful. The aim of my research is to better understand why such significant achievement gains were made once IMPACT brought both advanced instructional technologies and a new level of collaboration among school leaders. In order to understand students' perceptions of their motivation to learn while using IT's, I first conducted unscheduled classroom observations with eight teachers of core content area subjects (Math, English, Science, and Social Studies).

After obtaining permission from the teachers to drop in at any point throughout the semester unannounced, 13 forty-minute observations were performed across five site visits. In order to maintain the anonymity of the participants, teachers will be referred to as: T1, T2,

T3, T4, T5, T6, T7, and T8. Numbers assigned do not correlate to the order in which observations took place or to grade level. Observation protocol, based on Newmann's Levels of Engagement (Newmann, 1992) as discussed in Chapter 3, recorded student interest, observable behavioral, and covert cognitive responses in addition to the presence of technology infused instruction at timed intervals. The content areas observed consisted of three math (T1, T2, T3), two English (T5, T6), one science (T4), and two social studies courses (T7, T8).

In this chapter, the researcher's vignettes will be titled *Researcher's sketch* and will be in block quotes under the reported observation data. They are used to enhance and enliven the data collected during classroom observations (Mizzi, 2010). This autoenthographic element serves to connect the personal self of the researcher to the social research context in such a way that it adds to the richness and reflexivity of the qualitative study (2010). It is also a way to include the researcher's life experiences that would otherwise be overlooked (2010). Because of the researcher's role as a former classroom teacher, the autoethnographic element purposefully offers a transparent view of the subjectivities at work during the research process. Additionally, to shed light on these narrative voices means to provoke a deeper understanding of the tensions that often exist between the researcher and the research.

T1

When students enter the classroom, T1 has test review problems on the interactive white board (Active Board) at the front of the class. Students open their laptops, take out their calculators, and begin their work as the bell rings. After ten minutes of work, the teacher uses the Active Board to explain the math problems and provide for any last minute questions before students start their math test. The test is given using the online web-hosting server adopted by the school system, Angel portal, and students spend the remainder of the

class time completing their assessment online. The teacher has a long extension cord available for students' laptops and seamlessly incorporates the available technology into her instructional plan.

> *Researcher's sketch*: With familiar ease T1 directs students to the quiz review on the Active Board and tries to encourage the class to pay attention - threats of failing the impending test stir some students back into engagement. The instructor carefully walks through the math review and seems comfortable with the laptop transition that has taken place on this campus. T1 is neither innovative in her delivery nor dynamic in her temperament. The students are somewhat engaged in the process simply because they know the test is today. On one hand, I am impressed by the sheer amount of technology present in her instruction but underwhelmed by the traditional nature it takes. I can't help but wonder if the students feel the same way.

T2

T2 also gives students an assessment, though it is a traditional paper/pencil test. The Active Board is off and students are instructed to keep laptops closed. No observable difference in engagement exists between T1 and T2 despite their different approaches. However, T2 allows students to use headphones to listen to Mp3 digital audio players during their assessment which provides a noticeable difference in engagement during multiple interruptions caused by students entering class late or announcements made over the loud speaker during the test. Students wearing headphones remained engaged while those students not wearing headphones continually stopped for several minutes at each interruption. T2 uses a Kindle reader while students test and leaves the room once to take a phone call. The researcher did note that in the teacher's absence, several students use their laptops to quickly retrieve information despite the teacher's instructions that laptops should remain closed.

Researcher's sketch: This room mirrors the other math class. The teacher is obviously comfortable with technology, using her Kindle to read and texting from her cell phone while the students are taking a paper/pencil math test. This is the first school I have ever been to that encourages students to use Mp3 players. Two students arrive late, an announcement over the loud speaker interrupts instruction, and one other student comes in to get a book from a student who is in this class. Students listening to Mp3 players hardly notice the interruptions. Again, much of the instruction here could take place with a chalkboard and overhead projector. Is it just assessment that forces teachers into this mold?

T3

Math instruction in T3's classroom takes place in three phases. When students enter the room, they are told to use paper/pencil to complete the quiz review which is up on the Active Board. Several students have headphones on and surf the internet on their laptops. After several minutes, the students begin completing the quiz review, though many continually return to their Mp3 players or laptops rather than engage in the math review. Several students also carry on conversations that are unrelated to the math review. Midway through the class, T3 has students change seats and close laptops. He then uses the Active Board to finish explaining the math review. Finally, he hands out paper quizzes and the students attempt to complete the assignment.

Researcher's sketch: This is a tough crowd of students, primarily boys who are uninterested in whatever this teacher brings their way. They do have their laptops open, which they are told to close. This is the third math class that I have been in and the laptops have yet to be used for instruction. The students bring their netbooks to class, open them up, and are told to put them away.

T4

T4 spends the majority of his class periods preparing students for their EOC (End of Course exam given by the NCDPI). Students do not use their laptops. The teacher uses a ready-made EOC prep program delivered through the Active Board. Students at the front of the class actively engage with the test review while those at the back of the room have their heads down and are less engaged. Several students also use their laptop bags to hide their cell phones while they text during the test review. While T4 is clearly knowledgeable about his subject area, only half of the students participate in the test review. T4 also mentions to me as he finishes lecturing that he is sorry to have not been more interesting but that the EOC is still a long way from being assessed in formative ways so he has a hard time preparing students for the test without reverting back to traditional forms of delivery.

> *Researcher's sketch*: As a former classroom teacher, I cannot believe that T4 has let two students sleep their way through his class. The students up front, all boys, are engaged in the question and answer session and even go to the Active Board to solve biology equations but the students in the back are completely tuned out. Once again, the students are told to turn off their laptops and keep them closed. T4 is preparing these students for yet another assessment (EOC) and relies on traditional lecture to review for the upcoming test. Perhaps phasing in the 1:1 model is farther behind than what the administration believes it to be.

The second observation in T4's class is fairly similar to the first. Students are encouraged to take a quiz using the Angel portal on their laptops, but several students instead have their heads down and do not participate. The latter part of the class was spent reviewing homework which students complete using pencil and paper. Once again, about half of the students in the class actively engage in the homework review while several other students

talk to one another, text from their cell phones, or listen to music covertly with headphones run through their jacket hoods. Students who are paying attention alternate between providing oral responses and using the Active Board to demonstrate their content knowledge.

T5

The English classes I observed, T5 and T6, are the least reliant on technology, yet students are actively engaged in both observable behavioral and cognitive activities. Both teachers are extremely animated; T5, in particular, relies on chanting and immediate whole-class response repeatedly throughout her lecture. Students prepare for their EOC exam during the first class period I visit and review their scores from that test during the second observation.

> *Researcher's sketch*: T5 is truly a dynamic teacher. The manner in which class is conducted commands respect and everyone is up and attentive. There are poster board outlines covering the Active Board and laptops are closed. This is the least technology dependant classroom I have visited. T5 has tremendous presence and at once drives students toward success and shows care and concern for their well being, often exhibiting many of Brophy's key motivational strategies. Many times, T5 relates examples back to the students' family members and life experiences. T5 is obviously very acquainted with these students and understands who they are. If every teacher could be this dynamic, I am not sure that dynamic tools would be necessary. At the same time, though, I have to wonder if these students aren't missing out on essential 21st Century skills and valuable digital resources by writing and planning essays in such traditional ways. Are these students ready for online portfolios or PowerPoint presentations? Can they distinguish between credible news sources and

process lots of different types of digital media into a cohesive discussion? Or, are they just becoming adept at passing the state End of Course (EOC) exam?

T6

T6 leads a class discussion about a play with an Advanced Placement class. In both English classes, teachers rely heavily on traditional forms of communication and students actively listen but do not produce an actual product. Also, in both classes, teachers are dynamic and in complete control of the classroom environment, continually prompting students to participate if they appear to be off topic.

Researcher's sketch: The students are discussing a play and will later pull up a YouTube video and digital audio file of a performance. The technology seems to support instruction well, even if it only makes up 5% of the allotted time. Walking into this classroom feels like I have been transported to another school. The majority of students are Caucasian, with one African American and one Hispanic student making up the only non-white students present. I find myself profoundly disturbed by the racial composition of this class. The non-AP classes I have attended have been 80%-90% non-white. Why does it skew so much here? The students in this class are bright and actively engaged in the discussion, but are there others who have been kept out of this class? Interestingly, the YouTube clip and audio file T6 shares with the class come from a student who had found the media at home when he was looking for information to help him understand the play more fully. T6 is thrilled with the students' find and sees the benefit of using it. Perhaps this type of student-prompted technology use will spur the teacher to augment instruction with digital resources more fully in the future.

T7

The Social Studies teachers, T7 and T8, also have a high degree of student engagement. T7 places students in collaborative groups and has them create timelines using a web 2.0 tool called Dipity. The structure of the class is similar during the second observation, as students use Prezi.com to build group presentations. During the first observation, T7 places 10 historical events on the whiteboard and students create a digital timeline on Dipity representing the significant events in chronological order. During the second observation, groups are asked to build a Prezi, digital presentation, in order to inform the rest of the class about the responsibilities of the three branches of government. To complete their assignments, students use their laptops, Web Quest history program, and their textbooks to build their presentation. The structure of the classroom is also noticeably different than the other classrooms I visit, with tables instead of desks. Students in T7's class are focused and attentive to their work without the presence of a dynamic teacher or a high-stakes assessment. The students work together across racial and gender lines and operate at a higher level of collaboration and engagement than in other more traditional settings I have seen.

> *Researcher's sketch*: I am completely in awe of the high level work these students are producing in this setting. This is not an Honors or AP course and the students are completely engaged in collaboration and multitasking. T7 uses web 2.0 tools to drive instruction and nothing these students are doing could be done without their laptops. Each group member decides how they will approach the overall assignment in a way that equally shares the responsibility. The nature of both Dipity and Prezi allows groups to collaborate in real-time without having to email something back and forth. One group of three girls divides the assignment into branches of the government and each takes a section to research independently. As they type in their information, they

also look for relevant YouTube videos and upload digital images from the internet that relate to their project goal. As they work, they check-in with each other about format and simultaneously create their product. When one student finds a source that helps another group member, she simply places the information on the site under the appropriate category. Students do Google searches, use Web Quest, and have their text books open as they synthesize various data sources into their presentation. There is no time off topic. The teacher rarely even has to intervene. The room buzzes with idea sharing and knowledge production. Every one of these students would be able to walk into the college class that I teach and handle the technology and project creation tools I use without a struggle.

T8

Time spent with T8 begins as a standard observation. Students come in to the class and begin an open book pencil/paper quiz. As they finish, T8 instructs them to open their laptops to MS Word and begin completing the end of chapter questions from their books. Midway through my observation, an announcement of "code red" comes on the loud speaker. The teacher immediately begins classroom preparations, and I join the students as they huddle up against the cinderblock wall farthest from the window. Significant to this research, despite instructions not to have their cell phones out, several students text and try to figure out what caused the disruption. After an hour, news has circulated among the students that a bank robbery took place nearby and the suspect has fled on foot toward the school. During this non-instructional time, many students use their Mp3 players and covertly text on their cell phones.

While the second observation with T8 is very similar in structure to my first visit (prior to the interruption), the majority of students attempt to complete the paper/pencil quiz

and chapter questions in MS Word. However, several students are also on Facebook and two students simply put their heads down, refusing to complete the assignment.

> *Researcher's sketch*: The "code red" in T8's class is a sobering reminder of the reality in this town. At one point as we crouch in the corner together, I ask a female student if she is nervous about this kind of thing and her response was, "no, we have something like this about once a week." No wonder the teacher is so methodical in his preparations of the room, covering each window with heavy dark paper, placing a colored square under the door, and ushering the students into the safest section of the room. The students are so calm, texting covertly and whispering about who may or may not be involved in the event. Every day these students carry with them the poverty, violence, and abuse that lurks just outside the doors. It is part of what makes the pervasiveness of the technology here so startling. This is not Chapel Hill or Highland Park. These students, many of whom live in the large transitional foster home a few miles away, have very little access to technology apart from what is offered at school. It is a courageous act by the administration and faculty to believe in these students enough to fight for resources at this school that otherwise would not be here. The students must have a sense of that, must be aware, somewhat, that their school is special and that they have been given an opportunity that many students like them would not otherwise have.

Student Interviews

One of the primary objectives of this study is to hear directly from a sampling of students. Generally, even though students are directly affected by large pedagogy shifts like the one that has occurred in this school, they are rarely given the opportunity to respond in

thoughtful ways about their experience. Often, the success or failure of school reform programs are gauged according to standardized test results and rarely incorporate feedback from those who have been most dramatically impacted by the curriculum change.

After providing signed informed parental consent, five male students and five female students (two freshman, two sophomores, three juniors, and three seniors) are interviewed individually about the technology used on their campus and their perception of how the technology, particularly the newly implemented 1:1 laptop rollout, has affected their learning process and motivation to learn. Interviews were then coded according to the four motivation subgroups that align with the school wide survey in which students were also asked to participate. They included: intrinsic goal orientation, extrinsic goal orientation, task value, and control of learning beliefs. To protect the anonymity of the students, all names have been changed, though gender and racial identifiers were kept the same.

A general discussion of the technology used on their campus reveals that students view the Active Boards and laptops as the primary modes used by their teachers. With some additional prompting, several students also mention using flip video cameras, expressions for Active Boards, and IPods. All of the students interviewed also feel that their teachers generally have a good understanding of how to use the technology and feel comfortable teaching with the laptops. Students also explain that their school uses Angel Learning as the web-based host for all of their classes.

After discussing what technology they use at school, students are asked to talk about how they feel about the technology changes that have taken place over the past four years in the school system. All the student responses focus on the laptop rollout that took place in mid September:

Joe: “The laptop helps out a lot, but I can’t access stuff because it is blocked which is frustrating.”

Seth: “The computer itself is a good thing that a student can go home and use them...you can learn things at home and understand it fully if we don’t understand it at school.”

Jill: “To be honest, I don’t like the laptop. I’ve had a lot of trouble with mine. It deletes my documents and I can’t open documents at home and get my homework done. I’ve lost a lot of my work because of my laptop.”

Juan: “I like it [laptop]. We use it in almost every class. We use the Angel website, but that’s all you can get on because everything else is blocked.”

Michelle: “I think the laptop helps with projects. Sometimes they are good and sometimes they malfunction, but it’s okay.”

Ka: “The laptop is alright but it’s a lot more work but it’s better because what I don’t finish at school I can finish at home.”

Cindy: “The laptops are new this year. They help us with our typing and with keeping up with our grades.”

Lucy: “I don’t really care for the laptops. I am more of a paper/pencil type of person.”

Carl: “I don’t use the laptop that much. I don’t really have the experience but next semester I have English 4 and I am guessing it will help me keep up with my work.”

Felipe: “I use my laptop mostly. I think it was a really good idea for them to do that for us.”

According to their response, students are then prompted to talk about why they do or do not like using their laptops and whether or not they would choose to keep their laptops if the school gave them an opportunity to go back to traditional paper/pencil format.

Extrinsic Motivators

Several students mention both the opportunities and disadvantages associated with having their laptops at home. Homework is a dominant theme among the participants. Joe and Cindy do not have internet access at home and are frustrated by the expectation that they can complete online work at home by finding a Wi-Fi connection at the public library or at friend's house. Lucy also mentions that when you work and have sports after school that you do not have access to the internet even if it is available at home so she cannot complete her homework assignments the way she used to. These three students all feel that their grades are negatively affected by technology use at school because their teachers required them to complete and submit homework assignments through Angel.

On the other side of the issue, Juan feel like having his in-class work on the laptop, "makes our work easier because we don't have to write papers and stuff. We make flashcards on the computer in Math and then can study them at home." Michelle, Juan, and Carl also like that they have access to all of their grades through Angel.

The idea of pencil and paper versus using the laptop is another dominant theme directly related to how students feel they are doing on performance objectives like standardized tests and quarterly grades. The two female students, Lucy and Jill, who dislike their laptops, also believe that their grades have been negatively affected by their teacher's reliance on the laptops for tests and homework. Conversely, the male students, Seth, Juan, Felipe, and Carl, who express extremely positive feelings about their laptops, believe work is

easier and their grades better because of the laptops. Ka and Michelle also think it is easier to stay organized by using their laptops to take notes.

Intrinsic Factors

It is difficult for the students interviewed to talk directly about feelings of self worth or trust factors associated with the technology they use at school and most of them avoid the topic. However, Seth and Felipe have strong feelings about their laptop use:

Seth: "There is a sense that when we used to have paper that they didn't care about us and they just wanted us to write notes or do a worksheet but with the computers you feel a sense like a student like they like us enough to give us computers which is exciting to me. It gives a student more confidence in themselves to learn a whole lot faster than pencil and paper."

Felipe: "I just like that we have the opportunity to have it. Some people don't have the opportunity so now I have this computer and I can actually do my school work at hom

Throughout the interviews, students also mention that many websites they would like to use are blocked, which conveyed to the students the idea that the administration does not trust them. Juan, Seth, and Cindy agree with having blocked websites at school but express a desire to be able to access Facebook, games, Skype and music when they are at home.

Because Jill and Cindy communicate such a strong dislike for the technology reliance on their campus, they are prompted to talk about any ways in which the school has reached out to them to try and find solutions for their difficult transition away from traditional pencil and paper work. Jill said, "They never ask us. They just make us do it their way." Jill, Cindy, and Juan are also the students with the least amount of basic computer skills going into the start of the laptop initiative and feel that they have not received enough training on how to

save documents or navigate Angel which causes frustrations. Juan, who is positive about the laptops, did mention that when he first moved to the school that he felt uncomfortable because everyone else knew what was going on and how to use the Active Boards and laptops but he did not and that sometimes other students laughed at him when he tried to figure out what to do.

In talking with the students, there is a strong sense that those students who already possess an interest and background in working with computers generally feel more positively about the technology use on campus and about their experience in the classroom. However, those students with the least amount of background knowledge and computer skills are the most frustrated and negatively impacted by the 1:1 rollout. While all of the students are aware of training for their teachers, none of the students had received any significant training before the computers were distributed.

Autonomy

Proponents of technology-rich education point toward the positive impact technology can bring in the area of control over one's learning to the classroom environment. Motivation experts have also pointed to the idea that increased autonomy leads to higher levels of student motivation to learn. In these interviews, several students allude to an increased sense of autonomy associated with laptop use while those students who do not like their laptops feel that their autonomy has been negatively impacted:

Joe: "I miss the hands on stuff, being able to work out problems at my own pace instead of being timed on the computer."

Seth: "To me, it gives a whole lot more freedom than I use to have. The school's done a great job. It helps me learn a whole lot faster."

Jill: "In Science, we even do experiments online. We never get to hold stuff. Instead it's a website and we just watch it. Another thing is that teachers put time limits on everything now with Angel and you can't submit something unless it's done all the way so you can't even get some credit."

Juan: "All the subjects are about the same. I can do it at my own pace, depends on what we're doing. And, I can save stuff and go back to it later. I like that."

Michelle: "I like that in math she puts all of her teaching online so that we can go back and look at it later and check and see what work we are missing. Before, we didn't know."

Ka: "I like typing my papers more than writing and it's easier because I have the internet to use on my work which is more fun. I actually like the IPod…we used them for a Shakespeare thing and answered some questions and I kind of liked it better because we got to go at our own pace and could rewind it whenever we needed to."

Cindy: "We use PDA in my computer class and the laptop to take notes in other classes and it's good because you can cut and paste and organize things easier."

Lucy: "In science, we even put our textbooks online and you do experiments that way. I miss the touch/feel of things. And when you take tests on the computer you can't go back, you have to keep going and if you miss it then you miss it."

Carl: "It's helpful in learning things; last year we had the PDA and flip video camera and we edited things and made it look good. I liked doing that better than pencil/paper. I think this [laptop] will help me by being active. It's hands-on so I don't just have to sit and listen."

Felipe: "All of our assignments are online on Angel and we turn it in on that same website, no paper wasted and it's easier to keep up with the assignments and not lose them."

The idea of paper/pencil versus keyboard is a frequent topic for these students in terms of autonomy. Lucy and Jill feel like they had more control over their learning process when they could hold the pencil and work out problems, particularly in math and science, while the other students like the flexibility and organizational advantages that come from using the laptop. In fact, several of the students who favor the technology in other areas also mention the difficulty of taking math tests online versus using paper/pencil. Students also feel the time limits teachers are now imposing on opening assignments and on tests make using the laptop much more difficult and less desirable. Therefore, it seems that for these students, feelings of autonomy gained by allowing students to work at their own pace and on their own terms can be eroded by unreasonable time limits and an inability to submit partially completed assignments. The struggle against timed assignments and the pressures associated with timed completion is an issue particularly relevant for the students in the areas of math and science.

Value

During the interviews, students are asked if they felt that the use of technology in their school, including but not limited to their laptops, seems valuable for their future success. Every student, including those who have had negative experiences, is positive about the outcome of learning how to navigate technology even if it is not his or her favorite medium. Jill and Lucy still want to go return to a more traditional pedagogy, but both students do acknowledge the value of working on projects and pushing through the difficulty

of navigating the technology in order to be more ready to work and go to college when they graduate.

Seth was particularly positive about the experience he is receiving: "Our school went from paper to technology. They call it paper saving but I call it that we're getting to the 21st Century a whole lot better than it used to be…using the computer more gets us use to using computers more often and gets you mature for college and classes." While several students mention college readiness, Carl and Juan also feel like they would be more hirable after high school because of their experience with computers.

The issue most widely discussed that tended to impede the feelings of value associated with technology use involves network stability and reliability. Each student mentions their own frustrations as well as the visible frustration of their teachers when the network goes down or is running slowly. Students also point out that their teachers have to scramble to come up with alternative assignments and that tests get pushed back because of network problems. These occurrences often leave students feeling frustrated and ill prepared for the work that day.

Additionally, students in the interviews who talk about technology being fun or enjoyable only did so when they were describing creative assignments, video, and group projects. Even then, only two students had had those types of enjoyable experiences with the technology on their campus. Many of the assignments and assessments that the students described doing were traditional in nature, yet now required the use of the laptop. Students less comfortable with the technology repeatedly consider the laptop to be a hindrance in completing these assignments and do not see the point in having to use the laptop to perform a task that they could more easily do with paper and pencil, particularly in math and science.

MSLQ – Motivated Strategies for Learning Questionnaire

Students at Town A High School were invited to participate in the Motivated Strategies for Learning Questionnaire as part of an ongoing evaluation initiative by the school system. A modified version of the MSLQ was placed online in the Angel portal and the principal made several announcements to encourage students to voluntarily participate. The school system then shared their results in an Excel document with the researcher.

The survey consisted of 17 items that are rated on a 7-point Likert scale from "not at all true of me" to "very true of me." The seventeen items correspond to four primary motivational strategies: extrinsic goal orientation, intrinsic goal orientation, control of leaning outcomes, and task value. 375 from a total student population of 690 students voluntarily took the survey. The survey was posted to the Angel portal website and was available for two months. Students could only take the survey once and were reminded by the school's principal that it was available for them to take on three separate occasions via daily announcements over the loud speaker.

Table 5 provides the descriptive data that the researcher produced from survey data according to the four subgroups:

Table 5
MSLQ Group Statistics

Gender	N	Mean	Std. Deviation
Intrinsic			
Male	156	4.766	1.431
Female	219	4.831	1.417
Extrinsic			
Male	156	5.768	1.107
Female	219	6.134	0.867
Task Value			
Male	156	5.299	1.393
Female	219	5.353	1.416
Control			
Male	156	4.555	1.453
Female	219	4.407	1.316

In addition to the seventeen questions adapted from the MSLQ, students were asked to identify their gender. An independent-samples *t*-test was run to determine if any statistically significant variation occurred between male and female responses. The survey results reveal that both males and females responded favorably, in general, to all four motivational subgoups while females, as demonstrated by the *t*-test, responded significantly higher in the category of extrinsic goal orientation which included specific questions related to grades and performance as motivation strategy. The *t*-test did not reveal any additional statistically significant difference between male and female responses in either the subgroups of extrinsic goal orientation, task value, or control.

Table 6
Independent Samples Test by Gender

	t-Test for Equality of Means	
	T	Sig
Intrinsic (equal variances assumed)	0.442	0.658
Extrinsic (equal variances not assumed)	3.447	0.001
Task Value (equal variances assumed)	0.364	0.716
Control (equal variances assumed)	-1.042	0.306

A Cronbach's Alpha test for reliability was also performed to strengthen the validity of the results. The Cronbach's Alpha is a measure of the reliability of the particular scale and ranges between 0 – 1, with higher scores being a more reliable measure. It is widely understood in the social sciences that the ideal range is between .7 - .9 (Nunnolly & Bernstein, 1994). However, some researcher will use as high a range as .75 -.80 or be as moderate as to also include a range above .60 (Garson, 2011).

Table 7
Reliability

Scale	N	Alpha
Intrinsic	4	.782
Extrinsic	4	.643
Task	5	.865
Control	4	.664

The Cronbach's Alpha revealed that because the Alpha for the extrinsic goal orientation and control scales fell below .7, the results are marginally less valid which indicates that the results should be viewed with a degree of caution. The Cronbach's Alpha specifically validated the reliability of the intrinsic goal orientation and task value subscales as each are above .78 and .86 respectively.

Thus, data from the survey suggest that students are positively motivated to learn when technology is used as a vehicle to deliver instructional content at this school. While the categories of extrinsic goal orientation and value had the highest average responses on the Likert scale, all four categories can be viewed as positive motivating factors.

Chapter four has provided a detailed report of the research findings including narrative descriptions of classroom observations, student interviews, and survey data. The following chapter analyzes the results of the study and discusses limitations and future implications.

Chapter Five

Discussion

Faced with the difficulty of educating at-risk students, one possible solution links success to motivation. The social-interactive aspects of web 2.0 tools and technologies that provide the cognitive practices of thinking, problem solving, and learning (Jonassen & Reeves, 1996) combine to create technology infused curriculum. Proponents of technology infused curriculum argue that technological tools can provide students with more options and input into their educational experience (Lisenbee, 2009). By using technology infused curriculum, school systems are attempting to increase student motivation, hoping that when students are given a say into how and what they learn, they will feel more invested in their learning and improve their achievement outcomes (Kolderie & McDonald, 2009). Because of this, individualized instruction and innovative school improvement plans using interactive technologies are becoming increasingly pervasive.

Theoretical Framework

Two key voices in the discussion surrounding student motivation and technology use in schools combine to form a two-fold framework for examining the technology initiatives offered at a rural, low wealth, high minority high school in central North Carolina. Brophy (2010) has long believed that students' motivation to learn directly correlates to achievement. Four key principals of motivation, including intrinsic and extrinsic goal orientation, autonomy, and task value, have emerged out of Brophy's work and were used here to gauge students' perceptions of their motivation to learn when using instructional technologies. The observation protocol, student survey, and student interviews centered on these four components in an effort to better understand how students perceive themselves to be affected by the technology driven instruction at their school.

Dede's research (2007; Clarke-Midure & Dede 2009) explains that reaching the full potential of information and communication based technologies (ICT) in schools involves augmenting instruction with digital resources, sharing knowledge collaboratively through innovative web 2.0 tools, and utilizing virtual world software to provide context-specific, inquiry based instructional environments. In order to more fully understand how the motivational strategies data that have been collected for this study connects to specific aspects of technology driven instruction at the school, the researcher triangulated the data through the lens of Brophy's motivational strategies and Dede's concept of fully realized ICT. Additionally, data were analyzed in conjunction with previous research in the areas of student motivation, at-risk student achievement, and technology driven multicultural education as discussed in chapter two.

Restatement of Research Questions

The National Research Council and the Institute of Medicine (2004) report on fostering high school students' motivation to learn, argues that motivation is a key factor in the success or failure of education. At the forefront of technological shifts in curriculum is the premise that students want to use computers and are motivated to learn because technology is more engaging than conventional approaches. Increasingly, school reform programs include expensive technology initiatives, yet most current research surrounding these approaches involves little more than comparing test scores and teacher satisfaction surveys. By examining at-risk high school students' perceptions of their motivation to learn when using instructional technologies, this study offers a shift away from the traditional voices currently dominating research on this topic. A better understanding of the link between students' perceptions of their motivation to learn and the use of instructional

technologies in school which may ultimately lead to increased achievement among our most vulnerable students. Three questions and the triangulation of the data collected converge to form this study:

1. To what degree do at-risk high school students feel that instructional technologies help contribute to their academic success? Student interviews and survey data provide insight about the degree to which at-risk high school students feel that instructional technologies help contribute to their academic success.
2. To what degree are feelings of autonomy and goal orientation related to increased motivation among at-risk students who are taught using technology-driven instructional models? The survey tool, classroom observations, researcher's sketch, and student interviews specifically demonstrate how feelings of autonomy and goal orientation are related to increased motivation among at-risk students who are taught using technology-driven instructional models.
3. What role does students' perceived value of digital literacy as a 21st Century job skill play in motivating at-risk high school students when using technology in the classroom? Survey data, student interviews, classroom observations, and the researcher's sketch are used to better understand what role the perceived value of digital literacy as a 21st Century job skill plays in motivating at-risk high school students when using technology in the classroom.

Results

Observations

Town A High School has become a tremendously successful school system due in part to the collaboration and willingness of its faculty to adopt and implement the technology

reform handed down by its administrators. For the first three years of the IMPACT model, teachers completed approximately 25 hours of technology specific professional development per year. Before this school year began, teachers also spent 12 days over the summer specifically preparing for 1:1 laptop rollout.

The degree to which teachers were able to utilize the technology available to them varied greatly. Some classes were entirely technology driven while others were more selective in its use. One instructor used the technology to deliver innovative and creative pedagogy in keeping with Dede's (2007) model of fully realized ICT. In most of the classrooms, however, the work performed on the Active Boards and on the laptops could have been done in traditional ways using a chalk board, overhead projector, and pencil/paper.

While elements of the Erben, Ban, and Castañeda (2009) continuum (Table 1) for understanding the degree to which teachers use technology as a learning tool were visibly present in several classrooms, the full spectrum of the continuum for utilizing technology driven instruction was not achieved. According to Erben, Ban, and Castañeda, one side of the continuum shows how teachers can use technology solely for teaching content. The other end of the continuum represents ways in which teachers can use technology to facilitate learning. By continually moving along the continuum, a teacher creates an environment rich in active learning. While several of the teachers did use technology as a tool for aiding instruction or as a tool for facilitating student assessment rarely were students asked to generate, create, or practice. According to the continuum, teachers also underutilized the elements of managing and instructing via technology tools. In the case of Teacher 7, however, technology was a tool that opened up a more creative approach to learning and processing. Students worked together across gender and racial lines in order to create a product that demonstrated what

they knew in an innovative way. Students visibly enjoyed what they were doing and were proud of what they accomplished. Similar themes emerged in the student interviews and in the survey data which suggest that motivation to learn is at its highest when technology based projects and class work are fun, relevant, and creative.

According to Dede's research (2007; Clarke-Midure & Dede, 2010), the knowledge sharing that took place between students as they collaboratively built their presentation with the use of a web 2.0 tool enabled T7 to authentically teach 21st Century skills. T7's classroom also exhibited many of the attributes of successful technology-enhanced language learning environments by Butler-Pascoe and Wiburg (2003) that can be applied to using technology infusion among all marginalized student groups, including: providing interaction, communicative activities, and real audiences; supporting development of cognitive abilities; utilizing task-based and problem-solving activities; being student-centered and promoting student autonomy; using multiple modalities to support various learning styles and strategies; and supporting collaborative learning (p. 15-19).

Technology infused curriculum was most noticeably absent when teachers were discussing upcoming standardized tests. The summative way in which End of Course exams are still given by the state seemed to force teachers out of innovation and back into the traditional modalities of lecture, worksheet, test, and review. While students were engaged in the learning process, no collaboration or enthusiasm was observed. It appeared that the impetus for passing the test or quiz motivated students to participate in the process, but during the lecture or seatwork, many students tuned out regardless if the work was done on a laptop or by pencil/paper.

Dede (Clarke-Midure & Dede, 2010) reinforces this notion by pointing toward the tremendous innovation in technology use over the past 20 years in schools and the complete lack of innovation in assessment in the past century. Particularly detrimental, Dede warns, is that traditional assessment cannot measure 21st Century skills and instead measures what students know without the tool, not what students know with the tool (2010). In an environment like Town A High School where 21st Century skills are at the forefront of pedagogy, a significant tension still exists between the authenticity and effectiveness of the assessments handed down by the North Carolina Department of Public Instruction (NCDPI) and the school system's movement toward less traditional forms of pedagogical practice as outlined by the IMPACT model, a comprehensive technology and collaborative program also produced by NCDPI.

During the observations conducted for this study, the ubiquitous presence of Mp3 players and cell phones was astounding. Students were continually trying to text, download music, or listen to their headphones while class was going on, which serves to reinforce Oblinger & Oblinger's (2005) assertion that students desire to use technology to connect in meaningful ways. In some settings, the presence of laptops became another way for students to become distracted by myriad websites more interesting than that of the teacher's lecture. However, the technology overall, used to varying degrees, did seem to provide a new medium for teachers to deliver core content instruction in a way that attempted to increase motivation among the students. Amazingly, even months after the initial 1:1 rollout, in each class I visited, every student carried his or her laptop and opened it at the start of class which demonstrated that these students have a sense that when they use their laptops they are becoming better prepared for life outside of high school and value the technology they are

using at school. However, the distance between why students are motivated by technology use at this school and the ways in which teachers used the technology exemplifies the ideological struggle between using computers to deliver the "official" curriculum in controlled ways and using computers as a vehicle for changing the curriculum though innovation and creativity (Muffoletto & Horton, 2007).

Similar to Dede's (Clarke-Midure & Dede, 2010) research, a recent study by the Metiri Group (2009) on the state of technology in schools, finds that learning by using technology to facilitate tacit and explicit knowledge cannot be fully realized until "content, sound principals of learning, and high quality teaching" are aligned "with assessment and accountability" (Metiri Group, 2009, p.2). Consequently, these questions still remain for the students of THS: Can 21st Century instruction tap into the feelings of value associated with technology use in the classroom? Will the meaning-making power of web 2.0 creation tools combine with high quality teaching and relevant assessment models in such a way that student motivation to learn is maximized?

Student Interviews

During the process of interviewing students for this study, it became apparent that those students whose parents allowed them to participate in the student interviews for this study seemingly did so because their students had something to say, whether positive or negative, about their experience. The students were eager to share their opinions and recommendations, providing incredibly rich insight into the daily workings of the technology tools they use. Because of the innovative technology use at this school, findings from the interviews are particularly compelling in nature because they rarely exist in current research exploring this topic. The fields of motivation theory and at-risk student achievement have yet

to converge into a single framework for evaluation and have not produced these types of best-practice based recommendations that are derived from theory based on both disciplines.

While many of the students felt an increased sense of control over their learning and found the laptop use to be valuable for 21st Century job skills and college readiness, two female students were disheartened by the negative effect having homework and tests online has had on their grades. Even though the two female students liked using the Active Boards, they both felt a sense of helplessness when it came to troubleshooting problems with their laptops, in part because they lacked background computer skills when starting the year. Their experience indicates an increase in negative feeling associated with laptop use among students who have had the least amount of prior experience with technology. Peck, Cuban, and Kirkpatrick (2002) had similar findings when evaluating the effectiveness of the technology plan at a Silicon Valley high school. Students who had a high degree of technology experience away from school were most motivated and successful when using technology at school. For many school systems, like this one, technological resources away from school are minimal. Therefore, large scale implementation of technology initiatives like 1:1 laptop rollout must identify students with little technology background and work to build a better foundation for them so that they can succeed during the transition process.

Attending a school with such innovative technology did appear to be a source of pride among those students who liked the technology the most. However, the reality of having blocked or restricted websites bothered many of the same students who otherwise were positive about the technology driven instruction. Triangulated with survey data which showed how feelings of trust and self-worth associated with intrinsic goal orientation are motivating factors for students when using technology in school, it is reasonable to assume

that limitations such as blocked or restricted websites can erode student motivation when a lack of clarity or an absence of understanding as to why those policies are in place is present. Although the data suggest that intrinsic factors are not as significant to student motivation as others, it is nonetheless important to understand how policy decisions can effect motivation to learn and, in turn, achievement.

Students were particularly critical of using the laptops in place of science experiments and to take high stakes math assessments, pointing to the lack of control they feel with the absence of traditional manipulatives. The lack of creative tasks and the presence of traditional types of assignments being pushed onto the laptop were also primary themes among those students who found the laptops to be difficult to use. Additionally, students overwhelmingly felt that the lack of an equally accessible Wi-Fi connection outside the school was unfair and frustrating since they were required to complete homework online. Students were also aware of the disconnect between the training teachers have received and the complete lack of training they received prior to the laptop rollout.

Overall, among these students, 8 out of 10 would choose to continue laptop use, even in its current form, rather than return to paper and pencil instruction. It became clear in talking to them that using pervasive amounts of technology to deliver instruction added to the perceived value of the education that these students were receiving.

Survey Results

Results from the Motivated Strategies for Learning Questionnaire (MSLQ), triangulated with the student interviews and classroom observations, further corroborate the positive way in which students view technology at this school. In all four categories, extrinsic goal orientation, intrinsic goal orientation, control, and task value, students' average

responses were on the positive spectrum of the Likert scale. A *t*-test also demonstrated that female and male students were equally positive about the technology on their campus while female students felt significantly more motivated by grades and classroom success than did males.

Based on Brophy and Kher's (1985) assertion that increased motivation to learn enhances achievement, evidence in this study suggests that at-risk student's using technology infused curriculum are impacted positively in the four motivation subgroups including extrinsic and intrinsic goal orientation, autonomy, and value. Thus, at-risk student achievement gains at this school can indeed be linked to the technology implementation plan that is currently in place.

On its own, the survey data suggest that students are motivated to learn using technology despite the hurdles schools face in adapting instruction to meet the innovation opportunities the technology affords. Even though Dede's (2007) concept of fully realized ICT is not always present, students still experience increased motivation to learn when the areas of extrinsic and intrinsic goal orientation, autonomy, and task value are fostered via the technology tools. The data do suggest that the areas of intrinsic goal orientation and control were the categories students felt the least strongly about in terms of motivation. After hearing in the interviews about the frustrations students have encountered with time limits, lack of manipulatives, blocked web pages, and limited technical training it is understandable to assume that there is a direct connection between these road blocks and the effect they have on motivation.

The implications for best practice derived are therefore grounded in the assertion that technology infusion at this school is directly related to increased feelings of motivation to

learn but can also lead to decreased motivation among certain students, specifically those who are the least technology savvy at the beginning of implementation.

Limitations

Some limitations do exist because of the narrow focus of this study. Town A High School is in a very unique position as an IMPACT grant recipient. The student population is primarily non-white and low wealth, but the resources available because of the federal grant do not mirror the reality that most school systems with similar challenges face. It is also critical to remember that this study took place during the initial phase of 1:1 laptop rollout. While the data collected did provide insights, it is not, nor was it intended to be, relevant for all ninth through twelfth grade settings.

Further Research

Further research in this area is needed in several key areas. First, as technology becomes more of a ubiquitous presence in schools, authentic assessment in keeping with Dede (Clarke-Midure & Dede, 2010) could de developed so that the current tension between innovative pedagogy and traditional assessment may be addressed. Possibilities for future research in this area may include further development of situated learning contexts via MUVE technologies or project-based assessment guidelines for the evaluation of student work that effectively demonstrates what students know in relation to 21st Century skills.

Secondly, motivation theorists may want to consider how student motivation is specifically impacted by the current wave of technology reform sweeping across U.S. schools. Further research that incorporates core theoretical principals, including goal orientation, autonomy, and value, could examine technology use in schools as a viable attempt at increasing student motivation to learn and develop best-practice strategies based

on broader longitudinal studies. Research is especially lacking in the field of at-risk students where technology may indeed be a key to unlocking success. If more research supports the claim of this study that technology does increase achievement among at-risk populations, perhaps more funding sources will also become available.

Thirdly, research investigating the correlation between teacher training and effective technology implementation is also needed when attempting to link technology infusion to student motivation. The role that teachers play and their feelings of efficacy in relation to 1:1 laptop use may also hold valuable insight into additional behavioral strategies teachers can employ when using laptops with their students and when shifting classroom management approaches to include the use of technology.

Additionally, research is needed that explores the difference in motivational strategies among male and female students in relation to technology driven instruction. The findings in this study clearly suggested that females differ in their affections for instructional technologies based on the student interview data. The survey data, on the other hand, did not provide any indication to support that assertion and seemed to refute it. A more fine-tuned survey instrument or more in-depth qualitative analysis may be needed to determine if indeed there is a difference, and whether different strategies should be used when implementing large scale technology reform among male and female students.

Finally, as noted in the researcher's sketch, the percentage of at-risk students decreased in the AP English class at this school. Further research into the differences in perceptions of motivation to learn using technology among those AP students and the rest of the student body might improve insights into how the findings in this study relate to at-risk versus high-achieving subgroups.

Implications

According to Creswell, mixed methods inquiry, "is one in which the researcher tends to base knowledge claims on pragmatic grounds" (Creswell, 2003, p. 18). Mixed methods approach, Creswell informs us, "begins with a broad survey in order to generalize results to a population and then focuses, in a second phase, on detailed qualitative, open-ended interviews to collect detailed views from participants" (p. 21). Though broad generalizations are not the objective of case study models, the findings from this study may be nonetheless transferable given the timeliness of the topic and practical nature of the implications.

However positive the link between technology use and students' motivation to learn may initially appear, the findings also indicate that technology driven instruction can either positively or negatively affect academic success depending on the strategies with which it is implemented. This study suggests implications for practice among teachers, administrators, and policy makers, as well as researchers in the fields of student motivation, technology driven multicultural education, and instructional technology. Students in this case study who felt that their grades and personal feelings of self worth were negatively affected by technology use in the classroom provided rich insight into why technology can also hinder academic success:

1. **Implications for Teachers and Policy Makers: Time Limits, Design Restrictions, and Assessment**

The ability of computer delivered quizzes, tests, assignments, and openers to be automatically timed and designed in ways that traditional paper tests are not by limiting how students can navigate from one page to another or back and forth between questions deters students who are already struggling with content material. Such limitations as being unable to

submit partially completed work, the inability to go back to a question that has already been answered, or to skip a question in order to come back to it later can be detrimental to a student's ability to meet his or her own extrinsic goal expectations and may erode the feeling of autonomy that self-paced assignments provide.

In direct contrast to Dede's (2007) assertion that MUVE (multi-user virtual environment) technology creates authentic contexts for students to explore and inquire, artificial time and design restrictions create the opposite outcome for struggling students, essentially limiting the core 21st Century skills of collective expression, experience, and interpretation. Dede's (Clarke-Midure & Dede, 2010) assault on traditional assessment exposes the danger of placing outdated assessment strategies onto ICT mediums, recognizing their inability to demonstrate the students' capacity to use tools, media, and applications in effective ways (2010). Ultimately, the form of assessment does not match the mode of assessment which creates a gap in the authenticity and effectiveness of the assessment.

Educators should consider reevaluating how and why they are assessing, particularly in the areas of 21st Century readiness. Rather than repeatedly forcing teachers into traditional "weak but rapid instructional methods such as drill-and-practice" (p. 312), policy makers can look for ways to reconcile high stakes testing with new and relevant instructional technologies that capture student progress and reward authentic behavior in contextually relevant settings (2010). The gap between outdated assessment strategies and ever-evolving instructional technology creates a vacuum of frustration and failure among students already struggling to achieve.

While trying to redefine assessment is the most complex issue facing innovative technology use in schools, researchers like Dede (Clarke-Midure & Dede, 2010) are offering

solutions using situated learning and project-based assessment. NCDPI should consider the possibility of integrating methods like those offered by Dede (Clarke-Midure & Dede, 2010) that allow teachers to assess what students know while using the augmentation of the digital tools they are asked to use in the classroom every day.

2. Implications for Administrators: Server Problems, Connectivity, and Network Interruptions

While students in this study were overwhelmingly positive about the college and job readiness that learning to navigate technology provides, their repeated encounters with connectivity loss or internet inaccessibility erodes their belief that what they are doing is valuable. Instead, students doubt the worth of the technology they are using and feel ill prepared for their class work, particularly when network issues effect test dates. While it is impossible to prevent all network problems, providing students with a technical understanding of why problems occur and providing increased technology literacy in the face of such interruptions may remove the stigma and instead allow them an opportunity to discover their own solutions. Researchers in the area of at-risk students and technology infused curriculum implore educators to understand the value of teaching digital literacy in a way that empowers students with the language and know-how to navigate the nuance of technology and to understand how the tools they are using actually work (Young, 2002).

Additionally, the assumption that all students are able to submit and complete homework via the internet away from school can also hinder academic achievement. Students involved in athletics and students who do not have Wi-Fi access at work or at home often feel frustrated and less successful than those students who have better online access (Njuguna, 2010). Some school systems have negotiated discounted internet provider

agreements for students to gain internet access at home while other solutions may simply include a more realistic approach to homework and network accessibility outside of school.

3. Implications for NCDPI: Lack of Technology Training for Students

In this study, students who had the least amount of interest and background training in technology were the most negatively affected by the school's reliance upon instructional technologies. Although teachers at Town A High School completed approximately 60 hours of laptop specific training, students were given little to no training on how to save documents, upload work, and troubleshoot errors. One of the primary hindrances in motivating students to learn, explains Brophy (2010), comes when "students are routinely faced with performance demands that they cannot handle" (p. 9). Brophy describes student motivation as an "expectancy *x* value model" (p. 15) where "the effort people are willing to invest in an activity is the product of (a) the degree to which they *expect* themselves to be able to perform the activity successfully if they apply themselves" (p. 15).

In order to avoid creating a significant achievement gap when 1:1 laptops become a part of the instructional strategy, students should begin on a more level playing field. Possible solutions include a freshman computer class or an online module that all students complete before beginning laptop use in the classroom. As evidenced by the students in this study, it is not enough for educators to assume that students already know how to use technology. Tech plans must include continued training for faculty, staff, and students in order for the tools to be used effectively and for maximum student motivation and fully realized ICT to be achieved.

Possible solutions may also include a student training requirement be added to IMPACT implementation guidelines. Rather than try and create a module suitable for all

types of laptops, netbooks, or PDA handheld devices, schools could be responsible for developing their own technology specific training based on their schools needs as long as the training meets state guidelines.

4. **Implications for Stake Holders: Traditional Pedagogy versus Innovative Instruction**

Students in this study were keenly aware that often they are asked to do work on their laptops that could be done more easily and efficiently with paper and pencil. Classroom observations also revealed that seven out of the eight core content classes could have completed the assigned work without the use of the technology present. While not all students are hampered by traditional approaches, those students who felt the least competent with the technology were increasingly frustrated that they could not use paper and pencil especially during high-stakes testing simply because they had been given a laptop. Again, Dede (2007) emphasizes the way in which schools have successfully incorporated technology in traditional forms of instruction such as email, information accessing, and word processing; he argues, however, that "none draw on the full power of ICT for individual and collective expression, experience, and interpretation – core life skills for the 21st Century" (p. 12).

Student motivation was at its highest levels when the technology present was used in creative ways that could not be done in any other form via video editing, IPod self pacing, and/or web 2.0 project collaboration. It is not enough, therefore, to simply place work on a laptop, teachers must shift their deep rooted preferences for worksheets, lecture, and assessment to include alternative approaches to learning through meaningful creation, social media, and project driven curriculum.

Final Reflections

In looking back at the mixed methods approach taken in this study, more in-depth analysis on both the qualitative and quantitative side of the key questions may have yielded more focused findings. This could be accomplished either through the use of inferential statistical analysis with a more nuanced survey instrument or by conducting a longitudinal qualitative study of student perceptions. The combined work of Dede (Dede, 2007; Clarke-Midure & Dede, 2009; Clarke-Midure & Dede, 2010) and Brophy (2010) provided a new lens with which to examine technology infusion and its effects of student motivation to learn. Research strategies like this one that combines fields of theory may increasingly be called upon as technology continues to become an integral part of school instructional models. Perhaps as pedagogy shifts, new voices will emerge that combine student motivation theory and 21st Century practice into a single strand which would make evaluation and measurement more clear and precise.

It is the hope of this researcher that as more school systems, like the one in my own county, face the sobering challenges of educating students for a new century that they will not only harness the incredible power of instructional technologies, but that they will also do so in such a way that maximizes motivation among socioeconomically and racially diverse student populations through innovative and relevant methods of instruction.

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Appendix A

MSLQ Item List

The following is a list of items that make up the MSLQ (Artino, 2005). The items have been modified to better fit the research questions in this study. A Cronbachs Alpha was run for reliability on the survey results.

Part A. Motivation

The following questions ask about your motivation for and attitudes about technology use in your school. Remember there are no right or wrong answers, just answer as accurately as possible. Use the scale below to answer the questions. If you think the statement is very true of you, circle 7; if a statement is not at all true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

1 2 3 4 5 6 7

Not at all true of me *Very true of me*

1. In school, I prefer using technology in a way that really challenges me so I can learn new things.
2. If I study use technology in appropriate ways, then I will be able to learn the material presented in my classes.
3. I think I will be able to use the technology skills I've learned at school in my life after I graduate.
4. Getting good grades is the most satisfying thing for me right now.
5. It is my own fault if I don't learn how to use the technology available to me at school.
6. It is important for me to learn how to use the technology at my school.

7. The most important thing for me right now is improving my overall grade point average, so my main concern at school is getting good grades.
8. If I can, I want to get better grades at school than most of the other students.
9. I prefer to use computers even if it is difficult sometimes.
10. I am very interested in using the technology at my school.
11. If I try hard enough, then I will understand the technology used at my school.
12. The most satisfying thing for me when I use technology is trying to understand what I am learning as thoroughly as possible.
13. I think understanding how to use technology is useful for me to learn.
14. When I have the opportunity at school, I choose to use technology to complete assignments even if it doesn't guarantee a good grade.
15. If I don't understand how to use the technology at my school, it is because I didn't try hard enough.
16. I like using technology at school.
17. I want to learn more about technology because it is important to show my ability to my family, friends, employer, or others.

Appendix B

Items comprising the seventeen question modified MSLQ and Corresponding Subgroups

Subgroup	Items Comprising the Scale
Motivation Subgroups	
1. Intrinsic Goal Orientation	1, 9, 12, 14
2. Extrinsic Goal Orientation	4, 7, 8, 17
3. Task Value	3, 6, 10, 13, 16
4. Control of Learning Beliefs	2, 5, 11, 15

Appendix C

Guided Interview Questions

Students were prompted by the researcher to discuss how they use technology at their school and how they perceive their motivation to be affected by the technology used at their school.

Prompt 1:

Tell me about how technology is used at your school?

Prompt 2:

How do you feel about all of the technology you have on your school campus?

Prompt 3:

How has your exposure to the technology at your school prepared you for your future?

Prompt 4:

Describe for me a class you've had where the teacher used a lot of technology?

Appendix D

Appalachian State University

Informed Consent for Participation in Research Projects

To the Parent or Legal Guardian of _____,

My name is Danielle Madrazo, and I am a doctoral student in the Educational Leadership program at Appalachian State University. This fall, I will be conducting research at Town A High School. The purpose of my project is to understand how the use of technology affects student motivation. In order to understand how students feel about technology, I plan to conduct guided interviews with students at THS.

Your child was one of forty students randomly selected to potentially be interviewed as part of my research project. I will interview the first five male students and the first five female students whose consent forms are returned. Your child will only be asked questions related to his or her experience with the technology used at school. A list of prompts is included. Students will be interviewed once, and all interviews will take place during the school day this fall of 2010. The interviews will last approximately 20 minutes and will be recorded. The information provided by your student will be used to help me better understand how technology affects student motivation and to help THS evaluate the technology plan they have in place. All student participation in the interviews will be kept anonymous and all recordings will be destroyed once my dissertation is complete. Students who participate are free to withdraw from the study at any time without penalty.

After you have completed the bottom portion of this form, please return it by mailing it back in the enclosed postage paid envelope. Sign and keep the additional copy for your records.

Thank you for your consideration,

Danielle Madrazo
madrazodr@appstate.edu
(828)390-7380

_____ Yes, my child has my permission to be interviewed for this study.
_____ No, my child may not be interviewed for this study.

_____ _____

Parent or Guardian Name Signature

Appendix E

Student Assent

What is research?

I am asking you to be in a research study. Research is a way to test new ideas. Research helps us learn new things.

Being in research is your choice. You can say Yes or No. Whatever you decide is OK.

Why am I doing this research?

In my research study I want to see how technology affects students' motivation to learn.

What will happen in the research?

I am asking your permission to ask you some questions about your experience with technology at your school. I will record this interview so that I can transcribe what has been said. As soon as I complete my research, I will destroy the taped recording. I will not share your name on any of my research and your answers will be kept anonymous.

What are the good things that can happen from this research? What we learn in this research may or may not help you now. When we finish the research we hope we know more about how technology affects student motivation.

What are the bad things that can happen from this research? If ever you feel uncomfortable answering the questions, you can pass and not answer. It is ok if you choose to do this.

What else should you know about the research? Being in the research is your choice. You can say Yes or No. Either way is OK.

If you say Yes and change your mind later that is OK. You can stop being in the research at any time. If you want to stop, please tell me.

Take the time you need to make your choice. Ask me any questions you have. You can ask questions any time.

Name and Signature of Researcher Obtaining Assent
Date

<u>Participant's Statement</u>

The researcher has told me about the research study. I had a chance to ask questions. I know I can ask questions or stop at any time. I want to be in the research study.

_____

Name of Research Participant

Signature of Research Participant **Date**

Appendix F

Observation Protocol

The observation checklist has been developed based on Newmann's Levels of Engagement (1992) and was used to observe the behavioral and cognitive engagement of an entire class. The researcher noted the total number of students engaged at 10 minute intervals.

Grade: **Date:** **Time:** **Course:**	**Total # of students in the class:**	**Observable Behavioral Responses**	**Covert Cognitive Responses**	**Interest**	Presence of technology infused curriculum
Amount of participation in academic work	10min 20min 30min 40min				
Intensity of Student Concentration	10 min 20 min 30 min 40 min				
Enthusiasm and interest expressed	10 min 20 min 30 min 40 min				
Degree of care shown in completing work	10 min 20 min 30 min 40 min				
Additional Comments:					

Vita

Danielle Madrazo holds a Bachelor of Arts degree in English and Secondary Education from Howard Payne University, as well as a Master of Arts in English Literature from Baylor University. After earning her teaching licensure in K-12 English as a Second Language and 6^{th}-12^{th} grades Language Arts, Danielle spent 8 years as a classroom teacher working in high poverty public school settings. Currently, Danielle is an adjunct community college English instructor and mom to daughters, Sophia and Ava.