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Educational Technology and Instructional Pedagogy: Teacher's perceptions and abilities to integrate technology in the classroom

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by

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To my wife, Nicole, who has tremendous patience and has supported me not only through this long process, but in life itself.

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ABSTRACT

Many teachers leave the educational profession due to many factors. However, a majority of these conditions exist because our educational system and the institutions that prepare educators often fail to give educators the tools to do their job well. Preparatory courses for pre-service teachers, for example, lack the strength needed to ready the degree earners that enter their program with necessary skills to advance, especially when their institution has deficits laterally across the campus in terms of technology awareness, process, and structure. Once educators enter into school districts they are held responsible for student achievement that is not often supported by the latest technology and ever changing technologies that are present in the fields of other professional fields. Schools all around the country must make choices around adequate funding and balancing the needs of standards set forth by a hierarchy of government legislation. It is up to districts and their personnel to ultimately choose how to best meet all the needs and demands placed upon them in order to meet all of the needs of all their students. Technology of everyday life has moved well beyond what educators are taught to and regularly use to support student learning. Technology is being used in education as a tool for learning, collaboration, curriculum development and staff development. The fluent and collaborative use of technology is now as vital a skill as any other taught in the schools, and as such is an integral part of the curriculum whose purpose is to ensure that students enter the workforce fully equipped and completely at ease with the technology currently in use in the workplace.

CHAPTER I: INTRODUCTION

Inventors at different times and locations sought to create simple machines to improve work productivity for a multitude of tasks. In doing so, their works inadvertently led to progressive and systematic innovations, industrial revolutions, and societal changes to what was to be the "new normal." Technologies became embodiments of not only mechanical and electrical components, but inherently involved its users both directly and indirectly. Technology left agricultural economies for the development of railroads and the settlement of the West. In its uniting of America, technologies created big businesses, mass transportation, and connected America over telegraph and then telephone wires. These technologies made life seemingly easier, and provided for levels of escapism never enjoyed by the previous generation. As the world clashed over varied perspectives and wars broke out, unprecedented increases in education and research funding accelerated scientific advancements and led to beneficial "spin-off" technologies. Defense spending, therefore, pushed legislators and educators alike to place a greater emphasis on mathematics and science taught in childhood education to the post-graduate level. The time has come again where societal impacts and innovations have taken hold on the world, causing schools leadership, teachers and collegiate institutions to embrace a technological revolution in the educational continuum. Legislators and educational institutions need to collaborate on how to effectively blend newer technologies into educational pedagogy, all while enabling the 21st century learner with the skills they will need in today's global marketplace.

Every month a new piece of technology is introduced into society with unique applications that are increasingly useful in the educational world. However, before a teacher can implement such applications into their classrooms, schools all around the country must make choices around adequate funding of such media and hardware. Due to higher demands set forth by No Child Left Behind (NCLB) and Common Core Learning Standards (CCLS), school districts have to balance the needs of standards set forth by a hierarchy of government legislation with the realities of slashed budgets, varied socio-economic statuses, diverse student learning profiles, as well as teacher preparedness and readiness It is up to districts and their personnel to ultimately choose how to best meet all the needs and demands placed upon them in order to meet all of the needs of all their students—and technology seems to be one of the best mediums across the educational continuum.

When used properly, technology can provide incredible benefits to both teachers and students. Computer technology has the potential to become the single most influential teaching and learning tool in education (Sinclair, 2009), However, technology is not always the problem. Prior to subscribing to the belief that educational technology is universally the best choice for schools, a deeper analysis of how technology has either facilitated or hindered educators' approaches in best practices must be evaluated. In addition, an examination into teachers' perceptions of technology must occur in order to determine the value technology has in the classroom. Lastly, even if teacher readiness proves high, and schools are capable of implementing the variety of technological applications in their environments while meeting the state standards, teachers may or may

not have been provided with adequate knowledge to interpret, integrate, and develop technology into a successful means to effective teaching.

Teachers have felt pressure to implement technology in their classrooms through a variety of– societal, governmental, administrative, and even collegial factors. An and Reigeluth (2011), concluded that teachers believe that technology is an "important part to teaching and learning, helps students learn, and enables them to accomplish tasks more effectively and efficiently." Although teachers believe that technology has its place in the curriculum, they also realize that they are competing with societal factors out of their control. Today's students are growing up in the digital age. Most of them have never known life without specific technology, namely the Internet. From a very early age, they have constantly interacted with televisions, computers, cell phones, and other digital media. According to the Entertainment Software Rating Board, 67 percent of U.S. households play video games with each gamer averaging eight hours per week. For some students, more time is spent in an online gaming environment than on homework. With the capabilities of online gaming, students also lose the social interactions they once had taking turns with the controller at someone's house with earlier gaming systems. Norman Herr, a professor of science education at the University of California, found that children average over four hours of television per day. His findings are not isolated, however, as television is only one of many categories of entertainment. According to a national survey conducted through the Henry J. Kaiser Family Foundation published in 2010, the amount of time young people spend with media has risen intensely over the last several years and discussed that children from ages 8-18 spend an average of 7 hours and 38

minutes using entertainment media over the course of a typical day. Many of these children spend so much of that time "media multi-tasking" that they actually manage to pack a total of 10 hours and 45 minutes of media content into those 7½ hours (Rideout, Foehr, and Roberts, 2010). These statistics provide evidence that validates teacher feelings around the readiness to use technology in the classroom. Although children seem to crave the visual stimulation, the classroom curriculum and teacher chosen activities may not be able to equal those media outlets created by multi-billion dollars a year companies. Teachers also need to place demands on students that cannot be replicated via media, and may involve student sustainability to a task they may not find immediately gratifying.

Government officials have seen this societal trend with technology and have tried to gain an understanding on how to implement it in schools. According to a United States Department of Education report issued in 2007, the total spending at local, state, and Federal levels for the 2003-2004 school year was 7.8 billion dollars ("State strategies and practices for educational technology: Volume i—examining the enhancing education through technology program" 2007). This trend of spending will only continue with the development of further technologies that will enhance student learning and achievement. In 2002, Congress passed the No Child Left Behind Act (NCLB) that stated specific changes that needed to take place in schools, including directives on technology. NCLB emphasizes the improvement of student achievement within academics through the use of technology.

For technology to be infused effectively into school districts there are issues that need to be addressed. One problem lies in the lack of technological availability and awareness. Schools do not always have the necessary government or community capital to purchase appropriate technologies and resources. Government has spent billions of dollars on educational technology and grants in our schools, but never analyze what is gained from the spending. Educators must also be aware of the technology their school districts offer them, and how they can continue communicating through the proper channels to secure further products and support. Secondly, teachers must transform their teaching with this new technology and reflect on their practices (Bauer & Kenton 2005; Sutton, 2011). In addition, teachers must be prepared to integrate these mandates in front of a younger generation who find themselves saturated with technology, but have little need for focusing on anything academic.

Teachers seem fearful across the country of technology implementation in the midst of being held higher standards. Technology integration in New York State is a focus in the newly created Annual Professional Performance Reviews, or APPR, that each school district has been given the task to execute. By incorporating technology into their lessons, teachers may receive a higher rating on their APPR, however, this alone is not a major motivator to integrate technology within their own classroom. Teachers also feel pressure from colleagues, parents, and adjacent school districts to be "ahead of the game." When teachers see other teachers incorporating new ideas and technology within the classroom to better their students and their students' learning, many teachers see this

as pressure to “stay up with the times” and “up to speed” on the newest educational strategies.

A lack of understanding on the part of some teachers on how to use technology in the classroom has resulted marginal impact on academic performance with overwhelming technology dollars. According to Sinclair (2009), one factor that must be present in order for technology to have a positive effect on learning is clear and measurable objectives. Prior to the implementation of any technology in curriculum, teachers and students should be aware of why the technology is being used and how it will help meet educational goals and objectives (Sinclair, 2009). This will ensure that the technology is used its fullest potential. Just because technology is available to schools does not mean it should be thrown into the teachers’ repertoire of strategies. It needs to be used to support teachers and students in reaching learning goals that were not obtainable or as easily obtainable without the technology. According to Sinclair (2009), technology will be successfully incorporated into the curriculum if the knowledge and competency level of the teachers, especially teachers who teach others to use technology within the classroom (Sinclair, 2009).

It is also vital to have effective and meaningful communication between teacher and administrators to take full advantage of technology. Administrators need to understand how to use the technology and how it influences teachers’ instruction (Szuba , Rodgers, and et al). On the other side, teachers can voice any concerns to increase their level of comfort with using the technology offered to them. However, it is not just the communication that is the issue. “[T]here is growing concern that teachers are not

engaging with these new technologies" (Honan, 2010, 179). Proper training will also increase the probability that the teachers will incorporate technology into their curriculum (Honan, 2010). Teachers should be able to use the technology at near expert level, but many cannot. Instead of formal professional development for teachers, teachers often must resort to using practical knowledge and previous experience when incorporating technology into the classroom (Bordbar, 2010). According to Sinclair (2009), administrators need to consider extensive teacher training when evaluating the usefulness of technology. Otherwise, the technology will be a waste since it will most likely be misused or not used to its fullest potential (Sinclair, 2009). With technology training, teachers become more proficient in the use of technology. As teachers become more proficient, they become more confident, thus resulting in them adapting the technology to their own teaching style and curriculum, rather than simply focusing on the fact that technology is being used in the classroom (Venezky, 2004). Sinclair found that the willingness of teachers and administrators to integrate technology into the classroom and learn how to use it competently has a profound impact on the successful integration of technology. Despite these findings, Sinclair found that "those teachers who use computers as instructional tools do so infrequently and unimaginatively" (Sinclair, 2009, 46).

Recent studies reveal that the reason behind the infrequent and unimaginative use of technology in the classroom is not just because teachers are resistant to change or unwilling to incorporate it into the classroom. In actuality, teachers have three general concerns. They do not feel proficient in using the technology, do not completely

understand why the technology is being used, and they do not know the best way to incorporate it into the existing curriculum (Sinclair, 2009; Bordbar, 2010; Venezky, 2004). "…technology is used meaningfully when teachers have a good understanding of computer technology and believe that it has the power to influence learning" (Sinclair, 2009, 46). Therefore, administrators have the responsibility to ensure that teachers receive the necessary training to understand how the technology works and how it will aid in students learning process. In order to accomplish this, administrators must first provide teachers who will be using the technology with clear educational objectives, as "poorly stated educational objectives, teachers experiences and knowledge" increase the likelihood that the technology will not be utilized, or will be used improperly (Sinclair, 2009, 47).

Teachers must be provided with adequate training prior to technology integration and have continued training to ensure that all concerns are addressed and objectives are met (Bordbar, 2010; Honan, 2010; Venezky, 2004). It is with this commitment that teachers are not just given access to computers and the Internet, but are provided the time to prepare to use that technology effectively within the curriculum (Wozeny, Venkatesh, & Abrami, 2006). Overall, teachers require a sound philosophy regarding their technological beliefs and uses, and necessitate targeted professional development to help meet the needs of their diverse learners (Sutton, 2011). These philosophies should begin when the teachers, themselves, are in higher education (Sutton, 2011; Fuller, 2000). As an educator reflective practices and an interest in their professional growth leads to stronger lesson planning and delivery and should equate to more engaged learners.

The inventions stemming from multiple decades of history have drastically changed the way businesses and individuals view the world. From corporations who use current technologies on a global level, to grandparents who utilize Skype to keep in touch with their grandchildren, the technology has a way of expanding its users' horizons. Perhaps the most expanded horizons are those of students learning in classrooms around the world—computers and Smartboards are just as expected in today's classrooms as chalk and blackboards once were. Many educators and government officials have been convinced that the integration of technology into classrooms will transform education (Zuniga, 2010). The trend of government spending will only continue with the development of further technologies that will enhance student learning and achievement. With additional funds, there is no guarantee that the awareness, implementation, and usage of these new technologies will be seamless. The issues of Teacher Perception, Professional Development for Educators, and Challenges play a role in technology implementation. The research question for analyzing these issues is: *How does the availability and awareness of technology in a school building influence its usage in the classroom?* Through detailed and highly reviewed research, the answers to these questions will provide valuable insight on technology implementation, availability, and usage of technology within schools and their school districts through the eyes of teachers.

Definition of Terms

The term *technology* has been variably interpreted by researchers, and it is important to classify and define this term among others explored in this paper. For the purposes of this study, the term *technology* includes desktop computers, laptop computers, and other devices connected to such computers via a direct connection, network connection, or a wireless connection (Zuniga 2010). This includes Smartboards, ipads, and document cameras.

Technology also includes activities conducted with the aforementioned devices, including but not limited to exchanging electronic mail, conducting Internet searches, and creating multi-media presentations (Zuniga 2010).

For the purpose of this study, *technology integration* is defined as a seamless manner to support and extend curriculum objectives and to engage students in meaningful learning (Zuniga 2010).

Higher Education, for the purpose of this study, are four year institutions granting bachelors, masters and doctoral degrees.

For the purpose of this study, a *pre-service teacher* is a person who is enrolled at a higher education institution in a teacher education program (i.e Early Childhood, Middle Childhood, adolescent/youth adult, special education).

CHAPTER II: REVIEW OF THE LITERATURE

Perceptions

As new technologies enter our society, they are also becoming more and more of a factor in today's classrooms. However, simply providing access to educators does not ensure that technology will effectively enhance teaching and learning or the implementation of technology within the classroom, nor does providing access suggest that educators will make optimal use of the technology (Noeth and Volkov, 2004). With all knew things, instinctual human emotion is to be wary and to ask questions from our own perspective before being "sold" on the idea. The acceptance of new technology in the classroom is no different. The promise of technology in education is significant. Technology offers the potential of individualized instruction for every student as students become actively engaged in and responsible for their own learning (Honan, 2008). New technologies, therefore, have continued to both create excitement and cause concern for educators as they explore effective ways to use and integrate them into curricula (Walls et al., 2010). The capability to develop every student into a life-long learner is now even more achievable with developments in technology. Technology advances educators with more opportunities for learning and increases student achievement. Rapid developments in technology have provided rich sources of information and generated changes to teaching and learning for faculty in almost any discipline (Tang & Austin, 2009). However, no one can argue that the most important influence in student learning and achievement is still teacher quality. So it stands to reason that the true challenge of effectively integrating technology in education is human rather than technological. While

technology advances hold the promise of improved learning instruction, technology-focused professional development for teachers is critical if technology is truly to be used to promote learning for all students. More importantly, the use of new technology may require teachers to re-conceptualize the ways in which they teach (Georgina & Hosford, 2008). Teachers' perceptions of the effectiveness of technology also determine whether the technology will be used. According to Sinclair, the two main reasons for negative views towards technology in classroom are inadequate or nonexistent training for teachers and poor or inappropriate software. Sinclair continues by stating that there are some studies that show some teachers are unwilling and even opposed to using technology in the classroom, mainly because they do not feel competent to use it. This is due to factors such as poor teaching, inappropriate methodology and uninspired teachers (Sinclair, 2009).

Although knowledge of technology is a necessity, it is not enough if teachers do not feel confident using that knowledge to aid student learning. According to the National Center for Education Statistics only 20% of teachers consider themselves well prepared to use technology in their classes. This percentage may partially be due to confidence in using the technology. This seems to be particularly true for novice teachers. There is a significant influence of self-efficacy on novice teachers' classroom uses of technology (Ertmer and Ottenbreit-Leftwich, 2009). According to Ertmer and Ottenbreit-Leftwich, there is evidence that suggests that self-efficacy may be more important than skills and knowledge among teachers who implement technology in their classrooms. A study conducted by Bauer and Kenton found that there is a difference between the

number of technology-using teachers who rated themselves highly confident and those who rated themselves as highly skilled. Wozney, Venkatesh, and Abrami, found that teachers' technology confidence was a major predictors in determining if they could achieve instructional goals using technology. One can conclude that time and effort should be given to increase teachers' confidence in using technology to assist in student learning. This is specifically noted by Cradler, Freeman, et al (2002) who state that "considerable time for collaborative learning and practice is required for teachers to gain confidence in using technology" (52).

There are five stages that teachers go through for technology integration. These stages are: entry, adoption, adaptation, appropriation, and invention (Dwyer, Ringstaff, and Sandholtz). In the entry stage, teachers become similar with the technology. Teachers who are in this stage usually perceive technology as foreign, unreliable, and too time consuming. They express serious concerns over technology and have been labeled 'technophobic' (North & Noyles, 2002). According to research discovered by Ansell and Park (2003), "data shows that in 23 percent of schools across the country, at least half the teaching force was identified as 'beginners' in using educational technology." Laurie Dias, an instructional technology specialist for Cobb County Public Schools in Marietta, Georgia, explains that teachers do not like change. Integrating new technology asks teachers to change in two ways – adopt a new teaching tool and change the way they teach (Dias, 1999). It is often hard for teachers to accept this since many have been teaching a specific way for a number of years. Teachers in this stage often are more

susceptible to technical issues. When a new piece of technology is introduced to the classroom, most teachers fall back into this stage for a short time as they learn about it.

From there, teachers progress to the adoption stage. Here teachers become proactive towards integrating technology. Here they begin to see the value to technology and attempt to integrate in into their lessons. Although there are technical issues within this stage, teachers begin basic trouble-shooting. This is a pivotal stage for teachers. During this stage, teachers can either accept the technology or dismiss it. Technical support and training is essential in this stage. If there is not proper support, the teacher will never gain true acceptance of the technology and fully integrate it in their classroom.

The next stage is adaption. During this stage, the teacher has confidence in the technology and begins implementing it into his/her daily lessons. The fourth stage is the appropriation stage. Dias states that in this stage, "teachers' personal attitudes toward technology become the benchmark for this milestone in instructional evolution. Teachers understand technology's usefulness, and they apply it effortlessly as a tool to accomplish work."

The last stage a teacher goes through for successful technology integration, according to Dwyer, Ringstaff, and Sandholtz, is the invention stage. Laurie Dias summarizes this stage perfectly by stating:

> *Teachers experiment with new instructional patterns and ways of relating to students and other teachers. They reflect on teaching and question old patterns of instruction. Teachers begin to see knowledge as something children must construct rather than something to be transferred. Interdisciplinary project-based instruction, teach teaching, and individually paced instruction are hallmarks of this stage. Student experts surface to assist their peers*

> *and teachers with technology. Students work together in more collaborative way* (21).

Dias continues to state that in this stage teachers still need support and the best way to accomplish this is to share their experiences with the technology and even mentor other teachers. By sharing experiences and mentoring other teachers, the confidence that teachers have with technology will grow, propelling them through the entry stage and adoption stages and into the adaption stage.

Venezky's (2004) research reveals that teachers do not have to reach the invention, appropriation, or even the adaption stage. According to Venezky (2004), teachers must simply be proficient with the technology in order to utilize it properly and to incorporate it into the curriculum. Venezky's incorporates four stages of the technology integration process for teachers as follows: survival, mastery, impact and innovation. While the "mastery" stage could be translated as "expert," the mastery stage is the point in which teachers understand how to use the technology and can also teach students how to use the technology. Venezky's research supports Sinclair's (2009) findings that teachers do not have to expert technology users, but adequate training and support for teachers is critical, because it enables teachers to use the technology as a tool rather than becoming dependent on the technology, or not using it at all.

Helping teachers gain confidence with technology and level up to the "mastery" stage is no easy task. Ruiling and Overbaugh (2009) surveyed teachers to see how they implemented technology within the classroom. Their study claims that most participants were motivated to implement technology in the classroom seeing that it had a positive

effect on student learning. Teachers' perceptions of the effectiveness of technology can determine whether the technology will be used. According to Ertmer and Ottenbreit-Leftwich, the most powerful strategy to build confidence is by helping teachers gain personal, successful experiences using technology. Teachers' willingness to use technology outside the classroom is a strong indicator that they will implement technology within the classroom (Shapka & Ferrari, 2003; Baylor & Ritchie, 2002). Just as a teacher would ask students to go outside their comfort zone and try something new, so must teachers. Wozeny, Venkatesh, and Abrami confirm this notion in their research - teachers who use technology outside of the classroom for personal use are more motivated to implement technology in their classroom.

Educators who avoid technology outside the classroom are less likely to integrate it in the classroom (Shapka & Ferrari, 2003; Baylor & Ritchie, 2002). However, there are some who avoid the technology at home, but attempt to use it in the classroom. These educators, although they may not mean to, may pass their anxiety and negative attitudes towards technology to their students (Shapka & Ferrari, 2003). The changing role of the teacher perceptions and usage may be altered if the teachers see the impact of their technology integration has with student motivation and achievement. Impact of technology can be increases through the participation in professional associateions and sharing ideas with colleagues, both within schools as well as outside of schools (Cradler, Freeman, et al, 2002).

Although technology usage outside the classroom is a strong indicator, positive experiences with technology within the classroom have a profound effect of teacher

beliefs and confidence (Ertmer and Ottenbreit-Leftwich, 2009). Ertmer and Ottenbriet-Leftwich state that time is a tremendous factor in changing beliefs and attitudes towards technology. They also mention the following as factors to help build technology confidence:

- Giving teachers time to play with the technology
- Focusing on teachers' immediate needs
- Starting with small successful experiences and building to larger ones
- Working with knowledgeable peers
- Providing access to suitable models
- Participating in a professional learning communities
- Seeing the value in what the technology offers

Another concern in the perception of teachers is in regards to differences in the ways males and females view technology. Males' perceptions toward technology self-efficacy and the ease of its use are seemingly higher than that of their female counterparts. Numerous studies have indicated sex differences in computer attitudes whereby males hold more positive and less negative attitudes and females vice-versa (North and Noyles, 2002). The research literature on technology education also indicates various factors associated with gender differences and have been explored in connection to technology achievement. Many factors, in and outside the classroom, result in girls being turned away from computer technology. These factors include the media depicting men as experts in technology, societal expectations of different goals for boys and girls, the structure of learning tasks, the nature of feedback in performance situations, and the organization of classroom seating (Shapka, 2003). Because these factors are often subtle, they go unnoticed. It is little wonder why girls are not interested in computer technology.

Numerous articles have been written focusing on differences regarding technology aptitude and actual technology use (Tonduer, van Keer, van Braak & Valcke, 2008).

Gender differences in response to technology, mainly computers, have been widely reported by various experts in the educational field. Computers are also not inherently biased. However, the way computers are used can often reinforce gender bias. Parents and teachers should be sensitive to cultural biases and strive to expose both sexes to the advantages of technology. New ideas should be devised in order to promote greater gender equity in computer use and help close the technological gap between boys and girls (Shapka, 2003). Educators need to link the curriculum and technology with student interests. How females relate to technology and the value they bring to technology are often ignored or devalued in education. Once educators begin to understand how girls lose interest in technology and recognize the different learning styles of each gender, strides can be made in supporting girls and women in choosing computer-related careers and using computers as a medium of expression (Hermans, Tondeur, van Braak, & Valcke, 2008).

This alteration in perception can also take effect with the help of administrators. Baylor & Ritchie's (2002) data suggested that administrators who promote the use of technology, not only in words, but also in action help lead to a successful technology culture. By allowing, aiding, and rewarding teachers in various ways to implement technology, there will be a payoff resulting in an increase of teacher willingness and teacher morale (Baylor & Ritchie, 2002).

Ruiling and Overbaugh (2009) point out that perhaps one of the largest hurdles is for the teachers to "buy in" to the concept that while technology education drastically affects learning, teachers' own bias to the medium may affect a student's opportunity to use technology as part of their education plan. Baylor and Ritchie (2002) further intensify this. According to their study, they noted that the value of technology in schools is a challenge due to a lack of concrete understanding of how technology impacts learning, and in part to the ever evolving nature of technology. Essentially, pulling from these studies, one can conclude that teachers need to develop the skills to implement technology successfully within the classroom. If not, student learning can, and will, be affected.

As with all things, even the best laid plans can go astray. Road blocks affect our daily lives, both personally and professionally creating challenges we must overcome. To use the old adage, "there aren't enough hours in the day" seems like a cliché here, but it has merit here. Ruiling and Overbaugh (2009) state that the most serious problem in technology implementation is time. They referred to time learning new technologies, as well as issues with technical problems as a leading contributor to the disappointing technology integration in schools. An and Reigheluth (2011) second Ruiling and Overbaugh statement. 57% of the teachers surveyed perceived lack of time as a major factor in integrating technology in the classroom (An and Reigheluth, 2011). Dwyer, Ringstaff, and Sandholtz, state that it takes years for teachers to go through the five stages to integrate technology successfully. School days maintain the same number of hours, but with updates to existing programs and with new software being introduced,

there is no time to become proficient in the technology a teacher has in the classroom. Educators find it difficult to find the time to become familiar with all these programs. Even with professional development to teach our educators about new technology, there is still limited time to integrate new technologies into specific content for a grade level or department. Sinclair (2009) states that the major reasons for negative views toward technology are inadequate or nonexistent training and poor or inappropriate software. There is a time factor related to both of these issues. Time is needed to training and time is needed to determine appropriate software. However, time is hard to come by.

With No Child Left Behind and the new APPR standards, districts do not have the time to wait years for specific technology devices or programs to become effective. They are looking for immediate results. Unfortunately, there is only so much educators can do to rectify this challenge at the school level. Time is not the only challenge teachers face. The research of Bauer and Kenton (2005) support Ruiling and Overbaugh's (2009) claim. Bauer and Kenton, claim that teachers, who have the skills, confidence, and willingness to integrate technology in their classrooms do just that. However, issues beyond their control—lack of updated hardware and/or software, preparation, lesson time, and class structure—all greatly affect technology integration. According to the National Center for Education Statistics, district-level technology staff provided technical support in only 59%of schools to a major extent and only 27% to a moderate extent. Technology staff at the school level provided technical support in only 42 % of schools to a major extent and in 30% to a moderate extent (Gray, Thomas, and Lewis, 2010).

Some educators state that if there is enough time, there is not enough hardware and software for class sizes, or when the equipment is available, it is often unreliable or poorly constructed (Bauer and Kenton 2005; Ruiling and Overbaugh 2009). Since there is limited number of resources, most districts create computer/technology labs. By doing so, time becomes a factor again. Scheduling conflicts arise using the labs or the mobile technology carts. This is not to mention that due to the high demands for increased scores on mandated state tests, many teachers "scrap technology for another day." Plus, the need for teachers to have personal lives outside of school also contributes to the lack of exposure to new technologies (Zuniga, 2010). According to Hew and Brush, teachers who were willing to work longer hours to understand technology paid a personal price in burnout and an eventual exit from the school. All of this results in inadequate motivation to use technology by teachers.

Many of the participants from Shapka and Ferrari's study stated that ''exploratory learning'' was the most efficient methods for examining and understanding a new computer task or program (Shapka & Ferrari, 2003). Exploratory learning would offer teachers the opportunity to "teach" themselves the technology being presented. At the same time, teachers would be able to decide for themselves whether the technology is useful for their classroom purposes. However, from the research examined, it appears that since teachers lack the time to become familiar with technology, they do not fully understand its full potential and its influence on student achievement. This point comes full circle—when teachers are students is when they should be given a strong foundation in technology education.

Teachers who believe that they have the skills to implement technology successfully and who value the outcomes associated with integration were more likely to use technology within the classroom (Wozeny, Venkatesh, & Abrami, 2006). Those who feel that they do not have the and those who are considered to be in Dwyer, Ringstaff, and Sandholtz's entry stage using two strategies. (Wozeny, Venkatesh, & Abrami, 2006). The first strategy is by providing additional technology personnel in the school. Teachers in Wozeny, Venkatesh, and Abrami (2006) study expressed that additional technology personnel would increase motivation to use and integrate technology. Based on Fuller's recommendations, schools should have technology coordinators in the building whose job description is to help teach teachers with technology while at the same time help teachers devise, implement, and conduct lessons that integrate computers within the lesson. As a result, there was an increase in students' computer use (Fuller, 2000). However, even as the amount of technology grows within schools, there is a lack of technology staff associated with it. According to the National Center for Education Statistics, or NCES, published in 2010, 31% of public schools reported having full-time staff in the school whose only responsibility was technology support and/or technology integration. Forty-seven percent of secondary schools reported having such staff compared with 27% of elementary schools (Gray, Thomas, and Lewis 2010). Technology staff at the school level, according to NCES, helped integrate technology into instruction in only 29 % of schools to a major extent and in 34 % to a moderate extent. This is evidence that suggests that technology integration is not a top priority to technology staff.

In addition to this, the NCES report stated that, in public schools, fellow teachers, at 67%, were the ones who helped other teachers integrate technology into instruction. (Gray, Thomas, and Lewis 2010). If there were technology coordinators, as suggested by Fuller, if technology problem were to arise, personnel would be able to response quicker and more efficiently. Seeing that teaching time is precious, the additional personnel would help ease tensions that teachers have for losing instructional time to technology issues. By also having the additional personnel, there can be more opportunities for co-teaching lessons with the technology coordinators. This will allow educators who may have anxiety towards technology to become more familiar with its resources. An and Reigeluth (2011) state that time should be devoted for teachers to observe others who are successful in using technology. They concluded through their study that this would increase that teacher's confidence using the technology (An and Reigeluth, 2011). With an increase in confidence, comes an increase in usage. The second strategy to relieve tension is to create a comprehensive professional development program that is technology-focused, allowing teachers to feel more confident in their abilities, thus giving students a better learning environment. A teacher's perceptions of technology in the classroom lead to the need for successful training and implementation. Overall, teachers need to be trained to successfully implement specific technology within their context of teaching. If this is not met, then they are more apt not to use the technology in the classroom (Wozeny, Venkatesh, & Abrami, 2006). This is where professional development comes in.

Professional Development

Technology continues to play an important role in modern industrial society and integrating technology into schools will help prepare students to succeed in a rapidly changing world. Technology is transforming society, and schools do not have a choice as to whether they will incorporate technology, but rather how well they use it to enhance learning. Technology integration is also important because it supports the goals of education reform. According to the No Child Left Behind Act, there needs to be an emphasis on technology integration into the professional development of teachers, administrators, and other school staff. This Act also states that the integration of technology includes using it effectively, infusing it into the curriculum, and supporting technology literacy skill development. As a result, educators need to emphasize technology within their classrooms. However, according to Noeth and Volkov (2004) technology may have little meaning without appropriate objectives and goals for its use. It will also have little meaning without a specific, and detailed, structure for its application. The International Society of Technology in Education, or ISTE, created essential conditions that are necessary for implementing technology. These fourteen conditions are an over-arching goal for districts. One of these goals is a systematic plan ("NETS.T: Advancing Digital Age Teaching"). Trained and skillful educators and clearly envisioned plans for evaluating its effectiveness are also needed to ensure successful technology integration ("NETS.T: Advancing Digital Age Teaching"; Noeth and Volkov, 2004). In order to accomplish this, educators and community members must collaborate to create a formal technology plan. Developing a plan for using technology to support

education reform means more than providing for the acquisition of technology and its software. To be successful, a technology plan must promote meaningful learning and collaboration, provide for the needed professional development and support, and respond flexibly to change. To realize the benefits of technology, schools must develop a plan for integrating technology into the curriculum. Schools that are successful in integrating technology into the curriculum are often guided by a comprehensive technology usage plans, or TUP (Baylor & Ritchie, 2002,).

An effective technology plan is based on the shared vision of educators, parents, and community members (Tonduer et al., 2008). It ensures that technology strengthens existing curricula and supports meaningful, engaged learning for all students. It also specifies how the technology will be paid for and how its use will be supported. The plan for integrating technology into the school is also based on the school or district's educational vision and is part of an overall school-improvement plan (Baylor and Richie). Schools that effectively use technology have a carefully designed technology plan that is a part of the overall school-improvement plan. It is important to understand the contributions that teachers make in supporting or inhibiting the integration of technology in the classroom (Mueller, Wood, Willoughby, Ross & Specht, 2008). According to Mueller, a technology plan that is not integral to the overall improvement plan is likely to be short-lived. It is a tool for improving and ultimately transforming teaching and learning. To accomplish its job, technology must be an integral part of the school or community's overall plan to move all children toward higher academic standards. Sadly, some findings indicate that school policies are underdeveloped and underutilized

(Tonduer et al., 2008). However, some states, according to Noeth and Volkov (2004), have taken steps to provide guidelines for how to use educational technology more effectively; and 80% have developed standards for teachers and administrators that include technology. Although the standards are present they must be implemented and given time to foster effective learning in classrooms. Within a schools technology plan, professional development needs to be specifically stated. Teachers are required to participate in professional development opportunities throughout the school year to refine, finesse, and keep current the skills they have accumulated over their careers. It is also geared towards introducing educators to new ideas, strategies, and concepts. Technology needs to be a centerpiece of professional development days.

Multimedia education today involves more than one medium for the organization, information exchange, and interactive aspects of the learning experience (Tang & Austin, 2009). The current emphasis is on ensuring that technology is used effectively to create new opportunities for learning and to promote student achievement. It requires the assistance of educators who integrate technology into the curriculum, align it with student learning goals, and use it for engaged learning projects. The primary task of technology infrastructure is to support both instructional technology and student learning (Georgina & Hosford, 2008).

According to Yoon et al (2007), professional development affects student achievement through three steps. The following is an excerpt from her findings:

> *First, professional development enhances teacher knowledge and skills. Second, better knowledge and skills improve classroom teaching. Third, improved teaching raises student achievement.*

> *If one link is weak or missing, better student learning cannot be expected. If a teacher fails to apply new ideas from professional development to classroom instruction, for example, students will not benefit* (4).

Lack of professional development for technology use is one of the most serious obstacles to fully integrating technology into the curriculum. According to the Parkay and Hardcastle, the No Child Left Behind Act mandates states to allocate 25 percent of federal technology dollars to staff development. This act also states that the impact of professional development on the effective integration of technology into curriculum and instruction be documented. Some states report that the funds provided to them by No Child Left Behind are the only funds available to them for technology (Parkay and Hardcastle, 2010). As of right now, most of their technology dollars are funding the constant change in hardware and/or software along with their improvements (Ansell and Park, 2003). Staff development is expected to receive 15 percent of most schools' technology budgets (Ansell and Park, 2003).

No Child Left Behind also plugs parents into the equation for technology. NCLB states that there should be technology training and accessibility for parents so that they can support their children in their academic growth. According to NCLB, electronic data should be available to parents. One can conclude that educators will need to be able to successfully enter their students' data into computers allowing for parents to view it. One can also conclude that the educators will need to instruct parents on how to access their children's data. How can an educator successfully do this if they do not use technology in

their classroom since they see technology as a burden or they do not have the specific training or experience to input the data?

ISTE developed the National Education Technology Standards, NETS, and performance indicators for teachers. According to NETS, teachers should be able to demonstrate a sound understanding of technology operations and concepts, plan and design effective learning experiences through technology, maximize student learning by including various technological methods and strategies, and use technology to enhance their productivity and professional practice. The ISTE recommends that teachers be assessed on their technology literacy (Szuba , Rodgers, and et al, 2005).

The Fairfax County Public Schools, located in Virginia, adapted the ISTE standards eight teacher technology competencies divided into two competency skill areas: standards 1-4 focusing on operational technology and standards 5-8 based on technology integration (Szuba , Rodgers, and et al, 2005). The most frequent way teachers in the Fairfax County Public Schools meet the operational standards is by taking professional level technology courses, preparing a portfolio, or taking an operational skills test (Szuba , Rodgers, and et al, 2005). To satisfy the integration standards, teachers can complete coursework, serve as a technology course instructor, prepare a portfolio, or give a presentation at a conference. The Forum Unified Education Technology Suite, developed through ISTE, used the Fairfax County Public Schools as an exemplar for offering many resources and training opportunities to help employees meet the challenging technology standards. These resources include school-based technology specialists, district-

sponsored classes, and computer-based instruction available on both CD-ROM and the Internet (Szuba , Rodgers, and et al, 2005).

However, professional development is also important to administrators as well. They can benefit from understanding and proficiently using technology as they set goals for a school or district. According to Szuba, Rodgers, and et al, by having administrators experience technology as a hands-on helps them understand the process of change that students, teachers, and staff must undergo when integrating technology. The Forum Unified Education Technology Suite developed by NCES, states standards for administrators. It is referred to as the Technology Standards for School Administrator, or TSSA. These standards are broken down into six components that are listed below:

- *Leadership and Vision*: Leaders inspire a share vision for integrating technology.
- *Learning and Teaching*: Leaders ensure that curricular design, instructional strategies,
  and learning environments integrate appropriate technologies to maximize learning and teaching
- *Productivity and Professional Practice*: Leaders apply technology to enhance their professional practice and to increase their own productivity and that of others.
- *Support, Management, and Operations*: Leaders ensure the integration of technology to support productive systems for learning and administration.
- *Assessment and Evaluation*: Leaders use technology to plan and implement systems of effective assessment and evaluation.
- *Social, Legal, and Ethical Issues*: Leaders understand the social, legal, and ethical issues related to technology and model responsible decision-making related to these issues

The Utah Department of Education's Technology for Principals Leading Utah's Schools, or T-PLUS, project is an strong example of the state's assessment of administrator technology proficiency. It sets four primary goals and twelve objectives.

The following four goals are stated in the Forum Unified Education Technology Suite developed by NCES:

- Identify and critique technology-supported learning environments that address instructional or performance improvement goals.
- Oversee and manage a technology-integration project team and its process, including providing for relationships among all stakeholders
- Develop and justify strategies and tactics for introducing and integrating new technology tools and techniques based on change theory or a change model.
- Design and complete an action research project either individually or collaboratively with one or more other participants. The project will be field-based, data-driven, and reflective of outcomes based on a technological intervention

Professional development is needed in order to meet these technology standards. However, according to the National Center for Education Statistics the percentage of teachers that reported spending zero hours on professional development for educational technology in 2008 was 13%. Fifty-three percent of teachers spent 1 to 8 hours on professional development for technology, 18% for 9 to16 hours, and 9% for 17 to 32 hours (Gray, Thomas, and Lewis 2010). Only 7% of teachers spent 33 or more hours on professional development in 2008.

When professional development is offered the quality of the hours must be evaluated. Professional learning opportunities for educators seem to be inconsistent, and in many districts and schools these opportunities do not meet the needs of teachers. The National Center for Education Statistics reported that 66% of teachers in 2000 who received more than 32 hours of technology related training felt well to very well prepared to use technology in their classrooms. The percentage who felt well to very well prepared to use technology dropped to 34% for those who received 9 to 32 hours and to 24% for

those who received less than 9 hours of technology-related professional development. In a more recent study conducted by Wolf (2012), only 59 percent of teachers reported that professional development in their content areas was useful, and fewer than 50 percent found professional development in other areas, such as technology, to be useful.

According to Yoon et al (2007), the first step to professional development is to make sure it is "of high quality in its theory of action, planning, design, and implementation" (4). In the second step, Yoon states that "teachers must have the motivation, belief, and skills to apply the professional development to classroom teaching supported by ongoing school collaboration and follow-up consultations with experts" (4). However, many professional development days, sessions, and/or workshops are mandatory and ultimately, do not satisfy Yoon's second step. When technology-related professional development is instituted, they are often for a day, and some even just an hour to two sessions (Georgina & Hosford, 2008). But traditional training sessions and singular workshops have not been effective in making teachers comfortable with using technology or proficient at integrating it into their lesson plans. There are many approaches and strategies for faculty training. Technology literacy training should be uniquely individual and departmental cultures should also be considered before training begins (Georgina & Hosford, 2008). Instead, a well-planned, ongoing professional development program that is tied to the school's curriculum goals, designed with built-in evaluation, and sustained by adequate financial and staff support is essential if teachers are to use technology appropriately to promote learning for all students in the classroom. According to Cradler, Freeman, et al (2002), teachers need to be mentored on how to

integrate technology. This will allow them to observe and work with technology based on the standards based curriculum and then incorporate it into their own classroom (Cradler, Freeman, et al, 2002).

Yoon et al., (2007) conducted studies of professional development in the effort to determine how much time is necessary for an impact on student learning. It is safe to assume, the more time spent on a specific area, like technology, the better the result and ability to use it. However, Yoon concluded that if teachers participated in less than 30 hours of professional development, then there were no significant effects on student learning. Conversely, if teachers ranged between 30 and 100 hours, with an average of 49 hours, there was a positive and significant effect on student achievement. Yoon et al., (2007) National Center for Education Statistics also reported the following statistics of the teachers who participated in technology-related professional development in 2008:

- 81% agreed that it met my goals and needs
- 88% agreed that it supported the goals and standards of my state, district, and school
- 87% agreed that it applied to technology available in my school

Linking Yoon's study with the statistics confirmed by NCES in 2008, very few teachers are receiving the quality, and optimal number of professional development hours for technology.

According to the study of Baylor and Richie (2002), the value of technology in schools is a challenge due to a lack of concrete understanding of technology itself and of how it impacts learning. Therefore, professional development for teachers has become a

key issue in using technology to improve the quality of learning in the classroom. According to An and Reigheluth, 35% of the teachers they surveyed stated they limit their technology within the classroom because they have a lack of knowledge about specific pieces of technology. The lack of professional development hinders teacher's abilities to fully integrate technology into the curriculum. Traditional training sessions and singular workshops have not been effective in making teachers comfortable with using technology or proficient enough at integrating it into their lessons (Sutton, 2011). Many professional development programs are too broad and no subject specific. According to one teacher through an interview conducted by An and Reigeluth (2011), "Most of the professional development we have is to merely teach us how to use the specific system, and any examples that they give us are so broad it is hard to target it to one specific subject area" (59). Teachers need to be specifically taught how the technology fits into a subject and how it can benefit them in teaching the curriculum as well as achieving student success.

Baylor and Richie (2002) confirm that "teachers need prolonged exposure to new ideas and skills before there is a change within the classroom" (4). A study conducted by Brunner (1992) found that "for teachers to feel in command of educational technologies and to know when and how to use them, it can take as long as five to six years" (Brunner, 1992, 6). Most professional development programs do not offer prolonged development. Professional development subjects changes from year to year. When a program is offered, such as technology, the information is crammed into short sessions and all at once. There

is little or no time to practice and thoroughly learn what is being presented to them. (An and Reigeluth, 2011).

There are many approaches and strategies for faculty training. Technology literacy training should be individualized and provide teachers with the skills that they need for success (Wozeny, Venkatesh, & Abrami, 2006). Of the study conducted by Zuniga (2010), the biggest contributing factor for a lack of technology integration was training. The participants in Zuniga's study felt that the training that was offered through their school district was limited, inadequate, too basic, and "centered on the use of software as opposed to the actual integration of technology programs within the classroom" (Zuniga, 2010, 7). The following are comments from teachers during interviews with An and Reigeluth (2011):

> *"[Professional development programs] are geared towards new users… so many times I find myself bored or attending something that I have already prior knowledge of, or have been using already"* (59).

> *"The problem with our professional development is that many times we have had to attend technology training for technology that we do not have in the classroom yet"* (59).

> *"Right now, all teachers are thrown into the cafeteria together to all learn the same thing during our in-service. That really doesn't work. What English teachers need to learn is different from the Computer Teacher or the Art teacher needs to know…but the district doesn't want to spend the time or money to train small groups. They prefer the 'one size fits all' mentality"* (60).

A well-planned, ongoing professional development program that is tied to the school's curriculum goals, designed with built-in evaluation, and sustained by adequate financial and staff support is essential if teachers are to use technology appropriately to promote learning for all students in the classroom (Baylor & Ritchie, 2002). So what do school districts need to do in order to improve the professional development with technology? The three biggest improvements, according to An and Reigeluth, is to extend the length of professional development, allow for hands-on practice, and be subject-specific. An and Reigeluth (2011) also state that allowing teachers to observe others who are successful in using technology. By doing so, a teacher not familiar with the technology with gain how-to information as well as increasing that teacher's confidence using the technology (An and Reigeluth, 2011). Overall, to reach the goal of preparing teachers for effective technology use, a well-designed professional development program is essential. Professional development in a technological age requires new definitions and new resources. Investing significant resources and money to provide an array of educational training types are beneficial to schools. (Walls et al., 2010). With adequate support professional development can be viewed as an ongoing and integral part of teachers' professional lives. Two requirements help ensure the success of professional development for effective technology use. First, well –designed professional development should be an integral part of the school technology plan or overall school-improvement plan (Baylor & Ritchie, 2002). Second, the professional development should contain all the necessary components that research has found to be important. School policies play a significant role as technology related factors can be connected to

school improvement are a degree of tech training received (Tonduer et al, 2008). With adequate support professional development can be viewed as an ongoing and integral part of teachers' professional lives.

Some districts are looking past professional development and into another realm of training. Ansell and Park (2003) reported for Education Week that some states have adopted technology requirements for teachers with initial certification. They continue to state that several states require technology training or coursework for teachers. When Ansell and Park's (2003) published their findings, thirteen states require teachers and/or administrators to complete coursework related to technology. Of those thirteen, nine states require them to pass technology-related assessments and seven require technology training or coursework for teacher or administrator recertification (Ansell and Park, 2003).

Higher Education

Because technology continues to play an important role in society, integrating technology into schools will help prepare students to succeed in a rapidly changing world. Technology integration supports the goals of education reform. To ensure that technology is effectively integrated into the schools, educators once again need to look at the teachers and their background (Sutton, 2011). According to Sutton (2011), teachers need to be exposed to new technologies earlier in their teaching careers in order to have a strong understanding of the impact it has on learning. According to Ansell and Park's analysis of previous research, only "42 percent of novice teachers report feeling well or

very well prepared to use computers for instruction in their first year of teaching." To help adjust this percentage, an examination of colleges and universities need to be conducted. It is college and universities place to introduce and train teachers on the newest available research and value on specific strategies that increase student motivation and learning (Sutton, 2011). School districts and administrators would prefer new teacher hires who are already in either Dwyer, Ringstaff, and Sandholtz's adoption or appropriation stage rather than an entry stage.

To help solidify the importance of technology in colleges and universities, the standards, or NETS, created by ISTE were approved by the National Council for Accreditation of Teacher Education, or NCATE, in the hopes of aiding school improvement. (Eunjoo, and French, 2004). One of the purposes of NETS for teachers is to enable teacher education programs to promote the use of educational technology to facilitate personal and professional development ("NETS.T: Advancing Digital Age Teaching"). Performance indicators for each standard measure the necessary skills and knowledge accomplished by students. Since the NETS have been adopted by NCATE, those standards have been widely used throughout the nation to guide colleges and universities in application of technology in the educational process (Eunjoo, and French, 2004). According to the ISTE report published in 2002, 43 of the 50 states have adopted, adapted, aligned with, or referenced the NETS as official state documents (Eunjoo, and French, 2004).

With the demand of pre-service teachers in regards to course load, adding technology can seem impossible. To begin with, pre-service teachers enter colleges from

various educational background experiences and possess broad levels of technology competency. Bowling Green State University, who graduates the largest population of pre-service teachers in the state of Ohio, has approached the challenge technology competencies by implementing a mandatory technology skills assessment for all incoming teacher education majors (Banister and Vannatta, 2006). The Assessment of Technology Competencies, or ATC, is administered as a mandatory component of an introduction to education course which are accomplished in the first year of the teacher preparation program (Banister and Vannatta, 2006). According to Banister and Vannatta's research, students would be expected to use technology throughout their general education courses based on the ATC. However, this is not the only technology that is asked of pre-service teachers. They also are required to take an advanced technology integration course during their junior year that focuses on the use of technology to support academic content (Banister and Vannatta, 2006).

Technologies can provide powerful tools for student learning, but their value depends upon how effectively teachers use them to support instruction in the content areas. Tang and Austin (2009) concluded that it is not the technology itself that contributes to the learning effectiveness of students. Rather it is the instructional implementation of the technology. Recent studies on the integration of technology suggest that pre-service teachers need to "experience effective applications of technology for teaching and learning, if they are going to use them in their own classrooms" (Eunjoo, and French, 2004). Professors need to not just introduce new technologies to their students, but fully implement them into their instruction. One study conducted by

Downes focused on the influence supervising teachers had on per-services in regards to technology. Downes concluded that supervising teacher's use of computers within the classroom positively impacted pre-service teachers. When they became first-year teachers, they were more likely to use computers in their classroom (Downes, 1993).

Hew and Brush concluded in their study of pre-service teachers that university assignments required the use of technology, however, many participants indicated that they had a lack of technology knowledge and technology integration techniques. Hew and Brush found through their research that the university they studied require technology and they prepare pre-service teachers with lower-level technology skills. However, the university does not provide pre-service teachers with sufficient knowledge to support technology-based instruction. These results also indicate that current technology preparation of pre-service teachers in their university classes failed to demonstrate meaningful methods for integrating technology within a curriculum (Hew and Brush, 2008). The overall findings of Hew and Brush indicate that the technology skills of pre-service teachers are somewhat low. They also conclude that universities should identify prerequisites and instructional objectives for teaching technology skills and ways to integrate them into schools. Cradler, Freeman, et al (2002) suggests that faculty in colleges and universities should reduce their course loads in order to learn to integrate technology successfully into pre-service teacher activities and assignment.

The Center for Applied Research in Educational Technology, or CARET, conducted a survey and focus groups for educators to about the most effective strategies for planning and delivering professional development to teachers and then ranked them.

The second highest ranking topic, after student learning, was professional development related to the use of technology (Cradler, Freeman, and et al, 2002). CARET discovered that there needs to be a transformation with higher education. There their research, CARET states on page 51 in their study titled "Research Implications for Preparing Teachers to Use Technology" the following:

- College faculty should be required to use technology in their courses as a learning and teaching tool.
- Pre-service elementary teachers learn technology integration strategies by working with and observing practicing teachers and students while they use technology.
- Technology use in K–12 classrooms increases if pre-service teachers use technology in their pre-service course assignments and activities
- Schools of education can model best practices for new teachers by preparing their faculty to infuse technology throughout the curriculum
- Education faculty should integrate technology applications into pre-service teacher assignments and field activities so that new teachers have opportunities to acquire technical skills and practice instructional strategies.
- For their practice teaching assignments, pre-service teachers should be placed with teachers who are exemplary users of technology.

There are only a few programs within the United States that provides per-service teachers time to be hands-on and comfortable in technology. For example, Boise State University requires their per-service teachers to complete fifteen hours of technology field work in a public school with a teacher who has successfully integrated technology into their curriculum (Parkay and Hardcastle, 2010). Although this may help pre-service

teachers to become more knowledgeable, an examination of college and university professors are needed. Tang and Austin (2009) focused on general perceptions of four objectives (enjoyment/fun, learning, motivation, and career application) across five teaching technologies (Projector, PowerPoint, Video, the Internet, and Lecture), professors' effectiveness in using these technologies, and students' self-reported GPA. Enjoyment and learning objectives must be infused within one another in order to achieve greater success. Tang and Austin (2009) confirmed mean scores which revealed that video conveyed the highest amount of "Enjoyment" for students with PowerPoint providing the highest amount of "Learning and Motivation." If professors do not incorporate these types of technologies within their classes, there overall teaching effectiveness is compromised. It appears that there is a correlation between professors and their students and grade school teachers and their students. The use of new technologies within the classroom positively affects the teaching effectiveness. Based on Tang and Austin (2009) research, the integration of new technologies result in an increase of motivation and increased students learning.

Professors need to use a different mix of technologies in the classroom and use them creatively in order to promote the most learning for students while at the same time satisfy students' learning needs and objectives. Sutton's (2011) conclusion mirrors these two conclusions. By weaving in various types of technology, teachers will be presented with authentic learning experiences which will allow them to become more familiar and thus more willing to use technology in the future (Sutton 2011). Cradler, Freeman, et al, 2002 states that by allowing pre-service teachers to work in groups ranging from eight to

twelve on course assignments, those pre-service teachers will not only work together, but increase their willing to work with technology.

There is data to support the idea that pre-service teachers' perception of faculty modeling of technology significantly affected their intent to use technology (Kim, Jain, Westhoff, & Rezabek, 2008). By watching a faculty member use technology and noticing all the valuable tools and its effectiveness, pre-service teachers are more apt to use the same technology within the classroom. If it wasn't for modeling in this research, the pre-service teachers may not have felt so strongly in using technology when they have a classroom of their own. This shows that teacher modeling can truly change perceptions and have an impact on pre-service teachers.

Georgina and Hosford's surveyed 237 professors from sixteen universities and discovered that almost 95% of those professors replied "yes" to the question: does your university offer faculty technology training? However, as when Georgina and Hosford asked to what extent the professors attended the training, only 7% claimed that they attended to a very great extent. 50% stated that they attended to some extent. Georgina and Hosford concluded that the low attendance may explain why over 33% of professors surveyed preferred to teach in a traditional classroom without the integration of technology. No wonder why pre-service teachers will enter their own classroom being somewhat technology illiterate.

Sutton stated that, although there is technology implementation in technology specific classes, these classes are far and few between. Many colleges and universities only require one technology class (Sutton, 2011). With the number of new technologies

available, each type of technology is discussed so briefly and at such a demanding level that there is inadequate retention and transfer when these students become teachers. Participants in Sutton's study rarely had the opportunity to experience technology that could enhance instruction in the particular areas they were teaching. College and universities need pre-service teachers to be exposed to these new technologies in a more in-depth and meaningful way that allows them to successful implement the technology within the classroom (Sutton, 2011).

Chapter III: Original Research

Introduction

Colleges and Universities are often thought of as being the most prestigious educational facilities, combined with legacy statuses, and alumni funding to keeping their schools relevant and competitive. It has long been understood that there is a hierarchy in a person's educational path in life where each grade subsequently builds on the other, developing newer skills and honing others previously learned. Once students reach high school their transcript, coupled with SAT and ACT scores, provide them with a possibility to land placement in the institution of their choosing. That academy is the final step in terms of preparation for specified skill sets to match job and marketplace demands. One skill that has become universally accepted into all workplace environments, and has even gained a poll position on resumes, are technological skills and the automaticity in using them. School districts, therefore, are often pressured to spend tax payer money on purchasing technology software and hardware, implementing

proficiencies into their curriculums, providing teachers with the professional development to implement competences into lessons, and competing with the social media driven society students find themselves involved in daily. Colleges/universities are supposed to be in alignment with public schools in order to communicate their needs necessary for success by the time they reach their undergraduate work. They expect students to arrive with this background knowledge, and their own hardware and software to actively participate in classes, link to assignments and classmates through the worldwide web, and meet digitally structured deadlines. Upon investigations into the vertical articulation between technology preparedness and usage between high school and the college level, it can be derived that although there are some commonalities in terms of computing knowledge and machinery, school districts far surpass technology usage, preparedness, and integration into academic and real life skills than colleges.

SUNY Geneseo

SUNY Geneseo is a University College of the State University of New York. It is located in the Village of Geneseo in Livingston County, NY. The campus is situated on 220 acres, just a short drive from Rochester and Buffalo. It is one of the most selective public colleges in the country with an enrollment of roughly 5,500 students – over 800 of which are undergraduates in the School of Education. As a result, education is the largest major within the college. Among undergraduate institutions, the College ranks in the top 10 nationally in the number of alumni with doctorates in STEM fields. Overall, SUNY Geneseo is a school to have original research compiled on it because of its moniker as a "teacher preparation school" known throughout Rochester. A 2013 edition of Best

Colleges in Regional Universities conducted by U.S. News and World Report, SUNY Geneseo ranked number one in colleges and universities as the best undergraduate teaching institution in the northern region of the nation and ranked number 2 for top public colleges (("SUNY Geneseo - U.S. News Best College Rankings"). The U.S. News & World Report rankings have been published for many years and Geneseo has consistently appeared among the top fifteen schools in the college's categories. The survey report, conducted in Spring 2012 was based on receiving the most votes from top college administrators as paying a particular focus on undergraduate teaching ("SUNY Geneseo - U.S. News Best College Rankings"). Geneseo website shared a published article in which SUNY Geneseo ranked 11th out of 100 colleges in a report of the most selective colleges in western N.Y, Eastern Ohio, and Western Pennsylvania.

SUNY Geneseo promotes itself in various media forms and is thought to have a well-rounded approach to technology and its usage throughout their campus. They contribute to media through the efforts of advertising on television and using social media. The college has a mobile site for prospective and current students to navigate for information, and the site was formulated to be easy to use and offers the same information that is presented on its website. The educational institute is connected to Facebook and as of July 2013 have 14,536 likes. They also have a Twitter account which currently has 952 followers since July 2013. Geneseo's technology staff posts media updates, recognitions, and various news and events on a regular basis using these two social media mediums. The college's actual website is developed to be organized, inviting, and allows visitors easy access to the majors, departments, programs, and

information. However, through a closer examination, a visitor looking for more specific information, especially in the realm of technology availabilities will have a more difficult time locating specific information. Most times, specific information could be obtained by inputting a query into the search box located in the top right hand corner of the main page. SUNY Geneseo is one of the many college websites to provide a plethora of information, however, locating that technological information proved difficult.

When exploring the Geneseo website in the hopes of locating technology not only within the campus itself, but in the School of Education, one of the first news articles to surface was an article regarding the school's reaccreditation. SUNY Geneseo has just reaccredited themselves for an additional seven years by the National Council for Accreditation of Teacher Education (NCATE). According to a news report published in May 2013 on Geneseo's website, NCATE's "decision indicates that the school meets rigorous standards in all categories set forth by the professional education community and assures the public that graduates have acquired knowledge, skills and dispositions necessary to help all students learn" (Irwin). The article continues in stating:

> *In their report, the NCATE team praised the School of Education for promoting a culture of collaboration and "can-do" spirit. Teacher candidates were recognized for their content expertise, their outstanding pedagogical knowledge and skills, and their deep and sustained commitment to volunteerism. Faculty members were praised for their scholarly work including recent publications and presentations at state, national, and international conferences and their dedication to the local educational community* (Irwin).

It is important not note, however, that in May 2013, SUNY Geneseo's website indicated that NCATE made three recommendations for improvement. These

improvements were enhancing their assessment system, a more focused clinical experience for graduate multicultural education majors, and increased opportunities for students to work with diverse faculty members. In response to NCATE, Geneseo's School of Education faculty are participating in various initiatives to revise programs, including a new vision for teacher preparation at SUNY Geneseo which are based in technological roots.

> *Young teachers are similar to their students in that they have grown up in a world where laptop computers, cell phones, and handheld gaming devices are commonplace, and homes are filled with computers, TVs, digital video recorders, and game consoles. They are as comfortable interacting with digital devices and accessing the Internet as their students are. Still, this does not mean they understand how to use the technology of their daily lives to improve their teaching practices. Helping them develop this understanding is the job of pre-service teacher preparation programs* (National Technology Plan, 44).

A 2011 document "Title II: Higher Education Act Report" insists that SUNY Geneseo does the following:

- Integrates technology effectively into curricula and instruction
- Uses technology effectively to collect data to improve teaching and learning
- Uses technology effectively to manage data to improve teaching and learning
- Uses technology effectively to analyze data to improve teaching and learning

After further quarrying about the NCATE reaccreditation, a document dated January 16, 2012 stated that NCATE highlighted Geneseo for their lack of technology. Within that same document, Geneseo's way of addressing this issue is through "the mandated laptop program, increased visibility of open labs, use of ANGEL for course support, Smartboards in classrooms, on-line classes, student teaching technology seminars, and the development of internet communities" (IR Chart, 2). It is with the NCATE report's

recommendations and Geneseo's responses that further research on how technology currently plays within SUNY Geneseo, in particular the School of Education, bears expanded scrutiny.

Geneseo's website, geneseo.edu, was a stepping stone in examining all of the technology related affairs within the college. One of the first experiences of technology can be found prior to entering the School of Education. In order to gain acceptance into the School of Education, students are required to complete an application for acceptance. Within this application, technology is stated once – under proficiencies. It states that candidates use appropriate technologies to enhance instruction and promote active learning ("Application Process"). Once completing the application, prospective students are required to sign below the statement that reads "I have read, understand, and will strive to develop the proficiencies and dispositions of the Undergraduate Conceptual Framework of the Shear School of Education at SUNY Geneseo" ("Application Process," 7).

There is only one class that mentions technology as a required class for all majors, but technology is not mentioned in the course description. According to a August 2007 memorandum between Geneseo and the State University of New York, "the College has incorporated technology training into each section of INTD 105, the General Education writing course required by all first year students. Student competences in information literacy are assessed annually through this course ("State University of New York at Geneseo and the State University of New York," 17). Going back into the course description of the course, it states:

> *Writing Seminar is a course focusing on a specific topic while emphasizing writing practice and instruction, potentially taught by any member of the College faculty. Because this is primarily a course in writing, reading assignments will be briefer than in traditional topic courses, and students will prove their understanding of the subject matter through writing compositions rather than taking examinations. Required of all freshmen. Prerequisites: Enrollment limited to freshmen.* ("Course Offerings").

One may assume these competencies may revolve around typing and communicating through the college e-mail or myCourses system, but without data specifically from the college, professors who teach this class, and/or students who attended the class, it is unknown to the level of technology integrated into the course.

After discovering the admission application, a further study of SUNY Geneseo's School of Education Conceptual Framework unlocked the following within the school of education:

> *"Our teacher candidates have a deep and broad understanding of knowledge, skills, and tools of inquiry in the liberal arts and sciences, including the use of technology, which supports an appreciation of the process of learning for its own sake and the ability to thrive as reflective citizens and teachers. They foster technological literacy in their students and integrate technology into their classroom curricula and professional practice"* (7).

This statement makes a candidate believe that technology is an essential element in preparing teachers for the classroom educator and their students. However, the truth of the matter is that teacher candidates within the School of Education at Geneseo have limited opportunities to learn classroom technology within their requirements to graduating. Out of the 17 required education courses for either childhood and/or special education, only two classes mention technology. The first class is Teaching Science and

Math to Children, known as CURR 316 in the course offerings book. Within its description states the following:

> *"This course covers contemporary teaching/learning strategies for mathematics and science instruction in early childhood and elementary classrooms. Instructional techniques integrate hands-on learning, manipulatives, the student's environment, functional uses of mathematics and science, and assessment strategies appropriate for all students. The focus will be on the nature of children's science and mathematics learning, the teacher as a facilitator of meaningful learning, and New York State and National Learning Standards for science, mathematics, and technology. Constructivism, the idea that individuals must build knowledge from their own experience and thought, provides an underpinning for insights into the nature of children's learning in the life and physical sciences and in mathematics. Includes field trip component"* ("Course Offerings").

Within this description, technology is only mentioned in conjunction with the New York State Standards. The description does not mention the fact that technology taught within the classroom. However, within one syllabus, technology is mentioned:

> *Student Use of Technology*
> *Describe how you will integrate the student use of technology use into your lesson – include the hardware/software you will use and describe how you will have the students use it. You do not necessarily need to demonstrate this in class, but it must be included as part of your plan* (Rommel-Esham).

Students who are required to take this class need to be familiar with educational technology and be able to describe how the students will learn it—but they do not need to demonstrate it practice. With that being said, this is only one syllabus for this particular class and used by a specific professor. No other syllabi from other professors were able to be located on the Geneseo website. Pre-service teachers, therefore, only need to be aware of technology without knowing the various types of hardware/software and how it can be

used for student achievement. It is vital for pre-service teachers to experience technology themselves and through the hands of faculty and cooperating teachers, not just a simple search on the internet to fulfill their requirements.

The second required class for education students at Geneseo is EDUC 326, or Classroom Management in Elementary School. The following is the description of the class in Geneseo's course offerings book based online:

> *This course provides knowledge of different approaches to establishing and maintaining well-managed classrooms as well as understanding of the core values underlying different approaches. Through case analysis, role playing, cooperative learning, use of technology, and simulated practice, students will learn how to apply principles of classroom management to actual teaching situations. Students also will learn how to organize a learning environment that minimizes management problems, how to avoid or overcome communication roadblocks, and how to respond to persistent, difficult behaviors* ("Course Offerings").

This class specifically mentions technology within the classroom, but only for behavioral management purposes. In addition to this, the class discusses a wide range of other aspects of behavioral management besides using technology. In other words, technology is not a focal point and will only be touched upon rather than an in-depth look at how it can be effective in the classroom.

It is important to note, however, that these are not the only courses that a student attending Geneseo can take regarding technology. Students are limited to only one other class that specifically discusses classroom technology. This class is EDUC 327, or Computers in Education. The course description for this class is as follows:

> *Designed as a survey of the various ways computers are employed for instructional purposes. Emphasis is placed on use of computers to*

> *teach the various skills and content areas and to manage instruction. Prerequisites: CURR 213, EDUC 214, or permission of instructor. Credits: 3(2-2) Offered when demand is sufficient* ("Course Offerings").

This sounds like an influential and vital class pertaining to technology integration. The drawback is that it is only offered when the demand is sufficient. There should always be a demand for this class, but it is not promoted by the school at length. Locating the course description was difficult because there was no up-to-date description. The last update was from an old course catalog dating back to the 2009-2010 school year that was found through a Google search. When clicking on the provided link, there were no details or connection to further sources.

When continuing to review Geneseo's Conceptual Framework, the following regarding educational technology was discovered:

> *"Technological literacy is critical in its role in collecting, analyzing, reasoning, and interpreting quantitative data and in fostering active learning. Technology in its many forms has come to be an integral part of the educational experience of all students. In addition to the vocational importance of fluency with technology, there is evidence that students are motivated by creative technological applications. Technology also plays an important part in addressing students with disabilities and individual learning styles. It provides students and teachers with access to varied learning materials and it serves as a key communication tool. Geneseo encourages students to explore and adapt technologies to use as tools of analysis, expression, and problem-solving* (8).

These paragraphs are quite surprising since there is a lack of courses specifically designed around classroom technology. In reading this information, one would assume that technology is imperative and crucial within the School of Education at Geneseo. One would also assume that the School of Education would want to showcase their

“renowned” view of technology within their program and want it to be made public. Overall, a teaching candidate cannot be technological literate if there are limited technology classes for students to take. The framework states that “Geneseo encourages students to explore and adapt technologies to use as tools.” In other words, Geneseo promotes exploration with technology, but the college does not necessitate or mandate that it is specifically taught nor assessed beyond the couple classes that trivialize upon it.

With the ever growing trend to use an online management system and online classes, students attending Geneseo need/should be training on using the program, even if it is just a basic introduction. However, the students do not have this opportunity. Rather, they are provided with several links on their website as self-help guides. Research has shown that one of the best ways for technology to be used it through hands-on experiences. Students do not have the opportunity to experience this program before they are required to use it. As for online classes, according to the college, the purpose of online, or hybrid classes are the following:

- Organization
- Document repository
- Self-guided learning Activities
- Archiving
- Electronic submission of documents
- Mapping student achievement
- For reflective activities
- Communication
- Engagement

("Pedagogy of Hybrid Learning")

They continue to state that it provides:

- A class community

- Stand-alone, 24/7 access to content & instructor
- Calendar/Syllabus
- Self-tests
- Email
- Announcements
- Discussions
- Grades

("Pedagogy of Hybrid Learning")

With this college requirement of using this feature and the amount of stress that typically is associated with incoming freshmen's adjustment to college life, negative perceptions about the program and/or technology may arise.

Overall, technology courses are few and far between. Courses integrating technology may be "hit and miss" depending on the teacher students have. However, with societal trends imposing its technology will within all areas of the work force, especially in education, any perspective student with the desire to teach or any current educator can see that it is imperative for Geneseo to do more with technology.

The 2011 document "Title II: Higher Education Act Report" provides a description of how the School of Education prepares pre-service teachers. The document stating that the campus library, Milne Library, and the School of Education have provided instructional technology training for teacher candidates prior to and during student teaching ("Title II: Higher Education Act Report"). During a pre-service teacher's senior year, he/she is required to complete three introductory technology modules – the first one being completed by the end of the first week of the semester. By mid-semester, the pre-service teachers much complete the second module and by the end of the semester, the third one needs to be complete ("Student Teaching Handbook"). There were

very few details about these seminars and no Geneseo personnel could answer questions via telephone. However, by searching the college's search engine, the fourteen page document,"Title II: Higher Education Act Report" states that all pre-service teachers are required to participate in a minimum of two instructional technology seminars, which is contradiction to the Student Teacher Handbook. The report continues by stating the first seminar, or module, which is conducted solely online, includes training in the use of different technology tools and provides students with an overview of the technology requirements within their student teaching placements ("Title II: Higher Education Act Report"). One can assume that this seminar gives a board overview of the technology that a perservice teacher will come in contact with while in their student teaching placement while at the same time provide the pre-service teacher with the necessary requirements to satisfy the school.

The second module, which only began in Fall 2010, "covers diverse uses of technology in classrooms, kinds of technology available, as well as the technological climate of the internet in today's world. This module is an introductory lesson to appropriate and authentic uses of technology in classrooms" (12). Minus the wording error, this seminar may provide more information about technology, but once again, the pre-service teacher is in his/her senior year and already half way through student teaching.

According to the report, if a pre-service teacher chooses to take the third module, it would "addresses the Teacher Education Resource Center, online resources for teacher candidates, Milne Library resources, and other locations students can look for technology

resources. Students are guided through online resources, research sites, and they are shown TERC online" (12). This module seems to lack its worth at this point of a pre-service teacher's career. This information should be brought to a perservice teacher's attention at the start of his/her required education courses so the pre-service teacher would have the knowledge and resources at his/her disposal to meet all the required proficiencies stated in the education framework.

> *The best way to prepare teachers for connected teaching is to have them experience it. All institutions involved in preparing educators should provide technology-supported learning experiences that promote and enable the use of technology to improve learning, assessment, and instructional practices* ("National Technology Plan," 45).

Pre-service teachers need to experience technology themselves. Within Geneseo, all pre-service teachers are required to create and teach at least one lesson per placement that integrates educational technology, resulting in two lessons within their semester long student teaching ("Student Teaching Feedback and Evaluation"). According to that same document, supervisors are expected to observe and evaluate the lesson using a technology lesson rubric while the pre-service teacher id expected to complete a reflection on that lesson. In addition to the lesson, pre-service teachers are assessed by both the cooperating teacher and supervising teacher - both at the midway point and at the end of their tenure within the school. The rating categories are as follows:

S = Superior
P = Proficient
D = Developing
U = Unsatisfactory
N = Not Observed

("Student Teaching Feedback and Evaluation")

Two statements contain technology within the nine page document. These two statements are as followed:

- Uses technology when appropriate to enhance content knowledge (p. 4)
- Uses technology when appropriate to enhance student learning and engagement (p. 4)

The framework also mentioned the quality of the classroom teacher's knowledge and fluency with technology.

> *Because the quality of technology-based classroom experiences largely is dependent upon the quality of the classroom teacher's knowledge and fluency with those technologies, candidates in Geneseo's education programs are provided a wide array of opportunities to study the evolving role of technology in education and to use that technology in curriculum planning and field experiences. This preparation goes beyond basic technological literacy to focus on the integration of technology into classroom curricula for skill. Teacher candidates are also expected to grow as reflective practitioners who are adept at using technology appropriately to enhance teaching and learning."* ("Conceptual Framework," 8)

A document titled "Characteristics of Excellence in Higher Education: Requirements of Affiliation and Standards for Accreditation" states:

> …teachers and learners who must learn how to develop and use general or discipline-specific technologies to identify, retrieve, and apply relevant information. Therefore, institutions should provide both students and instructors with the knowledge, skills, and tools needed to use the information, new technology, and media for their studies, teaching, or research (42).

As a result, an examination was done on the faculty in Geneseo's School of Education. According to Geneseo's faculty website, there are 22 full time professors who teach in the School of Education ("Full-Time Faculty and Staff"). After researching the faculty webpages, of those 22 full time professors, six do not have a profile on the

Geneseo's website. Nine professors do not mention technology on their website, while five professors state technology. Of the five professors who mention technology, four have been published either books or articles. The remaining professor who has technology has not published articles on technology, rather incorporated PowerPoint presentations to her profile. This is significant for two reasons. First, the professors have an interest in technology to conduct up-to date research and publish their findings. Secondly, it shows that the professors see technology as an important aspect in teaching. With that said, that classes that these five professors teach, based on their profile on the Geneseo website, do not focus on technology. This is not to say they do not use technology within their classroom, but it is not main focus based on the course descriptions.

Geneseo's School of Education's Conceptual Frame states that technology provides "varied learning material and it serves as a key communication tool." Geneseo follows through this this by requiring each student, beginning their freshman year, to use a program called myCourses. myCourses is Geneseo's Learning Management System which:

> *[I]s used to supplement a traditional classroom course with online content or to deliver courses totally online. myCourses provides a comprehensive set of tools for student-faculty online interactivity including a course materials repository, discussion forums, class announcements, class grades, surveys, assessments, course mail and much more. All Geneseo courses are created in myCourses automatically with enrollment* ("myCourses").

In 2012, 81% of faculty used myCourses on a regular basis, an increase of 10% from the year before. There has been a steady increase in faculty members using

myCourses since 2007 (“mrCourses 2012”). As for training, there were eleven training sessions in the 2011-2012 school year for faculty on myCourse with 98 total participants ("Technology Training 2011 - 2012"). It is important to delineate that the 98 does not represent different participants. For example, if one participant attended four different training sessions, then he/she would be represented as 4 participants. For faculty members who do not attend trainings, or need a refresher, there are numerous links associated with myCourses on the college website under the heading Services – myCourses.

Teachers in elementary and high schools are required by the State of New York to have 175 hours of professional development every five years. However, college professors are not bound by the same requirements. Professors develop professionally by scholarship requirements, and service to the college, community, and teaching (“Faculty”). According to the faculty section of the Geneseo Handbook, professors are required to be evaluated based on the following:

> *Evaluation criteria are weighted: teaching, 50%; scholarship/creative activity, 35%; service,15%. Teaching is evaluated through peer classroom observation, mandatory student evaluation through the Student Opinion of Faculty Instruction (SOFI) instrument, peer review of syllabi and other teaching materials, and the Annual Senior Survey. Scholarship is evaluated by internal peer review of juried and refereed work. Faculty and departments maintain inventories of faculty service contribution* (4).

Ultimately, the Geneseo faculty is evaluated partly on the teaching evaluations that students fill out at the completion of the course. This does not seem to be a strong indication of how the professor is teaching to a strong degree because many students do not take the evaluations seriously. Observations and peer review of syllabi and other

teaching materials, and the Annual Senior Survey are better indicators of teacher effectiveness. However, that is 50% of a teacher's evaluation. Thirty-five percent of a professor's evaluation and professional development is based on scholarship/creative activity. This focus here lies on the ability to research and publish their findings toward their scholarly goals. The last 15% of a professor's evaluation is service which includes speaking at conferences, seminars, hosting workshops, etc. This certainly is beneficial to fellow educators to listen and engage in the research a professor has conducted. However, it is also important for professors, especially those in the School of Education, to be aware of the current teaching practices at the elementary and high school levels and providing the pre-service teachers the utmost preparation. One can conclude that many professors research their interests, which is completely understandable, but there needs to be more accountability in teaching preserve teachers especially in the area of technology.

Research has shown that pre-service teachers are more willing to utilize technology if their professors use it. Pre-service teachers may witness their professors use technology to present information, but they may not be using the technology themselves, or being shown how to use technology to integrate in into the curriculum. This is quite concerning since towards the end of the Geneseo's School of Education's Conceptual Frame work states the following:

> *"Teacher candidates in the School of Education are given opportunities to demonstrate proficiency with educational technologies, including instructional and assistive technology, in both teaching and learning. That is, candidates are expected to be able to use appropriate technology to gather and analyze information and to assist in classroom management, as well as be able to instruct students in the use of technology. Not only are learning outcomes regarding technology a part of School of Education courses, but students attend workshops on information literacy coordinated*

by the library staff" (17).

According to the research found throughout Geneseo's website, the School of Education does not give their pre-service teachers the opportunities to become proficient with technology. A strong and influential word that is used in the paragraph is the work expected. The students cannot be expected to use technology to "gather and analyze information and to assist in classroom management, as well as instruct students" if the students are not specifically using the technology in an in-depth capacity. The students can attend workshops on information literacy with the help of the library staff, however, there are a few details missing. First off, these workshops are not required, they are optional. Other seminar offerings include topics such as Creating a Teacher Website, Creating an Interactive Multimedia PowerPoint, Using EduBlogs and PBWiki, Creating Podcasts & Enhanced Podcasts, webquests, interactive whiteboards, etc. However, these seminars are not always available to students. There are, however, workshops that perservice teachers can attend that are available on a regular basis. All students at Geneseo can attend workshops in the hopes of obtaining a Ruby Certificate. This certificate in rewarded to students for information management and digital age leadership ("Ruby Certificate"). According to the Geneseo website, the Ruby Certificate program is "designed to help students become discerning members of the information society." This technology training requires students to take four specific classes that meet several times throughout the semester. These sessions are as followed:

Creating e-portfolios for the Job Market
Critical Inquiry in Research
Fair Use

Social Networking for Professionals

Students are required to take 16 total hours to attend these workshops and keep a reflective journal pertaining to the work within each workshop (“Ruby Certificate”). These training workshops pose a few issues. First off, many pre-service teachers have very limited time to complete additional training sessions when they are already required to take so many education based classes, not to mention the field trip requirements for specific classes, field experience hours, and student teaching. The second issue regarding these workshops is that they do not speak specifically to perservice teachers. Any students attending Geneseo can enroll in these workshops. This is not to mention that students are required to take four additional workshops to receive the Ruby Certificate. To make matters worse, some of the elective workshops to not relate to classroom technology at all. Overall, the School of Education states that technological literacy is crucial, but does not truly act on it to meet the never ending demand of technology usage.

Milne Library, Geneseo’s Library, also offers technology consultations. According to the library site, students and faculty can get personalized help to “guide you through software basics, as well as adding special touches for a more professional product” ("Research or Technology Consultations”). This is a nice feature to offer, however, according to the website, technology consultants specialize in resume formatting, e-portfolios, spreadsheets, PowerPoint, and Web 2.0 tools. Pre-service teachers could benefit for the PowerPoint and spreadsheet consultations, but there are more and different educational technologies that can could be more beneficial such has smart board and document cameras for hardware, and software such as notebook.

Milne Library also offers a professional development series for both students and faculty. According to the library website, “the Milne Professional Development Series is an opportunity for the informal exchange of ideas related to scholarly communication, technology, instructional design, higher education and other topics relevant to our work at SUNY Geneseo” (“Library Workshops”). These workshops are held monthly during the semester and weekly during the summer. As stated through research, it is important to have continuous and ongoing professional development. Monthly workshops satisfy research, however, but the workshops change each month and do not build upon one another. Research has shown that professional development needs to be more than a one time workshop. Research also states that there needs to be roughly thirty hours of work within a specific domain to be effective. In addition to this, the Milne Professional Development Series is not structured substantially. If a student or faculty member was looking for a workshop on technology, the series coordinator would need to find someone to lead the workshop (“Library Workshops”). This may mean, the person selected, or willing to present may not be at the mastery level. That is not to mention needing enough people to attend the workshop. The past professional development that is posted on the website along with the scheduled workshops for the summer of 2013 does not involve educational technology.

According to a 2007 memorandum between Geneseo and the State University of New York, the college allocated more than $500,000 in private funds annually to support professional development expenditures such as faculty research, professional travel, and academic enrichment programs ("State University of New York at Geneseo and the State

University of New York"). This same document states that the Campus Auxiliary Services supports faculty development and research and by doing so provided the college with an additional $50,000 to support such activities ("State University of New York at Geneseo and the State University of New York"). This is a tremendous amount of money for professional development which the costs do not seem to fund technology training based on the research found.

According to a 2010 report, SUNY Geneseo's School of Education faculty members have received training in the use of Smartboards which have become more accessible within the School of Education ("Title II: Higher Education Act Report."). Although, the reports and documents examined from the past three years, do not indicate that there have been any smart board training sessions. Granted most of the education faculty members have been teaching for several years and may have had training at one time or another. However, technology consistently has updates and improvements to software and as a result teachers need to have continued training to adjust to the improvements.

According to a Geneseo document in response to NCATE's Standard 5: Faculty Qualifications, Performance, and Development, the college states that it is their goal to "ensure that faculty and candidates are skilled in working with the latest technology" (p. 4). This same document states that only one professor within the School of Education, has received specialized training on Smartboards and provides professional development to our faculty members ("Standard Five"). It does not state that any other faculty members have received formalized training on Smartboards. It is assumed that this

professor works with other faculty members who attempt to use Smartboards in their courses – more on the lines of "problem solving" rather than professional development. This is because there is no documentation that formal workshops or training sessions have been conducted by this particular professor. Since Smartboards are commonplace within school districts, pre-service teachers should have exposure and familiarity with them before entering into their own classroom. The best place for pre-service teachers to become familiar with this technology is in their education courses. Without proper training on Smartboards, professors may not utilize the technology, if at all, in their classrooms. Overall, all faculty within the School of Education needs to have formalized training on Smartboards.

However, Geneseo is one of 89 colleges in the United States to use a web resource called Just In Time Teaching ("Online Resources"). This resource allows students to respond electronically web-based assignments that are due a few hours before class. This allows the professor to reads the student submissions 'just-in-time' allowing for any adjustments to his/her lesson to suit the students' needs. This is a great use of technology, especially for pre-service teachers and the fact that education is becoming more web-based. However, there are only five professors at Geneseo that implement this program and none of them are from the School of Education.

According to the Computing and Information Technology Department, or CIT, their Classroom Technology Upgrades & Classroom Stats 2012, states the status of technology throughout the campus. There are a total of 126 classrooms, campus wide, that offer "dedicated technology" ("Technology Training 2011 – 2012"). Of those 126,

only 29 are full smart classrooms. According to the statistics, smart classrooms can support an array of multimedia including computers, VCRs, laserdisc players, Elmo Visualizers, Navitar Slide to Video converters, and projection for notebooks. Most classrooms are equipped with overhead projectors, TVs, and VCRs. Geneseo also has a total of 82 smartbox classrooms which consist of consisting of a switching device, an audio amplifier, speakers, and a projector ("Technology Training 2011 – 2012"). On or CIT website they offer a simple YouTube video on how to use the smartbox which is located in each classroom. No other training is available - although faculty and staff can request assistance from the CIT Department to solve any issues or problems.

Pre-service teachers attend classes in South Hall where the School of Education is located ("Facilities at CIT - Classroom Technology"). After further examination, there are 21 education classrooms. Since 2009, there have only been two Smartboards installed in the building, both in room 224 and room 233 in the year 2011 and 2012 respectively ("Technology Training 2011 – 2012"). Looking through each individual classroom in South Hall, the following was established:

- 14 of 21 classrooms have projectors
- 9 of 21 have overheads
- 2 of 21 for slide capabilities
- 6 of 21 have VCR/DVD player
- 7 of 21 have televisions

This amount of technology is deplorable for a the number one ranked teacher preparation program in the northern region of the United States. School districts offer more technology within their classrooms than Geneseo offers for their pre-service teachers.

There are two labs in South Hall that allow pre-service teachers to experience technology ("Computer Labs"). Of the 31 software applications, stated on the "Computer Labs" webpage, that are on each computer throughout the campus computer labs, only 11 could be for education purposes. However, of those 11, three are web browsers. Of the remaining eight, three are visual media (Adobe Reader, Google Earth, and Quicktime). Of the five remaining applications, three are content specific – Geometer's Sketchpad, Cabri Geometry, and Celestia, These software applications could be used in the classroom, but are specific and can meet only a few state education standards. These three programs are not mentioned in any courses for education students. If these software programs are used, they must not be given high priority. Without long exposure and in depth analysis of these programs, a novice teacher would have difficulty integrated these programs into their curriculum. The last two programs are Microsoft Office and Adobe Creative Suite. These programs can be educational, but a tremendous amount of time is needed to reach a mastery level for each program. At this point in time, SUNY Geneseo does not offer substantial technology for pre-service teachers and the faculty within the School of Education.

SUNY Geneseo requires incoming students to bring a laptop computer to Geneseo ("Class of 2017"). According to the newsletter, "this requirement has several benefits, including enabling students, faculty, and staff to take advantage of learning

opportunities that exist only when every student in a classroom has a laptop; establishing a campus culture in which faculty and staff are increasingly willing and able to explore innovative and effective classroom and co-curricular uses of information technology; and encouraging students to develop essential computer skills" ("Class of 2017"). (This brings up two issues. First, students do not have the software that the computer labs offer. The second issue is, since computer brands have different capabilities and different methods of documenting information, the CIT Department are more apt to have computer issues stemming from students' inability to successfully operate his/her computer.

According to the Geneseo's CIT's 2012-2013 annual report, there are ten priorities regarding technology. The third biggest priority, behind expanding the bandwidth and increasing the physical technology infrastructure, is the teaching/learning environment ("IT Priorities 2012-2013"). This consists of instructional design, collaborative tools, digital media, etc. The notes associated to this priorities indicate providing more support services and to purchase new equipment for the best price. The problem with this priority is that there is a need for more support because there are more technology issues and concerns. Students and faculty have difficulty using the new technology since they are not trained and experienced with it. Dating back to 2010, there are three months that have over eight hundred HelpDesk calls ("Stats &Facts 2012"). According to the same data, the lowest amount of calls dates back to July 2010 where the HelpDesk managed about 300 calls. These are a significant amount of calls for the school's technology HelpDesk. The following are HelpDesk tickets that were processed in the previous three years:

After closer examination, there are roughly 300 general tickets issues per month for the 2011-2012 school year ("Stats &Facts 2012"). If students and faculty had more training on technology and felt comfortable using the technology, it is possible to assume that the amount of calls would decrease. Studies have shown that they would be more apt to trouble-shoot and problem solve. As a result, one can assume that there would be less HelpDesk calls and tickets, especially those with general technology questions.

According to the Geneseo's CIT's 2012-2013 annual report , the ninth biggest priority is for training. The report does not mention who the training is for, whether it is for employees of the CIT department or for overall training of faculty members throughout the college. Training should be one of the highest priorities because it would limit the problems that may arise. Thus, there would not be such a need for additional support services. After searching training within the annual reports, the CIT department conducted twenty-six technology training sessions, open to students and faculty, during the 2011-2012 year ("Technology Training 2011-2012"). There was a total of 272 participants. Of the twenty-six session, as stated by the technology training data, there were eleven different session types. The remaining sessions were offered multiple times. However, the sessions offered multiple times were the same course with the same material just offered on different dates. This leads me to believe that these sessions are not as beneficial to the students and faculty of Geneseo.

Pittsford Central School District

Technology is pervading education. Smartboards, projectors,

elmos, flip video cameras, iPods and iPads are commonplace in many classrooms! I am being asked to integrate technology and often feel like I'm being thrown to the wolves! What exactly does it mean to integrate technology? Does the fact that my students are using pencils every day count as integrating technology? I feel tremendous pressure to not only integrate technology but also make sure students "use" technology and even learn technology in my Social Studies classroom. But what does that mean? If I ask students to put a document under the Elmo, is that student "using" technology and learning how to use the Elmo?

I use technology every day, but getting my students to use it daily seems to be difficult for me. I wish I could allow my students to communicate using technology, whether it be on Facebook or through their smartphones. However, students can't use phones or access Facebook during the school day. I assign an assignment here or there requiring students use the internet for information. I teach the students how to search appropriately. However, I haven't a clue what the difference between web 1 and web 2.0. I also learned a while ago that devoting class time to work on a "technology" project is not the best use of time. It seems as though too many problems are encountered and students squander the time.

With the pressures of APPR, where does technology integration fit into the equation? How is technology integration going to be measured? Is it even an issue anymore in light of APPR? I feel as if APPR and technology integration are in conflict.

(Bissetta)

Many teachers feel just as Bissetta does in her blog. They are worried about integrating the available technology into their classroom, the new evaluation process within New York State, and meeting the required curriculum demands at their prospective grade level. Knowledge of technology along with integrating it into instruction is a daunting task. However, teachers may not feel this way if they were more prepared. As seen through the "best" college undergraduate education program in the northern region of the United States, SUNY Geneseo lacks the ability to properly prepare

pre-service teachers to teach with technology in the classroom. Although there are many who hope that there is a "wind of change" coming with regards to teacher preparation programs, it still does not affect current teachers. School Districts ultimate goal is to prepare its students for their next level, whether it be higher education or in the workforce. Teachers' wariness about feeling equip to teach their students these skills are just one part of a school districts trials and tribulations in fully utilizing technology and preparing its students and teachers with 21st Century skills.

Pittsford Central School District is known for its prominent distinction as a highly rated school district. Pittsford is a residential, suburban community located seven miles southeast of Rochester, just north of New York's Finger Lakes. The Town of Pittsford received Relocate America's designation as one of "America's Top 100 Places to Live" in 2009 and the National League of Cities named the Pittsford Village's revitalization as "The Best in New York State" ("About Pittsford Schools"). There are more than 1,150 employees including teachers, administrators, and support staff that provide services for an enrollment of approximately 6,000 students in nine school buildings. The cost per pupil for 2012-2013 was approximately $17,500, with an operating budget of $113,146,376 ("About Pittsford Schools").

The Pittsford Central School District (PCSD) is one of the top school districts in the county, the state and the nation. The newspaper, *Business First,* has rated the Rochester area's 67 school districts each year since 2010 and Pittsford has continually topped the list. These rankings are based on four years of test data obtained from the New

York State Education Department (Thomas). The following information is also from the *Business First* rankings:

- It's the top-rated Rochester area district in all four subject areas (English/foreign languages, mathematics, science and social studies), based on standardized test data from 2009 -2012.
- Seventy-seven percent of Pittsford's graduates earned Regents diplomas with advanced designations last year. Advanced diplomas are awarded to high school graduates who have passed at least eight Regents exams. Putting that in perspective, that's more than 30 points ahead of the entire eight-county Rochester region which represented 45.6 percent.
- It's the only district in the Rochester Area with more than 60 percent of its students achieving superior scores (85 or better) on Regents tests in English, algebra, geometry, global history, U.S. history, biology and earth science.
- The two Pittsford High Schools, Mendon and Sutherland, ranked number one and two respectively of the 67 districts and 83 high schools within the region.
- Calkins Road and Barker Middle School ranked one and two respectively in the 90 middle schools in the Rochester region.
- Of the 160 elementary schools, all of the Pittsford elementary schools ranked in the top twenty-five. The following are each elementary schools rankings:
    - 2 – Mendon Center Elementary
    - 5 – Jefferson Road Elementary
    - 9 – Thornell Road Elementary
    - 13 – Park Road Elementary
    - 21 – Allen Creek Elementary

To look at Pittsford Central School District (PCSD) nationally, similar results were reflected. Both high schools in the district were highly ranked by *U.S. News and World Report* throughout the 2012-2013 school year. According the PCSD website, *U.S. News and World Report* ranked Mendon High School number 13 in New York State and number 71 in the country while Sutherland High School was ranked tenth in New York

State and number 62 among U.S. high schools. Pittsford's Mendon High School and Sutherland High School were also commended for their Science, Technology, Engineering and Mathematics (STEM) programs through U.S. News and Report. Mendon was ranked nationally at number 107 and Sutherland was ranked number 23. Only 250 of the nation's high schools made the list ("Mendon High School and Sutherland High School recognized for STEM programs.")

U.S News and Report was not the only report that specified Pittsford Central School District as the top school district in the Rochester region. According to the *Albany Business Journal*, Pittsford was recognized as the number one district in upstate New York in 2013. This ranking was based on 50 counties and 455 districts with an evaluation based on a variety of factors including graduation rates and performances on Regents exams. ("Pittsford recognized as No. 1 district out of 455 upstate New York school districts.")

With all these accolades, any visitor to the PCSD website would be clamoring to have his/her child attend school within the district. It is quite impressive, but the district honors do not stop there. According to the New York State Education Department, the average graduation rate for PCSD high school students over the past five years is 97.6% ("Graduation Rate Data"). Data obtained from PCSD states that over 95% of high school seniors will transition into college in 2011 while almost 2% are still undecided ("Success Summaries").

With so many graduates entering college, the students seem well-prepared to enter the next level of their education. According to a U.S. News and Report, Pittsford's high school Sutherland ranks tenth in the state with a college readiness score of 83.8. Mendon ranks thirteenth with a college readiness score of 82.2 ("Pittsford Central School District"). These scores, as stated by U.S. News and Report, were based on the percentages of twelfth graders who were tested and passed AP exams. Within Pittsford Sutherland, 88% were tested in AP tests and 82% passed. 100% of the students attending Sutherland were math and English proficient. The site also states that Pittsford Mendon, 90% took AP tests and 80% passed. Overall, Mendons's math proficiency was 99% and 100% received English proficiency ("Pittsford Central School District").

The bothersome aspect of these rankings is that U.S. News is missing various aspects of college readiness. After additional research there are very few organizations that specifically include technology in college readiness. For example, the College Board states that students are "college ready" when they have the "knowledge, skills, and behaviors to complete a college course of study successfully, without remediation" (Mijares). Mijares continues to say that college readiness can be identified through multiple measures:

> 1. Academic knowledge and skills evidenced by successful completion of a rigorous high school core curriculum
>
> 2. Success in college-prep and college-level courses taken in high school that require in-depth subject-area knowledge, higher-order thinking skills, and strong study and research skills,

3. Advanced academic skills, such as reasoning, problem solving, analysis, and writing abilities, e.g., as demonstrated by successful performance on the SAT

4. College planning skills, as demonstrated by an understanding of college and career options and the college admissions and financing process.

In addition to this, the New York State Education Department issued a press conference on July 28, 2010 regarding the state's college readiness which focuses almost entirely on math and ELA assessments, but failing to mention technology proficiencies ("A New Standard for Proficiency").

By analyzing Pittsford Central School District's website and its related webpages, interesting information regarding technology, or the lack thereof, surfaces. To begin with, the district's values on their webpage titled "Values, Vision and Strategic Initiatives" state that they believe in the following:

- All students should be successful and reach their potential.
- A highly skilled, well-educated staff is critical to student success.
- Staff should continually improve their practice in support of student learning.
- Collaboration with staff, parents and the community is critical to the District's success.
- An effective educational system anticipates, plans, and acts in response to a changing world.
- Research and evaluation are central to a quality school system.

Each of those bullet points can be brought back towards technology. Evidence has been presented that technology can help student achievement and therefore help reach each student's potential. In order to be a highly skilled and a well-educated staff member within the district, it is important to be knowledgeable of the significance technology plays within education, the curriculum, and in the classroom as a whole. As for collaboration, technology provides immediate, up-to-date communication within not only

the school, the district, and the community, but the state, the nation, and around the globe as well. Indeed the world is changing, especially in the area of technology. It is crucial for education systems to anticipate, plan, and act upon emerging technology and integrate it into the school system. In order to successfully implement it, evaluations of current curriculum and technology are needed based on research.

As for the vision of the Pittsford Central School District, it states:

> *As an educational leader with uncompromising commitment and passion for excellence, Pittsford Central Schools will deliver quality programs and services that maximize academic performance and personal development, and provide for each child's future success.*
>
> ("Values, Vision and Strategic Initiatives")

In their stride for excellence and their promise to deliver quality programs and services to maximize academic performance, personal development, and provide for each child's future success, the district does truly fulfill this statement when it comes to technology and preparing students for the demands of higher education.

Media

The Pittsford Central School District is visible across social media. On the top right of the district's website, there are links to the various types of social media. The district has a Facebook page with 450 "likes" as of July 29, 2013. The page is consistently updated with important information and news pertaining to the District. There are also videos and PowerPoint presentations on the site sharing information from various meetings, presentations, and activities. A number of people have written comments about specific events and people are interested in the webpage and come to

view its new content. The District also has a Twitter account for Pittsford Central School District (PCSD) Athletics. As of July 29, 2013 it has 716 followers. Another avenue for sharing media that the district utilizes is podcasts available for many district and school events. Currently, the district has over 130 podcasts and more than 70 videos posted on their website ("Podcasts"). Lastly, the PCSD is also present on a local cable, Channel 12. Each day, seven days per week, the district showcases events, activities, and concerts one hour in the morning and one hour in the evening ("TV12 Programs").

PCSD takes pride in their website and in 2012, the Rochester Business Journal recognized the district website as a Best of the Web Education Finalist ("Pittsford District Success Summaries"). The district's website has also been recognized by the National School Public Relations Association (NSPRA) and the New York School Public Relations Association (NYSPRA). These prestigious awards, however, do not represent the student and faculty commitment to technology, their knowledge, and their usage in the classroom. A closer examination is needed.

The main district website, pittsfordschool.org, looks professional with pictures, videos, descriptive headings, and lots of links. Links are topics such as Board of Education, Curriculum, Partners, Employees, and more. They also have sections for schools, parents, community, and more. They also have quick links ranging from athletics, alumni, lunch menus, jobs, and much more. Overall, the website is organized and professional. By selecting one of the schools within the district, one will find that each school's main page has a similar makeup to the main site. Once again, the site looks organized and professional and the district does a nice job of presenting and promoting

themselves. The Community, Employees, and Parents, links on the left hand side, once selected, provide an assortment of valuable resources.

With all the benefits mentioned, however, after closer examination, there are many flaws within the overall layout of the websites. Like Geneseo, they provide a lot of valuable information and more than enough for the average employee, parent, or visitor, however, is hard to locate technology information unless you have searched the numerous sites and links many times before. The district has a technology webpage, but it is very limited. One might expect seeing a surplus of information and resources after seeing the Community, Employees, and Parents, webpages, but unfortunately that is not the case. When accessing the technology webpage, visitors will spend a lot of time using the left hand side links because the webpages themselves have little information. In other words, a one viewing the webpage would only see information on ¼ of the screen. Therefore, a visitor would be required to continually select the links on the left hand side. This becomes tedious when searching for information and often times, that individual either gets confused, lost, or both. Some of the links with the technology website or subsequent webpages open to blank sites. If an educator knows what he/she is looking for and is having a difficult time locating the information on the PSCD website, then how are students, parents, and visitors going to locate information without implicit instruction.

Using the search function on the main heading that accompanies each page can be frustrating, and when searching, the results are limited and often times provides you links that require you to keep navigating to other links to find the information that one is looking for. In other words, the search function basically brings you to a main page rather

than directly to the information you are looking for. Some links lead to pages with nothing on them, and some links, when clicked, result in no page at all. Some pages state, read the information below, but there is no information provided. Some information on various pages pegs teachers with different names. This is probably because the teacher has since been married, but the webpages have not been updated.

One positive aspect of most of the school websites is they have a page titled "Websites We Use." All the schools have a webpage titled this besides both high schools and one middle school. This webpage provides students with numerous online resources ranging from online software, games, templates, and other informational websites. These are wonderful webpages, but each schools page is different from one another. They have different layouts however, with similar resources, but it is evident that some schools have put in more time and effort into establishing resources for students. Most of these webpages, besides two schools, are maintained and updated by the same instructional technology support specialist. This is strange because one would think that if a majority of these webpages are maintained by the same person, then the layouts and resources should be the same. In actuality, one would think that the specialist would create one main page and have each school have a link directly to that.

What is beneficial with the Barker Road Middle School and Allen Creek Elementary is that they have a link on the left hand side of the screen titled "Websites We Use" for teachers. Barker Road takes it a step further by also having a "Websites We Use" for parents. No other school websites offer these webpages. These resources are wonderful and easy to access. Anyone can quickly access the information and use the

resources available. All the websites and webpages pertaining to PCSD should be this accessible and efficient.

Unfortunately, another negative aspect of the PCSD website is the teacher webpages. According to the Middle School Course Study book which can be found in several locations, but ultimately difficult to find states that teacher websites are voluntary. Under the philosophy section of course study book, it states:

> *The expanding world of technology has created both opportunities and confusion. The introduction of websites as an alternative form of communication has prompted some teachers/teams to create and maintain sites. These websites are an optional form of communication, maintained voluntarily by teachers* ("Middle School," 16).

Once again websites are voluntary according to the Course Study Book. This is quite evident. Some faculties do not have websites, while others are very basic with only an introduction. Some faculties use it as a resource by providing updated information and links. However, some of the websites are not updated and currently have information from previous years. A few sites say they will be updated consistently, but there is either no information on the site, or the site is outdated. However, there are a select number of teachers who update regularly and include various resources such as web links, notes, PowerPoints, podcasts, etc. These websites, however, are few and far between.

It is distressing that this is stated in the course study book because according to No Child Left Behind (NCLB), electronic data should be available to parents. Teacher websites should not be just for communication, but to access data. Ultimately, teachers should be required to maintain websites and provide specific data to parents. This data does not necessarily mean sensitive data such as test scores and personal data. Data such as class schedule and events, special announcements, etc. should be included in teacher

websites. Student and parent resources should also be present even if it is as simple as a link directing them to the webpage "Websites We Use" as mentioned earlier. Overall, one would think the district would make sure these websites were up to date and fully represented the districts believe in technology.

As for sensitive data, the district does offer Infinite Campus Parent Portal. The Parent Portal is a confidential and secure Web site where a parent or guardian can get information about their child's schedule, grades, and teacher contact information. This is a secure site that requires login information, and is updated at teachers' discretion. Parents can follow up with their child on missing assignments, provide reinforcement after grades are shared, and monitor attendance and possible truancy concerns. In some cases, a parent could share the log-in information with their child so that a child who is self-motivated can view their own grades and comments from teachers and reflect on their education in a meta-cognitive way.

Equipment and Funding

In order to properly and successfully integrate technology into the classroom, technology needs to be present in the classroom. As a result, an analysis of the district's technology spending and capabilities was done. According to the PCSD, 88% of the teachers within the district believe that the district provides effective instructional technologies for teachers to use ("Tech Quest 6"). PSCD has a technology plan, titled Tech Quest 6, which is posted on their district's Technology Department website. At the end of the technology plan, lists valuable data pertaining to technology.

According to Tech Quest 6, the 2012 technology budget for PSCD in 2011-2012 was just under $2.5 million. This budget funds 18.5 technology staff people including a Director of Technology, eight instructional technology specialists,
one department secretary, four senior technicians, three and a half network technicians, and one data liaison ("Tech Quest 6"). It also funds hardware consisting of computers and servers, network electronics, peripheral devices and data projectors as well as for district software for academic, productivity, and management purposes ("Tech Quest 6"). The district's technology plan also states that funding goes to the Board of Cooperative Educational Services (BOCES) which offers services such as printing, audio-visual equipment and repair, library automation, document archiving, and database maintenance. Other areas that the technology budget funds is telecommunications and professional development ("Tech Quest 6").

After analyzing the data found within the technology plan, there are some peculiarities. For example, the Tech Quest 6 document states that the district projected to spend $843,899 for BOCES services. Calculating out the percentage of the district's expects to spend on BOCES, one determines that it is roughly 33%. However, later in the document, it states that 25% of the districts anticipated expenditures will be dedicated to BOCES "(Tech Quest 6"). This peculiar data is also presented for staffing, hardware and software, telecommunications, and professional development. For example, the Tech Quest 9 states that $100,000 will be designated for technology professional development which is 4% of the $2,497,732. However, on a proceeding page, it states that the anticipated expenditures for professional development are 15% which should total just

under $375,000. Hardware and software have a 9% difference among the two pieces of data while telecommunications has a 4% difference. These are significant differences especially when the data is discussing hundreds of thousands of dollars. What is also surprising is that no one caught this mistake when it states in Tech Quest 6 that "this technology plan is a living document. To keep pace with rapid technological change, it must be regularly reviewed" (p4). To keep pace with surprising data, according to Tech Quest 6, only 5% of the technology budget comes from grants. There are 569 professional staff members in the district, but only 5%, or less than $125,000, comes from grants ("Facts and Figures"). According to Tech Quest 6, in 2010, PCSD had 3414 computers, 400 projectors, and 229 Smartboards. No other documents on the district website or any linking webpages can back up this data. This is mentioned because in 2011, the district has some conflicting technology numbers from various sources.

According to the district's technology plan, there are 3,311 computers within the district. The webpage titled "Technology Successes Summaries" located on the district's main webpage claims there were 3,614, a difference of 303 computers. That is very significant and the technology department needs to examine the data that PCSD website is providing. This is possibly due to incorrect data based on the number of classrooms within the district. As odd as it seems, it is a possibility. According to Tech Quest 6, there are 403 classrooms, while "Success Summaries" states there are 450.

In addition to conflicts in computer numbers, there are inconsistencies with Smartboards as well. There are 202 Smartboards in the data presented by Tech Quest 6

whereas “Success Summaries” state that there are 269 Smartboards. Indirectly, Tech Quest 6 is stating that 50% of the district classrooms have a Smartboard. However, with the data obtained through “Success Summaries,” over 65% of the classrooms in the district have Smartboards.

With knowledge of the inconsistent data, it is hard to determine the accuracy of the remaining data found on the number of hardware in the district. However, according to the district’s technology plan, there are over 70 classrooms that offer interactive response systems, or clickers, with the two high schools housing the most rooms with the system. Tech Quest 6 also states that there are a total of 12 TI-Navigator systems within the district, all of which are in high schools and middle schools. Lastly, there are roughly 27 classrooms throughout the district do not have a projector. Once again, this data is unreliable with the varying data in regards to the number of classrooms in each building. No matter how the data is presented, it is obvious that PSCD provides its students with more hardware than SUNY Geneseo does for its pre-service teachers in their School of Education. Granted, PCSD has more students compared to Geneseo’s School of Education, but Geneseo currently provides its pre-service teachers with two Smartboards since 2009.

Pittsford Central School District also desires new technology, as most schools do. Tech Quest 6 claims the district wants to invest in over 139 additional Smartboards, 9 netbook mobile labs (one for each school), 18 Polycom cameras (two per building) for distant learning, 24 interactive response systems, 9 smarttables, and 40 i-Pod’s. All of

this new technology, would cost the district over $900,000 (“Tech Quest 6”). Most of the technologies listed to invest in sound appropriate except for the iPods. These iPods are for Jefferson Road and Allen Creek Elementary for the sole purpose of reading/viewing content (“Tech Quest 6). The size of iPods are very small, especially for reading purposes. To be more effective the district should purchase iPads for reading/viewing content. Granted this would cost more than the iPods, but once again, it would be more effective to integrate into the classroom. If they opt out of purchasing iPods altogether, it would save the district almost $12,000 (“Tech Quest 6).

Overall, there needs to be an examination of the technology budget. In theory, the PCSD can increase their grant funding to aid in the professional development workshops and other areas of PD such as strengthening tutorials, websites, etc. Plus, the district can look into using other ways to manage data storage. For example, districts could utilize more virtual storage options like a cloud based service. According an article published by EdTech Magaize, currently, 42% of K–12 schools implemented or maintained cloud computing in 2012. (Wong). As for PCSD, according to Tech Quest 6, they have 54 servers in 2011, with 34 being virtual. This is a significant increase from the previous year where they had 46 servers with only 23 of them virtual (“Tech Quest 6”). Evidence has shown that there would be a large cost reduction of physical servers and storage devices. The district is projecting to spend $360,000 on upgrading their servers and storage in 2015 (“Tech Quest 6”). Imagine what PCSD could do with a fraction of the $360,000 if they moved toward more cloud based storage rather than physical servers.

PCSD piloted Microsoft's Live@edu. This cloud-type service was the district's attempt to meet the need *for greater online collaboration. According to the article,*

> *The district discovered that there were difficulties upon teachers and students in regards to assignments completed with the use of a computer. Not every computer in the district or students' home computers had the latest version of Microsoft Office which resulted in file and format incompatibility problems. Other problems included loading an assignment on a flash drive and forgetting to bring it to school, or mistakenly sending a pervious and incomplete assignment through e-mail was common. This is not to mention the difficultly students had completing assignments that involved collaboration among classmates.*
>
> *("Microsoft Case Studies")*

As a result, Live@edu was piloted. This program includes Office Web Apps, Microsoft Outlook Live, and SkyDrive online storage *("Microsoft Case Studies").* According to the article, they also enlisted the services of Computer Generated Solutions (CGS), a member of the Microsoft Partner Network with Gold competencies for problem solving. In 2011, the PCSD Director of Technology selected three teachers to pilot the new system and began the pilot began in April 2011 *("Microsoft Case Studies").* It was completed four weeks later without any "hiccups." According to the Microsoft Case Studies website, because of the success of the program, PCSD planned to implement Live@edu for students in grades 8 through 12 by the start of the 2011–2012 school year with the idea that it will save the district $40,000 yearly and allow expanded opportunities for academic innovation and collaboration.

The article for Microsoft also states, that

> *The implementation will involve no formal promotion or training, because student adoption of Live@edu will be entirely voluntary.*

> *We are not mandating the use of Live@edu, because we're confident we won't need to," he says. "Based on the enthusiasm of staff members who participated in the pilot and of students whom we recently polled, we anticipate a 90 percent adoption rate by our third year of having implemented Live@edu.*

This pilot program, although fascinating and offering valuable resources, lacked true research and experimentation. Only three teachers within the district piloted this program and it only lasted four weeks. That data set alone is a cause for concern. After investigating Live@edu through PCSD website, there is no mention of the program throughout the main website or subsequent websites and their pages. This is especially concerning since, according to Tech Quest 6, the district is still planning on spending $360,000 in 2015 for upgrading their current server and storage space. Overall, cloud storage is not only cost effective, but there is evidence that shows that it increases efficiency, user mobility, and greater ability to innovate.

There is also a foundation called the KEEP Foundation located in Pittsford that aids PCSD in technology. This foundation "promises to provide financial resources to support and enhance educational programs and technology advancements in the Pittsford Central School District" ("KEEP Foundation"). According to the KEEP website,

> *Implementing state-of-the art technological tools is paramount to extraordinary instruction and learning. With the support and assistance of the entire Pittsford community, KEEP will provide the necessary resources to make implementation a reality and for staff training. This budget never covers all of the needs and requests for new computers, smart boards, high tech calculators, immediate feedback devices and other newly developed classroom technologies that underscore an "extraordinary" Pittsford education. KEEP is committed to raising resources to meet these expanding technology needs at each Pittsford school by enlisting the support of staff, parents, graduates, community members, and local businesses.*

Even with budget cuts, the district will still have additional revenue to purse new and/or ungraded technology and for staff training. No other school district can account for such a foundation.

To conclude, although SUNY Geneseo does not provide a technology budget for public access, and details are not given as to the specific number of technology staff members, it is quite evident that PSCD provides more hardware and software to its students than SUNY Geneseo does to their pre-service teachers.

Technology Plan

As research has shown, a technology plan is crucial in ensuring that technology strengthens existing curricula and supports meaningful, engaged learning for all students. The purpose of a technology plan is to assist in the decision-making processes involved with the use of technology in a school. It will also help facilitate student learning and teacher productivity, but ultimately it should be a guide to help prepare students with the necessary 21st Century skills that they will need to be successful whether it is in higher education or in the workforce.

According to Tech Quest 6, the districts technology vision is the following:

> *As a leader in education with a commitment to and passion for excellence, Pittsford Schools will promote the ethical and responsible use of technology to maximize the academic performance and personal development of all members of the learning community* (7).

As for the technology mission statement, it states that "Pittsford Schools successfully

integrates technology into the educational program to provide students with the knowledge and skills required for lifelong learning and for productive participation in society" (7). Both of these statements are strong and decisive. They state not only the use of technology within the district, but also integrating it into the curriculum. However, the key phrase is providing "students with the knowledge and skills required for lifelong learning." Students at the high school level, within a few short years, will be entering either higher education or the workforce and need to be responsible for their actions. To help foster this, students need to acquire technology skills.

The district also compiled a list of technology beliefs on page 8 of Tech Quest 6. They state:

- Thoughtful integration of technology promotes academic excellence.
- Students must learn to use technology effectively, ethically and responsibly in order to become productive members of society.
- By using current and emerging technologies, students and staff are able to effectively access information, solve problems and communicate.
- Technology affords opportunities for all to participate in learning communities, establish connections, deepen cultural understanding and develop the skills of global citizenship.
- Technology-rich learning environments empower educators to engage, motivate and meet the diverse needs of all learners.
- The District must use existing technology and also explore and evaluate the use of emerging technologies in order to maintain a leadership role in education.
- Technology enables the community to access resources and learning opportunities beyond the classroom.

These beliefs are core values for technology and will help increase student achievement throughout the district. Teachers, who many have a negative perception about technology or lack the skills to use it and ultimately limit their students opportunities to use technology, need to be aware of these beliefs.

As for the action plan itself, the district provides strong goals and objectives that meet the needs of the district, the schools, staff, and students. Pittsford should be applauded for developing such goals and objectives. However, the district misses their mark with the rest of the action. Each goal is divided into several objectives. Under each objective, there are Responsibilities, Action Steps, Indicators, and Date of Completion categories. These categories are simplistic and do not provide enough detailed steps on how the district will achieve the objective for each goal. For example, one objective for integrating technology across the curriculum and throughout the educational process is to "design and provide professional learning opportunities for staff members" (15). They have appropriate members within the district taking responsibility to achieve this objective, but the Action Steps, Indicators, and Date of Completion categories are vague. For action steps, the district has noted that they would "create an action plan to provide professional development" and "provide professional development opportunities before, during, and after the work day" (15). First off, a professional development action plan cannot be located on the Professional Development webpage of the districts website or anywhere the district site for that matter. This does not necessarily mean they do not have one, but since their technology plan is public knowledge, certain parts pertaining to the plan also be included. This is not to mention that a professional development plan would represent the district well and show visitors to the district site that they are making every effort to develop all around teachers. Within this category, or within their professional development action plan, information needs to be stated as to the types of technology professional development that is needed, who it is going to be developed, present it, and

evaluate it, how will it be offered, and much more. This is not a simple task and needs careful planning and execution.

As for the Indicator category, the only items listed are student work and teacher lessons. This alone brings up more questions than answers such as how are the student work and teacher lessons being evaluated to meet the objective and overall goal? Lastly, the Date of Completion states "on going." Technology always needs to be evaluated on an on-going basis. However, there should be set dates to complete or implement specific aspects of the objective. For example, an action plan should be developed by a certain date, student work and/or teacher lesson plans should have an evaluation developed by a certain date. This would hold the members more accountable for this particular objective in helping the district fully achieve their goal.

This lack of description and accountability is in many of the objectives stated in the district's Tech Quest 6 technology plan. Another piece of evidence is identified with Goal D. It states that the district needs to "promote an environment in which current technologies are utilized to provide diverse learning experiences and varied instructional approaches (24). One specific objective to this goal states that the district needs to "provide training for teachers in using technology-based instructional techniques and products to provide students with diverse learning experiences" (24). The district's action steps are listed as followed:

- Provide formal instruction for all Instructional Technology Specialists and turnkey trainers.
- Identify potential turnkey trainers.
- Offer workshops taught by Instructional Technology Specialists and turnkey trainers for all teachers.

Once again, the actions are not detailed. It is known what formal instruction looks like, who will instruct the technology specialists and how the district will go about identifying turnkey trainers. As for the workshops in general, the district needs to do more than just offering workshops to all teachers. For example, if a teacher has a Smartboard in his/her classroom, then a Smartboard workshop should be required, not just offered. In any workplace, when an employee receives a new piece of equipment, it is only fair to have him/her trained on using it and provide him/her with knowledge on how to use it to increase productivity and efficiency. By only offering the workshop, teachers may not attend for various reasons. What the district also should include in its action steps is other methods to train teachers on technology. There are many more ways and means to provide training such as county, state, and nationwide conferences and workshops, online courses and workshops, and online tutorials.

The indicator for this objective is by having "all Instructional Technology Specialists will participate in training identified by district and building administrators based on established targets (24). The objective is to provide training to teachers, but the only way it is gauged is my having Instructional Technology Specialist participate in training. It is evident that there needs to be more professional development and training within the PSCD in regards to technology. Overall, each goal and subsequent objective within PCSD's technology plan should be reviewed more carefully requiring specific information and details that holds the district more accountable.

The PSCD understands the importance of the ISTE standards and its commitment to technology as evidenced by not only by the district's technology plan, but by the

Jefferson Road Elementary School's technology website. This technology website is specific only to the Jefferson Road Elementary School. However, it is extremely difficult to locate. The only way to locate the site is not with a search function on the main district page, but to go to the Jefferson Elementary School's website, select teacher webpages, and then select "JRE Tech Benchmarks' Site." Any attempt to locate it is other ways was unsuccessful. Within this site, they have a link to the ISTE Standards, the district's technology plan, Jefferson Road technology plan, and benchmarks by grade level. The elementary technology plan mirrors the district's plan in regards to implementing technology. However, it provides more specific information. For example, it specifies that

- Technology resources will be introduced at grade level meetings
- Provide lab time for exploring technology recourses
- Teacher training for specific software within the building for both curriculum content as well as for data entry for assessments

One would think that each school would provide similar information, but it may not be posted-- although it should be posted to refer back to it. As for the elementary school's grade level benchmarks, the standards are listed and an overall goal, but no benchmarks. With additional searching, Jefferson Road Elementary School's website has a webpage titled "Grade Level Pages" that provides a brief description of what students will learn at each grade level. Contained in each grade level page, there is a short description of technology. One would think that they would link these pages to the school's technology plan for two reasons – one aesthetic purposes without have a blank webpage attached to the technology plan and two – for informational purposes.

BOCES

PCSD also involves the help of BOCES with technology needs. BOCES stands for Board of Cooperative Educational Services. BOCES is a public organization that was created by the New York State Legislature in 1948 to provide shared educational programs and services to school districts ("About BOCES"). By doing this, BOCES helps school districts like PCSD to save money by providing opportunities to pool resources and share costs. A benefit that BOCES, besides providing technical resources and services, is that they give an explanation on some of their webpages on why and how to use the resource. According to BOCES Instructional Technology website, they can provide the following technology services for PCSD:

- Computer systems planning
- Technology Acquisition and support
- Computer maintenance and repair
- Technology training
- Printing and graphics services
- Grant writing service
- Cooperative purchasing
- Distant learning
- Safari Montage
- Equipment loans
- Videotaping and production
- Apps
- E-books
- Royalty-free music

(“Instructional Technology”)

All of these services are either vital to educational technology or can enhance the learning environment in the classroom. These services can help school districts like PCSD in cost reduction. If the district chooses to participate in these programs, they would not have to

pay for the service themselves. Plus, BOCES offers grant writing which can also help offset technology costs within the district.

Another benefit that BOCES offers is shared staff. According to BOCES website,

> *Shared staff spend a portion of their time working on the specific needs of districts while also being involved with the wider network of BOCES staff members in order to share information, support each other with specialized skills and identify common problems and solutions. This shared approach, reduces time spent on troubleshooting and increases the regional knowledge base.*
>
> ("Shared Staff")

This is another wonderful service that is offered that provide districts with a BOCES staff member who will be working in-house to provide collective expertise for various district technical needs. These share staff placements allow up to a .6 FTE of an individual to work specifically in the district ("Shared Staff"). As a result, shared staff becomes familiar with district equipment, staff, computer software and procedures that pertain to their specific roles.

BOCES also offers a college bound exploration program called New Visions. This is where seniors can explore professional career interests while earning high school and college credit ("Monroe 2 BOCES"). Students intern in the profession of their choice and receive related academic instruction in English and Social Studies ("Monroe 2 BOCES"). This is a wonderful program for any senior, but especially students who will be taking the path in the teaching profession. High school students can work with teachers throughout Western New York and observe teachers in action. This can be a strong program for eventual pre-service teachers who can witness, first hand, teachers

using technology within a classroom. This is pivotal since research has shown the importance of observing educators using technology. It enhances pre-service teachers use of technology in their courses as well as when they enter a school as a teacher. However, the difficult part of the program would be to locate teachers who not only integrate technology in their classroom, but to integrate it effectively. With a strong professor leading the program, students can establish and/or increase their knowledge of educational technology and their benefits.

Requirements and Programs

With the new shift towards Common Core Learning Standards (CCLS), New York State Education Department has introduced curriculum modules and units. These modules and units are for ELA and math across grade levels that can assist school districts in implementing the Common Core Standards. Some modules within the CCLS are posted on engageny.org and they incorporate technology. New York State realizes the importance of technology with these modules. There needs to be a trickle down affect so that technology is present more in education courses in colleges and universities.

However, New York State's degree requirements for students in high school to successful graduate with a diploma do not mention technology proficiencies. The only statement about technology according to the New York State Education Department dictates "state learning standards in technology may be met either through a course in technology education or through an integrated course combining technology with mathematics and/or science" ("100.5 Diploma Requirements"). However, this statement leads one to believe that technology should be integrated into content areas, if a student is

not taking a specific technology course. This is a big leap assuming all students are meeting the technology standards set forth by the state. There are many factors that may limit technology within the classroom as discussed through the literature review such as teacher perception of technology and teacher knowledge of it.

When looking at the technology graduation requirements for PCSD, unfortunately, there are none. According to PCSD 2013-2014 High School Program Planning Guide, students are required to take three and a half units, or classes, of electives. Students can opt to take technology classes within those three electives, but those classes are not technology proficiency classes that will help them in college. The guide also states that "a five-unit sequence in art, music, occupational education, business or technology may be substituted for the three units of a second language" ("High School," 2). Once again, the technology substitution is based on classes that ultimately do not teach computer proficiencies that are required for college. Granted both the state and PCDS may assume that technology is present in students' daily lives, but there are no requirements for knowledge and proficiency when technology is employed in just about every career. Once again school districts, colleges, and universities need to be held accountable to for preparing their students with technology proficiencies for the next level.

Technology proficiencies need to be monitored and assessed throughout a student's career. These proficiencies need to be uniformly understood and used throughout the district. As mentioned earlier Jefferson Elementary School is the only school that provides a "Grade Level Pages" webpage that provides descriptions of

technology within each grade level. Are the technology skills taught at Jefferson Road the same in the other elementary buildings? In addition to this, Barker Road Middle School website is the only website that provides a technology literacy assessment. Once again, is this unique to Barker Road? Other questions arise as well:

- Is every student required to take the assessment?
- Is it just one assessment or are there multiple ones for different grade levels?
- What skills does it assess?
- Is it used for just Barker Road Middle School or is it available to the entire district?

All the schools, administrators, and teachers need to be on the same page. By researching PCSD's websites and pages, it is assumed that each school views technology differently and provides different resources. This should not be the case. At stated earlier, in 2011, over 95% of high school seniors entered college. That is a substantial number who should have similar technology proficiencies, especially since they are all from the same district.

As a whole, Pittsford Central School district has a uniformed library curriculum that involves technology. However, there is not much information provided about it. According to the district website the elementary library curriculum states the following:

> *In the elementary grades, students learn that the library is a gateway to information and ideas. It is a place where they can find stories to stimulate their imaginations and information to answer their questions. Students are introduced to a variety of print, audiovisual and online information resources and are taught how to locate and use them for research and problem solving. Story times, book talks, author and illustrator studies, reading programs and individualized reading guidance all help foster an appreciation of literature.*
>
> ("Library Curriculum: Elementary")

Information regarding the implementation of the elementary library curriculum, whether each student receives it, how often, how long, and how intense, was not stated anywhere on the district's website or adjacent webpages. However, one would assume that each class would be provided an allotted time to visit the library. Elementary students attend school from pre-K to eight grade. The library curriculum is more in-depth and involves more technology as a student transitions from grade to grade. It is not known the depth and breathe of the curriculum, but for such a prestigious school district, they would want to showcase this curriculum to parents and visitors of the website.

Barker Road Middle School requires students who are entering the sixth grade at to participate in a library and technology orientation ("Introductory Tech Tips for Students and Parents"). According to their webpage, it is provided in September as an introduction to the school computer network. This would seem a bit redundant since that students should already have knowledge of the computer network from previous grades, or at least one would hope so. If not, it is a positive trend that should be occurring in the other middle school and possibly even the high schools. No other information on the district webpages was found pertaining to this orientation in other buildings or the information that is provided to students during the orientation. This orientation seems to be an important step entering into middle school and one would hope that the other middle school requires their students to participate in a similar orientation.

There is also an instructional program at the secondary level. According to the library website,

> *[The program] teaches students how to plan and structure their research, apply effective online search strategies and evaluate information according*

> *to specific criteria. Working with rich collections of print materials, online databases, electronic books, digital photo archives and vast repositories of digitally streamed video and audio content, students learn to use multiple information sources and to seek out diverse opinions and perspectives as they construct their own understandings. As members of a learning community, they are taught to respect intellectual property and to adhere to the principles governing the legal and ethical use of information and ideas.*
>
> ("Library Curriculum: Secondary")

The High School Program of Studies Book offers a similar description for the library curriculum:

> *Students are taught how to plan and structure their research, apply effective online search strategies and evaluate information according to specific criteria. They learn to use a variety of tools and media to effectively communicate, create and share their knowledge with others. As members of a learning community, they are taught to respect intellectual property and to adhere to the principles governing the legal and ethical use of information and ideas. Working with rich collections of print materials, online databases, electronic books, digital photo archives and vast repositories of digitally streamed video and audio content, students learn to use multiple information sources and to seek out diverse opinions and perspectives as they construct their own understandings.*
>
> ("High School Program of Studies," 26)

These are wonderful descriptions, but nowhere on any of the PCSD webpages does it provide additional information about the library and high school studies. With the rigorous classes and the traditionally large course load a high school student generally takes, it is hard to fathom that there is an actual library class. This cannot be confirmed through the PCSD website, but one would assume that the library, at this level of schooling, is more of a resource than an actual class. Therefore, one can conclude that the only way the secondary library curriculum is provided to a student is through the core content areas and/or special area courses.

Personnel

There are six Instructional Technology Support Specialists within the district - all at the elementary level. Part of their job description is to provide leadership for the integration of technology into the curriculum, teaching, and assessment ("Instructional Technology Support Specialists"). According to a video posted on the Technology Department's website, they are a source for technology information, they provide information on emerging instructional technology, and instill best practices for using technology in the curriculum. They also specialize in the following:

- Integrating technology in the Common Core Learning Standards
- Utilizing software to support and implement Response to Intervention
- Access and manage data pertaining to APPR
- Implementing resources and strategies to meet students at his/her level using the principles of universal design.

("Instructional Technology Support Specialists")

Each of six Instructional Technology Support Specialists work together to help teachers integrate technology. Each one is specialized, according to the support specialist website, in a particular area and any teacher within the district can use them as a resource. The district is wise in implementing this position within the district. Of the six elementary Instructional Technology Support Specialists, only three have websites. All have general information of their job description and what they offer the district. However, only two provide resources and tutorials of various technology subjects. Only one includes videos and podcasts. Knowing the job description and the talents that they possess, one would think that their websites would be the most complete and influential.

However, this is not the case. One would also think that they would promote themselves to the fullest extent and truly showcase their efforts – especially during a time where there are budget constraints throughout districts.

As for the library/media specialist, there are six – once again, all located in the elementary schools. The library/media specialists don't seem to have the opportunity to work together. Elementary schools mostly have the same heading and some have similar content, but overall, they all have different layouts and different resources. I understand that they are from a different school, but it's the same grade levels, with same content, same curriculum. Each school's library site has several resources. Some have informational websites for both parents and students. Some also have games, activities, puzzles, and riddles in some links. Most have research resources, however, each one seems to be incomplete. With the wide of content taught in schools at various grade levels, one would think there would be more research based links – both for fiction and nonfiction. The same goes for the middle schools' library websites.

Conversely, the middle and high schools do not have library/media specialists according to the individual school library websites---listing themselves as librarians instead. However, on the main library site for the district, they are called library/media specialists. There is one for each building with a few assistances each. Although they do not dub themselves media specialists, they are in charge of the library website for their school. When accessing these website, the word "limited" comes to mind. The information that is posted on most of the sites indeed provides information, but information that is not in need of constant upkeep such as search engines, library polices,

schedule, and catalog. There are very few resources for students among these pages. There are only a few resources for students doing research on specific topics. With the abundance of topics within middle and high school content areas, overall, any visitor to the website would be disappointed. The only bright spot, although rather limited, is Calkins Elementary. It has the nicest and informative website of all the schools within the district. They provide the most online resources and provide links broken down into categories and disciplines. There is also an events page that provides recent events. The site also includes new books, description of the books, and book trailers. Once again, parents or fellow teacher professions might expect more from a library website.

Even technology teachers at the middle and high school level have very limited and inadequate websites. For being a technology teacher and having a passion to pursue a profession dealing with technology, one might think providing information on technology would be a higher priority. Just about the entire technology faculty have few to no resources and information attached to their website. Most have a basic introduction and a few have minor descriptions, but overall, they are not informative and/or useful.

Business teachers are the same way in regards to their websites. They provide very basic information, if any information at all. One business teacher's website has probably one of the nicest webpages on the district site. He provides students with information about all his classes, rules, procedures, rubrics, podcasts, and even updated news.

Departments and Classes

What is interesting within the Pittsford Central School District is the entire Technology Education Department. According to the department:

> *Technology is a component of general education that involves industry. This area of coursework offers insight into the organization of industry, the tools and materials used, the occupations available, and products and problems that occur in the field. The purpose of technology education is to provide an exploration of technical skills and career opportunities available in the field of industry. Technology Education also fosters an attitude in students that assists them in attaining their goals as citizens in our technological society. Educating students on career opportunities in the content areas of manufacturing, construction, communication and power/energy provides an awareness of the technical world in which we live. It is possible to obtain a Regents sequence in Technology Education.*
>
> ("High School Program of Studies," 51)

Although there are New York State Standards relating to technology, the Technology Education Department within PCSD has their own standards. One of the standards is computer technology. The Pittsford Technology Standards webpage states that "students should be able to use computers as tools for designing, modeling, processing information, communicating and for system control and have the ability to master the following." More specifically, students will satisfy this standard by doing the following:

- Apply needed information from media, electronic databases and community resources to complete research projects.
- Navigate operation system.
- Navigate the Internet to gather information to prepare a research paper.
- Use different programs.
- Use word processing software to create research papers.
- Use presentation software to create multimedia presentations.
- Enter data into a prepared/self-made spreadsheet.
- Create a table spreadsheet of data and use it to produce a graph.
- Create technical drawings of objects for projects.

- Use computer software to design projects, circuits, CNC code etc.
- Use software to manipulate machines.

("Pittsford Technology Standards")

Just about all of these skills can use used in college, especially pre-service teachers Most of these skills will carry students through college and will also aid them in teaching in a classroom. By learning these skills, students will not only gain vital knowledge on computers and software, but all gain the confidence to use technology later in life.

Another strand of the technology standards for PSCD, is based on information systems. According to the Technology Standards webpage, students should be able to do the following:

- Use a variety of equipment and software packages to enter, process, display and communicate information in different forms using text, pictures, and sound.
- Access needed information from media, electronic databases and community resources.
- Use communication systems to satisfy personal needs.

("Pittsford Technology Standards")

Communication is a key component in being successful in higher education. Pre-service teachers need to be able to effectively communicate and access information quickly. By teaching and/or honing these skills throughout a student's tenure at PCSD, that student will become more successful in college.

The last standard that would contribute to students skills in college is based on research. According to the Technology Standards webpage, students should be able to do the following:

- Choose appropriate data bases

- Choose and be able to use appropriate Internet search engines.
- Correctly employ search procedures and techniques to maximize effectiveness of search tools.
- Clearly understand rules governing plagiarism.
- Clearly understand copy write restrictions.

("Pittsford Technology Standards")

This standard is also significant for students entering higher education. Much of pre-service teachers required work is research based and as a result, students need strong, developed research skills to locate, analyze, synthesize, and report, on relevant and up to date research. All of these technology standards should not be devoted just to technology classes. They should be integrated throughout the curriculum and throughout each grade level.

At the middle school level, there is a technology program that students attend every other day. This program is called Gateway to Technology (GTT). This program is through Project Lead The Way (PLTW) and they are a leading provider of rigorous and innovative Science, Technology, Engineering, and Mathematics (STEM) education curricular programs ("Who We Are"). According to PLTW's website, the program engages students in activities, projects, and problem-based learning which provides hands-on classroom experiences. Students create, design, build, discover, collaborate and solve problems while applying what they learn in math and science.

The middle school course study book states:

> *Gateway to Technology's (GTT) cutting-edge program addresses the interest and energy of middle school students, while incorporating national standards in mathematics, science, and technology. GTT is "activity oriented" to show students how technology is used in engineering to solve everyday problems. There are currently four instructional units that excite and motivate students to use their imaginations. They are designed to teach them to be creative and innovative, while gaining the skills they need to develop, produce, and use products and services* (30).

The course study book continues by giving a description each of the class:

> *Seventh graders will work with a CAD program called AutoDesk Inventor during the unit "Design and Modeling". They will learn about 3D solid modeling and apply their introductory knowledge to the solution of a*

> *variety of problems. In the "Science of Technology" unit, students will apply their understanding of basic scientific principles to a variety of problems, where they will design, build, and implement their solutions.* (30)
>
> *In the second year of Technology Education, eighth grade students will receive an introduction to the "Magic of Electrons". The focus will be placed on the construction of simple electricity and electronics projects. Because this is, for many, their first exposure to electricity and electronics, projects are step-by-step construction with a small amount of theory. In the other unit, "Automation and Robotics," students will build mechanical devices using parts supplied by Fischertechnik, and learn introductory programming. Basic concepts and understandings will be applied to the solution of problems requiring construction, wiring, and programming of simple mechanical models* (31).

This program may or may not fulfill technology competencies that may be helpful entering college. This may be up to the technology teacher and how he/she develops the procedures for organizing, analyzing, producing, and presenting. However, the programs do provide students with problem solving skills which are imperative for higher education. By developing problem solving skills while teaching them creativity and innovation, students who enter college may be more motivated to use technology in higher education for the sole purpose of being creative. They may be apt to solve technology problems that arise with their problem solving skills.

Both high schools in PSCD use the same Project Lead The Way program for some of their technology classes. After examining all the technology courses offered at the high school level, all focus on math, science, and engineering, with little specifically stating technology. These classes range from Design and Drawing for Production to Communication systems, to Digital Electronics, to Manufacturing Design. Once again, it can be assumed that technology is included in organizing, analyzing, producing, and presenting just as it is in the middle school. In order to fully foster an attitude in students that assists them in attaining their goals as citizens in our technological society, as

mentioned by the Technology Education Department, a large and influential aspect is based on the teacher's perceptions, experience, and knowledge of technology.

As mentioned earlier, Pittsford's Mendon High School and Sutherland High School's STEM programs were nationally ranked. However, after closer examination, technology was not included in the rankings. Schools were judged nationally on their level of math and science participation and success, using Advanced Placement STEM test data for 2011 graduates as the benchmark to conduct the analysis. Plus, the U.S. News Best High Schools for STEM rankings methodology does not rely on any data from the U.S. Department of Education ("Best High Schools for STEM Rankings Methodology").

As for other classes that do not use the PLTW resources, only a few are in need to be highlighted. In the 2013-2014 Programs of Studies book for the district, keyboarding is offered to students who are in grade 9-12. The following is the exact course description from page 17:

> ***Offered at MHS only***
> *KEYBOARDING IS A NECESSARY SKILL IN THIS COMPUTER AGE! This semester course is designed for students who would like to master touch keyboarding techniques in the shortest possible time and increase key-boarding speed and efficiency. Specialized computer software is used that makes achieving these goals fun! You will also learn and apply word processing basics to create personal and business letters, reports, outlines, tables and other documents. This course is recommended for all students.*
>
> ("High School Program of Studies," 17)

This class has little to offer students to prepare them for college. Since computers, tablets, cell phones, and other technology devices have keyboards, students learn to type and

manipulate the keys even before they enter primary/elementary school. It is already evident with some schools in PSCD that keyboarding is already integrated into classes and is taught as early as first and second grade. Students can attend other, more influential classes that will provide a more meaningful skill than keyboarding.

However, this class does offer word processing basics documents such as letters, reports, outlines, etc. This would be a more effective class for college readiness as long as resumes, cover letters, e-mail, and other college documents are involved. Also, this course is recommended for all students. However, it is only offered to Mendon High School students. As a result, Sutherland High students are missing out on this course that, although minimal, does have its benefits. Another area of interest within the keyboarding class, is that it is only a half year. It also does not mention how often the students meet. With the amount technology information that can be offered to a student, this class could, in theory, run a full year, five days per week.

Another class that stuck out is actually a class for college credit. It is about Microsoft applications. It is offered as a college credit class, but in reality, it should be required for all students. It should be required because most to all college students will be using all of the applications within Microsoft Office at some point during college career. This is a half year class is designed for students in grades 9-12. It will also provide students taking it with four college credits. According to the High School Program Book, "the key to productivity is the ability to integrate the capabilities of software. This computer course utilizes realistic activities and projects designed for learning and

integrating Microsoft Office 2007 suite of application software: Word, Excel, Access, and PowerPoint" (15). Based on the course description, a student will:

- Learn how to prepare professional-looking documents using in-depth advanced word processing skills
- Become competent in database management using Access
- Create Excel spreadsheets, execute formulas and create charts
- Learn and utilize the full range of PowerPoint capabilities

("High School Program of Studies," 15)

This class is essential for all college students, but especially pre-service teachers. All of the skills taught within this class will be utilized with a school and the classroom. All information and data need to be professional looking, especially when it accessible to the public. Pre-service teachers will also be required to manage data particularly assessments and spreadsheets are perfect for accomplishing this. Lastly, powerpoint is a valuable skill because teachers are presenters whether they are presenting to students, colleagues, parents, or administration. Powerpoint, therefore, can be an effective tool.

The last technology class that is effective for college students – pre-service teachers especially – is Web Page Design. It is a half year course for students in grades 9-12 that will also provide them with one college credit. The following is the course description taken for the High School Program Studies book:

> *This Web design course teaches you how to plan, organize, and create a Web site from start to finish. Using HTML code and Notepad, then progressing into using Microsoft Expressions Web, (a Web authoring and site management program), you will learn to create and manage professional-quality sites. Using some very powerful design concepts and techniques taught in this course, you will learn how ordinary Web pages can be arranged to look more appealing and professional. This project-based course teaches you essential Web development skills in some of these Web page elements:*

- *Hyperlinks*
- *Templates*
- *Tables*
- *Formatting tools*
- *Image maps*
- *Thumbnail images*
- *Interactive forms, frames and much more!*

("High School Program of Studies," 19)

Although this class is not necessarily essential for pre-service teachers, web design is an up and coming trend and can certainly increase students' motivation to use technology. As stated multiple times, a positive attitude towards technology often increases an individual's ability to use technology. This is not to mention that having the understanding and skills of web design can assist teachers in their creation and maintenance of their classroom websites.

Pittsford Central School District also offers online learning opportunities according to the 2013-2014 Program of Studies book. "These online courses, also known as virtual classes, provide some or all instruction over the Internet as an alternative to our standard instructional program. Online courses are self-paced and usually highly interactive, instructor-led, content rigorous offerings." ("High School Program Studies," 50). Providing online courses is a must for high school students since colleges and universities are gearing more of their courses either fully online or as a hybrid class. According to the Program of Studies book:

> *Online courses require a high degree of self-discipline and motivation, good reading skills, and the ability to keep up with ongoing and demanding expectations without the structure of a fixed time and place for instruction. Successful online students are highly organized, self-starters, who can work independently, have excellent time management skills, and*

> *are willing and able to dedicate 4 - 6 hours per week per course to complete assignments. High speed computer access with an Internet connection is also needed. These courses can be taken for elective or college credit The student is responsible for all college course related expenses, and an Online Learning Coordinator is not assigned* (50).

Pittsford Central discusses the demands for online classes and eludes that only students who meet those demands should take online classes. Many students may not meet those requirements in high school and may still not have fully developed those skills when entering a college or university. However, many are still expected to take online, or hybrid college classes. In addition to this, students attending online classes that are not for college credit, meet with an online learning coordinator once per week. Since this is the first time students are exposed to online classes, it would seem that they should be required to meet and interact with their coordinator much more than the required once per week to help them fully understand all the "in and outs"
of an online class.

To make things even more difficult for high school students in Pittsford, those who are not taking an online class for college credit do not receive help for an online learning coordinator. There must be ways to receive help and guidance, but it is not mentioned online. Overall, an online class with no coordinator seems a bit unfair since professors are still available for online college courses. Ultimately, all high school students at some point during their high school career should be required to take at least one online class. By doing so, students will be able to properly prepare themselves for the demanding and strict college course requirements.

In addition to actual student courses, there are online learning opportunities for faculty and staff. The same set up and materials needed for online classes also provide video conferencing. This allows staff the opportunity to connect to cultural institutions, experts from around the world and acts as a way to hold meetings. This technology allows for the district to connect with large conferences around the state or the world.

Professional Development

According to the New York State Education Department (NYED) and the Office of Teaching Initiative webpage, school districts require teachers to have 175 professional development hours every five years. It states directly on the Office of Teaching Initiative webpage that content of courses, workshops, and other professional development experiences should be related to the following:

- *enhancing teacher subject matter knowledge,*
- *teacher knowledge, use, and application of appropriate teaching techniques,*
- *broadening and enhancing teacher abilities to apply more accurate and appropriate assessment methodologies, and*
- *enhancing teacher skills in effectively managing individual students and classroom in both heterogeneous and homogeneous settings.*

("175 and 75 Hour Professional Development Requirement")

Teacher knowledge, use, and application of appropriate teaching techniques speaks to technology although it is not spelled out that way. Learning about the effectiveness of technology and how to integrate it into the classroom are teaching techniques and will enhance the subject matter with students and increase student achievement. Professional development geared toward technology can also broaden and enhance teachers' ability to

apply more accurate and appropriate assessments. Technology can also enhance teachers skills in effectively managing individual students and classrooms since technology is motivating and engaging.

The State Education Department continues by providing suggested categories of activities for professional development. Although there is not a specific technology category, technology can fit in all of the areas specified on their website which are stated below:

- *Analyzing student data and student work to determine needed changes in the delivery of instruction.*
- *Participating in reviews of class performance data over time to make decisions about one's own professional development, based on student outcomes*
- *Collaborating with other teachers and teaching assistants to examine case studies of student work and development*
- *Participating in courses and other learning opportunities delivered from many providers, such as institutions of higher education, teacher centers, BOCES, school districts and independent professional development service providers.*
- *Coursework linked to improvement of instructional technique or content knowledge, which may or may not be in pursuit of a teaching or advanced teaching degree.*
- *Completing coursework for more advanced certification or certificates in additional areas or in accordance with teaching assignment requirement for extension to certification.*
- *Participating in regional scoring of State assessments, assessing student portfolios*
- *Creating and assessing teacher or teaching assistant portfolios*
- *Engaging in research projects (includes online research)*
- *Curriculum planning and development*
- *Developing or collaborating on the development of new programs and instructional methods*
- *Service as a mentor, support teacher, helping teacher, or peer coach*
- *Service as a cooperating teacher for a student teacher or field internships; including attendant meetings and processes.*
- *Participation in study (collegial) circles such as "Critical Friends" activities, structured guided reflection activities focused on student learning*
- *Participating in formal programs of peer coaching or participation in peer review*
- *Participating in Professional Development School activities or other school-college teacher development partnerships*

- *Serving on CDEP (Comprehensive District Education Plan), or DCEP (District Comprehensive Education Plan), or CEP (Comprehensive Education Plan), or other school leadership activities or committees.*
- *Delivering professional development (e.g. conducting workshops, job-embedded modeling and coaching, providing pre-service teacher preparation courses)*
- *Pursuing National Board certification or re-certification (either as candidate or provider of support)*
- *Service/designation as Master Teacher*
- *Engaging in Sabbatical work related to content specialty or enhancement of teaching strategies.*
- *Teacher of the Year activities*
- *NYSTCE "assessor" or test development committee member*
- *Development of Statewide curriculum*
- *Service as an elected officer in professional organizations*
- *Service as teacher center director*
- *Service on the State Professional Standards and Practices Board*
- *Developing and presenting a major paper*
- *Publishing in educational journals*

("175 and 75 Hour Professional Development Requirement")

All teachers new to Pittsford are required to participate in an induction program. This two year program is designed to accelerate the learning and enculturation of new teachers, both in career and the district, so that they can guarantee that every child has access to a highly skilled teacher ("Professional Development"). Based on the Professional Development webpage, teachers participating in the program complete approximately 30 hours of training with one of the topics being technology. New teachers receive an orientation to the district's technology resources although specifics are not provided or found on the district's webpages. The new teachers are also required to attend training sessions throughout the year on various topics although technology was not specifically stated as one of those topics ("Professional Development").

Mentors work with new teachers within PCSD with a role of observing and providing feedback to new teachers ("Professional Development"). These mentors are

trained on their roles and responsibilities. No other data was located referring to the additional roles and responsibilities. One would hope that these mentors are experienced teachers in the area of technology with the abundance of hardware and software engrossed throughout the district.

According to the professional development website, teacher leaders such as standards leaders, department Leaders, Team Leaders, and grade level chairpersons are also required to participate in training designed to assist them in providing leadership to their colleagues. Once again, additional data was not available, but again, one would hope that technology is involved to help colleagues better use technology and integrate it into the classroom.

Although the state mandates 175 hours of professional development every five years, the PCSD requires that all teachers complete a minimum of 12 hours of professional learning annually. According to the district's professional development website, these 12 hours can take the form of teacher center courses during the summer or after school, participation in a Collegial Circle, or attendance at a relevant conference outside of school hours. What is surprising is that mentoring, according to a powerpoint posted on the Professional Learning Initiatives webpage, can count towards 100% of a teacher's your professional development. This is surprising because, although mentor teachers are trained to work with new teachers, they are not working to better themselves in their discipline, content area, or in the use of technology.

As for the rest of the PCSD Teacher Center website, it states on the site that the center is committed to supporting professional develop that focuses on 21st century skills.

They also mention technology as the first topic when discussing the various areas of learning they provide. When examining the types of technology professional development they offer – both past and present, there were some, but not enough to warrant significance. They offered:

- One sessions on technology integration into math
- One session of video recording
- One session on assessing data through technology
- One session on collegial circles
- Several sessions on various software applications such as Castlelearning.com Edmodo.

("Pittsford")

Among the other sessions and workshops, technology may have, indeed been present, but it was not listed in heading or in the description of the session or workshop.

In addition to this PCSD, also offers professional development opportunities as elective course for faculty (Tech Quest 6). The district's technology plan, Tech Quest 6, states "examples of elective course offerings include Getting to Know Microsoft Office 2007, including separate modules on Word, PowerPoint and Excel, Designing and Sustaining Portal Pages, and Utilizing *Infinite Campus*" (48). An attempt to locate elective technology courses through the district website and adjoining webpages were unsuccessful.

According to the webpage titled Collegial Circles within the Teacher Center website, "a collegial circle is a professional learning community made up of educators who are committed to enhancing or improving their professional practice" ("Success Summaries"). According to the Teacher Center within Success Summaries, there were five collegial circles based on technology in 2009. In 2010, there were only four

technology collegial circles however, in 2011, they increased to eight ("Success Summaries"). Specifics were not provided such as the type of topic within technology or the number of participants, but it is good to see that collegial circles regarding technology are being implemented. It shows that some teachers are truly interested in technology and want to better themselves.

Not connected to the Teacher Center, is a webpage titled SMART Board Training Resource Page found through Barker Road Middle School that is geared towards Smartboard training. It is not known whether the training is just for faculty within the middle school, but the site provides:

- Multiple courses with varying levels of knowledge
- Dates of training sessions
- Tutorials
- Game templates
- Various Smartboard resources

This is a tremendous opportunity for technology professional development especially since the district has so many Smartboards and hopes to eventually have one in every classroom. This type of training should be available to all teachers, if it is not already. It can impact student learning and the classroom environment significantly and should be promoted. This website was only found when searching through each schools teacher websites.

As for the workshops in general, the district needs to do more than just offering workshops to all teachers. For example, if a teacher has a Smartboard in his/her classroom, then a Smartboard workshop should be required, not just offered. In any workplace, when an employee receives a new piece of equipment, it is only fair to have

him/her trained on using it and provide him/her with knowledge on how to use it to increase productivity and efficiency. By only offering the workshop, teachers may not attend for various reasons.

BOCES also offers technology professional development in a wide array of topics ranging from integrating technology in specific content areas, to software applications, to apps, to web design. However, some cost money and most educators need to get permission from his/her administrator. One workshop stood out in regards to preparing students for higher education. The one and a half hour workshop is titled "What College Readiness Means in Technology: From the College Level Perspective" and the description is stated below:

> *Most high school students know how to use Google, Facebook and Microsoft Word. But using a computer at college is oftentimes much more sophisticated. Basic mechanics (how to troubleshoot connectivity issues, how to manage files, how to optimize battery life), basic maintenance (managing battery life while on campus, general care, updating software, avoiding malicious software), and productivity (using the computer in class to assist and supplement learning) are typical skills that college students are expected to know. This session will be a discussion that attempts to identify the gaps of technological literacy between K-12 and higher education, and start a dialogue to address these concerns.*
>
> *Participants will see what types of technology college freshmen will be expected to be proficient in. Additionally, participants will initiate a dialogue for addressing the technological literacy gap.*

("What College Readiness Means in Technology: From the College Level Perspective")

This workshop is interesting for several reasons. First, it is not offered often when it is obviously important to teachers at the high school level. Second, this workshop is

more effective to college bound high school students rather than teachers. It has its benefits for teachers, but a workshop such as this should be provided to all students.

However, technology is limited in professional development because so many districts are focusing on the new Common Core, APPR, test scores, making Adequate Yearly Progress (AYP), etc. Districts need to realize that technology integration can satisfy and enrich all the areas of school. As a result, there should be consideration on professional development specifically geared towards technology.

Chapter IV:

A Comprehensive Technology Guide:

A plan to link school districts to colleges and universities

Introduction

Arne Duncan, the United States Secretary of Education, recently noted that, "[w]e need to change society's views of teaching—from the factory model of yesterday to the professional model of tomorrow—where teachers are revered as thinkers, leaders and nation-builders. No other profession carries a greater burden for securing our economic future" (Wolf, 47). If teachers are "thinkers, leaders, and nation-builders," as Arne Duncan said, they must be provided with the very best in all academic areas, especially in in the growing development of technology in schools and workplace training. The country as a whole needs to change the way those who prepare others for life skills and training are prepared. Schools have a growing need for outside consultation services for curriculum needs, testing development, data collection and analysis, and behavioral management. Technology, too, has become a component so vast that schools require assistance to not only understand the "latest and greatest," but also how to fund new technological endeavors, assimilate them into curriculums, and train their staff properly in regards to effectively implementing the knowledge, skills and tools at the classroom level. The following action research component found within this thesis provides not only a descriptive technology plan for education (K-12 and Higher Education) but also a

vertical articulation of how a well-formulated infrastructure can support an appropriate classroom infusion of technology into pedagogy.

Teaching and Learning Framework with Technology

This technology plan was developed to provide administrators, teachers and students with the educational benefits of technology within the classroom. When new and emerging technologies are carefully integrated into the curriculum and skillfully applied to instruction by well-trained teachers, students have opportunities to achieve the highest levels of academic success, personal development, and become technologically literate for the 21st Century.

Educational technologies enable administrators, teachers and students to access information, enjoy diverse teaching and learning experiences, and establish connections that extend beyond the school community. Educational technology, when used in the classroom, will strengthen student engagement and improve student achievement by enabling them to access and analyze information, solve problems, collaborate with others, and communicate their thoughts and ideas. Effective use of learning technologies will allow students to become self-directed, self-motivated and lifelong learners. This will ultimately prepare students whether they are entering a two or four year college or entering the workforce.

With educational technology, we can:

- Engage students in inquiry-driven and project-based learning by providing tools for research, communication and creation which will be expected in college.
- Bring real-world experiences to classrooms which will eventually help develop positive attitudes towards technology and its proper uses.

- Motivate and challenge students with varied and participatory learning activities.
- Foster the development of communication and collaboration skills by enabling participation in online global environments.
- Stimulate creativity and innovation by giving students tools with which to
- question, explore, discover, solve and create.

The purpose of this technology guide/plan is to assist in the decision-making processes involved with the use of technology in the educational system to help prepare students to "college ready" and have the 21st Century skills to be successful in higher education. It will also help facilitate student learning and teacher productivity. This guide is a guide and should not constrict the decisions and practices of schools or the district as a whole. Because of the constantly changing nature of the use of technology, it is necessary to update this guide in case the district is confronted some of the additional issues regarding technology and preparing students for higher education. Specifically, this guide attempts to address the following:

- The use of technology assist in preparing students, teachers, and administrators to meet the National Education Technology Standards
- To improve students and faculty's perceptions on the benefits of technology
- The professional development strategies and structure to carry out the national standards and improve the perception of technology
- To describe the current hardware and software available and their influence within the classroom, school, and/or district.
- To advise an evaluation system for monitoring the professional development, appropriate hardware, and software, and faculty competencies with technology.

Mission Statement

Simply being able to use technology is no longer enough in today's society. Students today need to be able to use technology to examine, investigate, learn, and explore. 21st Century skills are vital for preparing students to work, live, and contribute to society. The district will utilize national best practices and use technology as an avenue to access and synthesize information and properly use it as a tool to communicate, collaborate and create with others.

Vision Statement

Graduates will be prepared for the challenges that arise from college and careers in the 21st century. "College ready" means more than attending a college or university in the pursuit of a two or four year degree. Being "college ready" refers to students not only knowing the necessary knowledge and skills in their desired field, but demonstrating that they know how to learn and build upon what they learned in high school to solve problems. A student who is "college ready" has awareness and understanding of technology and how it is used to increase his/her ability to solve problems.

We envision technology in our school district to be one where:

Our Students…

- are technological literate
- are actively engage in technology
- work collaborative with classmates and faculty
- balance technology in their daily lives
- see the importance of technology and how it can be used for research and learning
- communicate with others on a local, national, and global level

Our Faculty and Staff…

- exhibit passion to use technology

- are technological literate
- are actively engage in technology
- collaborative with students and faculty members not only within the district, but locally, national, and globally
- balance technology in their daily lives
- use data to make meaningful and effective instructional and administrative decisions
- see the importance of technology and how it can be used to solve problems
- collaborate with parents to develop technology literate students
- create engaging, creative, and meaningful lessons with technology based on state standards
- create professional learning communities with other teaching professionals to remain current on best practices related to technology
- provide students with access to current electronic resources that will support students in their learning
- attend and participate in technology professional development to increase competence and confidence

Our Administrators…

- exhibit passion to use technology
- are technological literate
- are actively engage in technology
- create collaborative communities with other educational professionals to remain current on best practices related to technology
- use technology in a timely and effective manner in order to transmit information to stakeholders
- use data to make meaningful and effective technology decisions
- develop appropriate professional development opportunities to help teachers understand the role of technology in instruction

Our Parents…

- are involved and engaged in their children's technology experiences
- work collaboratively with school leaders, faculty, and staff to support their children in their technology use
- model appropriate technology literacy

Major Steps and Recommendations

Step 1: Evaluating Technology

Technology should be a tool to help educators meet the educational needs of all students. Continuous evaluations of technology need to be adhered to all areas of a district to determine if the technology is appropriate and has the ability to enhance the teaching and learning process.

Goal 1: All technology within a district needs to be evaluated on a yearly basis through a created committee or department and be based on measureable data.

Recommendations include:

It is recommended that the district creates documents that will aid in reporting data to the districts technology department/committee. The following criteria should be imbedded in current documents or in the creation of new documents to assist in determining technology integration, teacher effectiveness with technology, and professional development activities.

Will create criteria for evaluating new and existing software and hardware

- Evaluate the usefulness of software applications and hardware within the building.
- Will provide detailed justification stating how the purchasing of technology will impact student learning.
- Create standard procedures for teacher training prior to new technology implementation
- Will develop evaluation to assess teacher/staff present knowledge, readiness, and ability to use technology
- Will meet set a specific number of times per year to meet. Each meeting should be conducted based on measurable data. Members will review and examine the needs within each building and make appropriate decisions.

It is also recommended that districts create committees at the building level and/or

district level that will link ISTE Standards to the curriculum. These committees should be members from each school building that reports to the Director of Technology. The committee should be selected based on the following:

- Desire to implement technology
- Knowledge of technology
- Currently implements technology in the classroom
- Evaluations
- Observations by administrators of technology being implemented in the classroom
- Recommendations from administration and faculty members

These committees should also monitor the success of the district's technology plan and stress the importance of instruction technology throughout all areas of the curriculum. These committees should also provide feedback to the district's technology department on an on-going basis. The members from each building should work closely with the building's technology specialist and/or library media specialist.

STEP 2: Teaching Students

Every student will have the opportunity to use educational technology to access, analyze, research, and experience information in ways that develop higher order thinking skills, increase their ability to use technology as a tool in solving problems, and support their confident use of the technology skills they will need for success in their future study and employment.

Goal 1: All students will be able to demonstrate effective use of technology skills and information literacy skills.

Recommendations include…

- Overall, districts need to develop a technology-rich classroom that involve the following:
    - Assignments which allow students to work collaboratively with other students, locally, nationally, and globally, on project based assignments.
    - Lessons that provide detailed strategies to locate, analyze, interpret, and record research through online data based and websites
    - Instruction on internet safety, school district policies regarding the internet, appropriate "netiquette," and have an understanding of his/her digital footprint.
    - Provide reasoning for the use and processes of technology and how they affect people on a local, national, and global scale.
- Appendix B has a sample outline for students' technology proficiencies by grade level.
    - These proficiencies can be revised and adjusted based on student data obtained through surveys, observations, sample work, etc.
    - The determination of student proficiencies can have various avenues. The following are suggested evaluations for student proficiencies:
    - At the primary level, student proficiency can be determined with the help of the outline stated in Appendix B. These proficiencies can be determined and documented by teacher observations and student work samples.
    - At the elementary level, proficiencies should not only be determined based on the performance indicators set on Appendix B, but through benchmark

projects as well. These projects can be incorporated into the content areas as integrated artifacts of each discipline.
    - At the high school level, districts can develop a combination of benchmark projects as well as more formalized assessments. In addition to this, students should take a comprehensive survey provided to them at the end of eighth and twelfth grade. This will allow students to reflect upon the technology they used and the behaviors which should have been acquired upon completion of each of those grades.

- An examination of technology classes that are currently available within their district. Although most are beneficial to students who will immediately enter the workforce from high school, most technology classes do not prepare students for colleges and universities. Some technology proficiencies are incorporated within the content areas, but many technology proficiencies are not. As a result, districts should implement a technology class at the primary and elementary levels. At the high school level, computer technology classes should also be implemented allowing students to either hone or strengthen the proficiencies taught in the elementary grades. Lastly, high school students need to be exposed to online and hybrid classes. Colleges and universities are incorporating these types of courses into their departments at a rapid pace. In order for students entering colleges and universities to be successful in that learning environment, they first need to be exposed to it in high school.
- Districts also need to provide instruction on the following areas for high school students since they are vital and prominent use in colleges and universities:
    - Digital drop boxes
    - E-mail
    - Wikis
    - E-books
    - Online assessments
    - Online portfolios

- The district should administer a survey to previous students after graduation. This will ultimately inform districts as to the level of preparedness students experienced while within the school district. This is vital because it will provide districts information that they can use to adjust current knowledge and practice as it relates to overall technology use.

STEP 3: Strengthen Leadership

For public education to benefit from the rapidly evolving technology, leaders at every level must not only supervise, but provide informed, creative and ultimately transformative leadership for systemic change. Every administrator should be technologically literate, will provide leadership in integrating technology into curriculum, instruction, and student learning activities; and will have access to technology resources that support them in developing management systems.

Goal 3.1: Ensure that the administrators are actively involved in the use and integration of technology

Recommendations include:

- Invest in and attend at least one technology professional development workshop or course in order to keep up to date on continuous technology innovations.
- Discuss with faculty through faculty meetings, grade level meetings, pre and post observations, informal discussions, etc at least twice per year to ensure that faculty and staff take advantage of the technology professional development offered in the district as well as outside of it. Documentation should also be included as a monitoring and reflective tool.
- Administrators should work closely with the Director of Technology, the Technology Department, and technology committees to help foster and develop partnerships between higher education institutions – especially in the development of pre-service teachers. Anticipated higher education data should be implemented to help hone where a majority of graduates within the district attend and use that data to develop technological initiatives with the institutions to strengthen students 21st Century skills.
- Encourage creative technology partnerships with the business community.
- Empower students' participation in the technology planning process. Administrators should be present in analyzing student data pertaining to technology and discuss with students their perceptions, ideas, and usage of technology on a continual basis.
- Foster and nurture a culture of responsible risk-taking while advocating for policies promoting continuous innovation with technology. Administrators should, on an on-going basis, meet with faculty who are piloting technology within the district.
- Administrators should experience either the adopted or current technology within his/her school even if he/she does not use it on a daily basis. This will give the administrators more knowledge of the effectiveness of the technology and/or

challenges that may arise resulting in pro-active problem solving.

- Administrators should attend a minimum number of technology lessons each year based on district recommendations.
- Administrators should, if at all possible based on training, instruct a technology workshop or course at least once per year.
- Develop policies and procedures and seek funding opportunities to provide digital resources to educators, students, parents, and communities before and after school hours.

- Collaborate with public libraries to provide anytime, anywhere access of educational content.
- Monitor effectiveness of the district website.
- Consider ways to reward teachers that have achieved proficiency on meeting the standards.
- Explore the possibility of a technology requirement for recertification for teachers and administrators.
- Administrators should be observed using technology to ensure they are using the technology for best practices.
- Administrators should, if at all possible, participate in technology based collegial circles.
- Provide data to the faculty and community about the effectiveness of technology within the district each year.
- Although there is a district technology plan, principals should create a building technology plan that sets goals for the faculty and staff to meet on a yearly basis based on their specific needs and desires.
- Meet with faculty at least twice a year to discuss technology integration within the classroom.
- Maintain an administrator website that provides valuable information to parents and the community about school and district policies, activities, events, recognitions – both staff and students, and technology initiatives/developments.
- Administrators should be willing to assist in technology lessons in classrooms and showcase these lessons to faculty.
- Communicate new and innovative resources and free software to teachers that may enhance student motivation, creativity, problem solving abilities, and achievement.
- Add technology questions into the interview process for potential hires.
- Add a technology piece to observed lesson plans to potential hires, if applicable based on the district's hiring procedure.

Goal 3.2: Ensure that administrators are proficient in the use and integration

of technology through professional development activities.

Recommendations include:

- Create a differentiated professional development program for administrators to address the use of technology in the following areas:

    a. To enhance and support instruction and standards-based curriculum leading to high levels of student achievement,
    b. To use data in making leadership decisions,
    c. For communication and collaboration among colleagues, staff, parents, students, and the larger community,
    d. For systems support, management, and operations,
    e. To understand the social, legal, and ethical issues related to technology and model responsible decision making related to these issues

- Create a rubric or evaluation process to determine administrator proficiency with technology.

STEP 4. Improve Teacher Training

Teachers have more resources available through technology than ever before, but some have not received sufficient training in the effective use of technology to enhance learning. Teachers need access to research, examples and innovations as well as staff development to learn best practices.

Goal 4.1: **Ensure that the faculty is proficient and actively involved in the use and integration of technology through professional development activities.**

Recommendations include:

- Improve the preparation of new teachers in the use of technology.
    - New Teacher Induction/Orientation should involve the use of technology. Not only should a new teacher be introduced to accessing e-mail, the district server, and how to request work tickets, but also but information describing types of hardware and software within the district, the purpose of each piece of software and hardware, and to successfully implement each within the classroom. New teachers should also be presented with the technology standards. They should also be presented with resources on how to access exemplar lessons, activities, and/or student examples. Teachers should be provided information on where to find additional resources, who to talk to within the district if you had additional questions.
        - New Teachers should be provided a handbook, binder, or other source as a reference.
        - A link should be attached to the district site allowing any teacher in the district to access this information.
    - Each new teacher should have a mentor who is proficient in instructional technology within the district.
        - The new teacher and technology mentor should meet on a regular basis, decided by district, and meeting should be documented.
        - Mentor should observe the new teacher using the technology and provide constructive feedback.
- Every teacher will meet technology competency standards that ensure their ability to use learning technologies effectively in supporting student achievement of the New York State Learning Standards
    - Teachers should be evaluated on their technology capabilities for the sole purpose of designing professional development and not for

evaluation as an effective teacher.

- Teachers should be evaluated on a yearly bases and documentation should be included from each year to show growth in the understanding and competency of technology.
    - The following are options that a district can potentially use to determine teacher competency:
        - Observations from administration
        - Teachers will include a write-up for their post observations with administration describing the technology, or lack of technology within the observed lesson.
        - Capture classroom interactions with technology via video.
        - Recommendations for a mentor teacher (if the teacher is new to the district and is participating in new teacher orientation)
        - Develop lessons integrating technology and upload them onto the district website along with student artifacts.
        - Consistently updating the classroom website that showcases the National Education Technology Standards within the classroom.
        - Plan and conduct a technology workshop for teachers. The workshop must span over at least three, one hour sessions.
        - Take a technology course through a college, university, or intermediary service.
        - Write a technology grant that has a minimum dollar requirement established by the district's technology committee.
        - Participate in writing/revising curriculum that integrated technology
        - Pilot an emerging technology tool in the classroom after approval from the district's technology committee
        - Any other form of assessement that is approved by the district's technology committee.

Goal 4.2: Provide sustained, intensive and high-quality professional development professional development and continuous support enabling faculty to be confident and knowledgeable when working with technology.

Recommendations include:

- Require a specific number of professional development hours towards technology each year and in specific areas of faculty need. This need will be on an individual basis. This will ensure that faculty will be able to effectively apply educational technology to instruction.
    - Documentation should be placed on file depicting:
        - the number of hours attending technology professional development
        - the type of technology presented during PD
    - Evaluations should accompany any and all technology PD showing the importance, or lack thereof, of the PD and the technology described within as well as how the teacher can/will incorporate into his/her instruction.
    - Documentation will be kept regarding individual faculty participation so that faculty are continuing their knowledge and competencies rather than taking the same or similar technology PD from year to year.
- Require that Technology Specialists/Library Media Specialists or outside technology specialists conduct technology PD training.
    - This training should be submitted to administration or technology committee describing the need and importance of the training within the grade-level, building, or district.
        - Documentation should be kept either on file or better, online, so that attending members can refer back to the information presented and track when similar training was presented and who/how many attended.
        - Training should comprise of evaluations for each attending member.
        - Training should be on-going and thus be established, broken up into several training experiences.
        - Training should require attending members to experience and use the technology first hand rather than just a lecture based presentation.
        - Technology PD show require attending members to collaborate with each other.
        - Goals and objectives should be required and stated before signing up for technology PD.
    - If Technology Specialists/Library Media Specialists or outside technology specialists cannot conduct technology PD training, and there is a need for technology training, then a faculty member who has shown mastery of specific technology can present PD.
        - A faculty member who shows mastery will have done so through:
            - Attending technology PD that relates to the training he/she would be teaching.
            - Successfully integrating the technology within the classroom designated by:
                - Administrator observations
                - Co-worker recommendations
                - Student surveys or interviews
- Faculty planning on attending specific technology PD should submit questions,

ideas, perceived notions, etc about the technology so that those who are running the training can be more prepared to the attending members' needs and desires.

- Teachers should be required to state technology goals during their annual reviews and/or growth plans. These goals should be based on data obtained through professional development, observations, needs within the classroom, student data, etc.
- Website development/management professional development needs to be required at least on a yearly basis. According to NCLB, electronic data should be available to parents. Teachers need to update their website and classroom data often. Outdated, incorrect, or no information at all, looks poorly on a teacher and the district.
- Technology PD should be offered in a variety of formats ranging from internal PD, online, study groups, video conferencing, etc. Some avenues will allow faculty to pursue and complete technology PD away from their normal school hours if they choose to do so. School districts need to investigate availability and feasibility of providing these various opportunities.
    - If at all possible, include technology PD on days solely for PD, superintendent conference days, and/or relieve faculty from their regular duties in order to attend training. This is because training that occurs outside of regular office hours may be perceived to be an additional burden and faculty members may be tired and less able, or willing, to absorb information.
    - Provide mini-technology training during grade level meetings or building meetings to problem solve or address questions on an ongoing basis.
    - Training the trainer models in which training a small group of trainers and they deploy training at the school level.
    - Training may also be available on diskette, CD-ROM, DVD, videotape, the district website, or another medium.
- Technology PD should be provided at various levels allowing faculty members to progress in their technology competencies, meet their own personalized goals, and satisfy NETS Standards for Teachers.
- Technology PD should be reassessed each year to eliminate PD that faculty members do not need since they already received training, or the technology software or hardware is obsolete.
- School districts need to create a professional development section on their websites or district networks to allow teachers access to a wide variety of professional develop opportunities with technology and list whether they are internal, online, study groups, or other form of PD.
- Districts should also allow for uploading and downloading resources pertaining to technology so that teachers n refer back to the information presented in specific PD sessions. This will also allow any faculty member within the district to view the resources and give them time to "play" and experience the resources to

become more knowledgeable on a personal level. Examples of these resources are:
    - Tutorials
    - Exemplary lessons and/or activities
    - Exemplary pieces of student work
    - Software and hardware business websites
    - Suggestions
    - Ways to implement software/hardware into the curriculum
- Technology PD sessions should include manuals, documents, and/or other support resources. These materials are important because they give attending members something to take with them and refer to. The materials should explain both how to operate the technology and how to apply it to their lessons, activities, and/or overall classroom.
- See Appendix E for a list of potential technology PD.

STEP 5. Support E-Learning

There has been significant growth in online learning, or e-learning, in school districts, colleges, and universities. As a result, it possible for students at all levels to receive high quality supplemental instruction or even full courses personalized to their needs. Traditional schools are turning to these services to expand opportunities and choices for students and professional development for teachers.

Goal 5.1: Provide learning opportunities to students to foster the development of 21st Century skills and competencies, and in particular to ensure that learners have the digital literacy skills required for their future endeavors.

Recommendations include:

- Provide every student access to e-learning since the e-learning environment is present in higher education as well as the current workforce.
- Provide various types of classes/courses ranging in content for students.
- The district should promote e-learning and recommend that each student take at least one e-learning class/course.
- Faculty members teaching e-learning classes/courses should be required to meet with students at least twice per week in order to maintain proper understanding of the program and problem solve since it is possibly a student's first experience with e-learning.

STEP 6. Move Toward Digital Content

A perennial problem for districts, schools, teachers and students is access to materials and resources that are immediate and up to date. Textbooks are increasingly expensive, quickly outdated and physically cumbersome. A move away from reliance on textbooks to the use of multimedia or digital content offers many advantages ranging from cost savings, increased efficiency, improved accessibility, and enhancing learning opportunities in a format that engages today's web-savvy students.

Goal 6.1: Each year, transfer more content from hard copy, to digital content.

Recommendations include:

- Ensure that teachers and students are adequately trained in the use of online content. Students need access to their digital content in order to successfully collaborate with other students, access information quicker, respond to others faster, and to share information at a faster pace. Plus, colleges and universities require use of online content whether for research, responding, analyzing, or communicating.
- Encourage universal access to computers and connectivity for each student no matter what district computer or device they are working with.
- Evaluate the costs and benefits of online content, aligned with state standards, as part of a systemic approach to creating resources for students to customize learning to their individual needs.
- By introducing online content, students and teachers will be able to develop strong cross curricular activities as well as real live problem solving.
- Districts should look into purchasing e-readers, digital textbooks, library books and resources, and other books used in content areas.
    - Although there is an upfront cost, maintaining and updating may be more cost effective. An analysis is required based on the district and its current funds.
    - Easier to transport
    - They are better for the environment – going green.
    - Allows for better differentiation
    - By purchasing them, students learn to use the technology which will better prepare them for using the technology in college.

STEP 7. Develop a centralized, district access point for resources, information, etc

Districts administrators, teachers, students, and their parents desire quick and immediate access to content. Today's society thrives on up to date and immediate access to information. School districts need to provide an avenue to allow members of the district as well as the community the opportunity to access information from a centralized location.

Goal 7.1: Continue to develop a centralized, organized, searchable, and user friendly website that contains relevant digital content that can be easily accessible.

Recommendations include:

- Require administrators, teachers, and all staff members to participate in accumulating information and resources for parents and community members and post them onto the district site in an organized fashion.
- Require that the information and resources are up to date and easily accessible by clear links, headings, and descriptions.
- Resources for school districts, available at any time and any place with appropriate security logins where necessary, will include:
    - Samples of effective curricula and lesson plans aligned with New York State Learning Standards
    - Samples of student work and assessment
    - On-line professional development
    - Opportunities to engage in collaboration with colleagues
    - Student data and resources broken down into sections designated for each individual, the classroom, the school and district level
    - Web-based applications that allow teachers and administrators to build relationships with parents and communities
    - Management tools that expedite administrative tasks, freeing up more time for direct student interaction.
    - Access to free software applications to assist in learning, remediation, or practice outside of the classroom
    - E-mail
    - Classroom notes, assignments, and other classroom materials
- Each section, or link, attached to the main district website should be reviewed by the Technology Department to ensure that the information is appropriate, accurate, and up to date. The Technology Department should also make sure that all links are accessible, with district data properly secured, and information is not

redundant.

***Goal 7.2**: Parents and/guardians will have the opportunity to access web-based information about their children's learning environment, climate, and outcomes, as well as a wide range of student activities that can help them to assist their children at home.*

Recommendations include:

- Districts will include online the following for parents/guardians to access:
    - Students/Teacher communications
    - Graduation requirements
    - Course-taking options and descriptions
    - Content curriculum
    - Assignments
    - Learning standards
    - Students' assessments
    - Classroom news, procedures, etc
    - Teacher credentials
    - Any other factors that impact children's learning opportunities, learning climate, and learning outcomes.

STEP 8. Adjusting Job Descriptions

The district has a support structure in place that allows technology to successfully operate as well as structure to integrate technology successfully in the classroom. Technology management, help desk, and instructional technology support personnel are just a few areas of need within each district. Without one part, the how structure is not stable. However, if there is too much overlap within job descriptions, then other areas, such as technology integration within the curriculum, can suffer.

Goal 8.1 Redefine job descriptions among Technology Specialists, Library Media Specialists, and others within the Technology Department.

Recommendations include:

- **Technology integration specialists, or technology infusion specialists**
  - If located in the high school, this group should teach a technology class
  - Meet with teachers on a minimum number of times per month to discuss technology integration.
  - Assist staff and students in the use of technology, responding to help desk requests in a timely manner.
  - Developing and presenting differentiated technology training for teachers and school staff in a wide variety of instructional applications for the purpose of achieving each school's instructional goals, enhancing staff productivity, and improving student learning.
  - Teach a technology class – with new demands on teachers and the amount of content they are required to teach, technology skills may not be a priority. With technology specialists, they can teach a computer class where the students are introduced to computer functions and programs.
  - In elementary school, they should teach the basics of the computer and basic functions and abilities. See Appendix B for benchmarks by grade level.
  - In the high school, they should teach advances skills that students will need in higher education or in the workforce. See Appendiz B for these benchmarks by grade level.
  - Manage school website and assist teachers on their classroom websites
  - Teach technology professional development in the use of technology, how to integrate technology in the classroom, as well as technology competencies.

- Acting as the liaison between the school staff and division-wide technology resources and as the technology point of contact for the school.
- Collaborating with teachers in their schools to plan lessons and model best practices in integrating technology into all facets of the K - 12 curriculum.
- Co-teaches with classroom teachers that integrate technology.
- Collaborates with the school library media coordinator to provide leadership in the school's use of instructional technology resources to enhance learning
- Research and share new and innovative technology resources for schools and classrooms
- Provides resource information relating to new techniques and practices that relate to the use of technology and that enable students to use technology as a learning tool.

- **Technical support staff:**
  - This group of users is responsible for installing and maintaining the technology infrastructure.
  - They will need specialized technical training to keep equipment and applications running properly.
  - They should also observe professional development workshops regarding technology so they can learn about potential problems and user needs related to both the equipment and applications.
  - Troubleshoot building problems thoroughly before forwarding to district technicians, including checking for hardware errors or damage, confirming that software is properly installed and updated, and checking cable connections to the hardware and in the wiring closets.
  - Perform routine maintenance on building hardware as directed by the district technology department, including but not limited to, cleaning of dirt and dust, hardware maintenance procedures, and reimaging computers.
  - Maintain an inventory listing of all technology hardware and software in the building, sharing that with the district technology office for inclusion in the district databases and for fixed assets reporting.
  - Install hardware and software as directed by the district technology department.
  - Assist with the maintenance of district databases, particularly those with student accounts, including eDirectory and curricular software.
  - Coordinate the use of equipment and labs in and between buildings.
  - Assist buildings with all technology purchases or donations, and with ordering of supplies needed for building technology, including ink/toner and media.
  - Provide on-site installation, support and troubleshooting at assigned district buildings
  - Install/remove programs to support instruction and proper operation of district computers

- **Library Media Specials:**
    - Collaborates with the technology specialist to provide leadership in the school's use of instructional technology resources to enhance learning
    - Focus on using technology as a tool to analyze, research, and communicate.
    - Instill appropriate and safe procedures when using the internet and online data.
    - Promote the use of technology an efficient way to locate and discover up to date information and resources
    - Are proficient in standards for the 21st Century Learner developed by the American Association of School Librarians.
- *If the district cannot afford these three individuals within each building, then a teacher(s) within each school should take the role of the technology integration specialist, but in the role of a mentor or advisor rather than a full-fledged position. If this is the case, then the teacher(s) should be compensated with a stipend based on the districts collective bargaining agreement.

STEP 9. Consider Innovative Budgeting

Schools will continue to advocate for funding needed, but there is a realization that the state budget affects the funds districts receive. Districts need to be been supportive in addressing needs creatively and limited resources. Needed technology often can be funded successfully through innovative restructuring and reallocation of existing budgets to realize efficiencies and cost savings. The focus begins with the educational objective and evaluates funding requests – for technology or other programs – in terms of how they support student learning. Today, every program in *No Child Left Behind* is an opportunity for technology funding – but the focus is on how the funding will help attain specific educational goals.

Recommendations include:

- Determine the total costs for technology as a percentage of total spending.
- Consider a systemic restructuring of budgets to realize efficiencies, cost savings and reallocation. This can include reallocations in expenditures on textbooks, instructional supplies, space, and computer labs.
- Consider leasing technology with 3-5 year refresh cycles. This will save costs on having to purchase new technology and/or upgrading existing technology.
- Create a technology innovation fund to carry funds over yearly budget cycles.
- Use district homepage and social media as a means of communicating district news
- Examine current technology classes with potential of eliminating ones will low enrollment or develop a system of offering them at specific times.
- Restructure the high school Keyboarding classes allowing for more 21st Century skills and computer proficiencies
- Expand the use of e-learning opportunities through BOCES, professional organizations and other online opportunities
- Reevaluate current technology resources currently in place and eliminate those that are not effective or utilized by faculty.
- Recommend additional grant funding and compensate faculty members who receive grants. Possible compensation can be monetary or partial fulfillment of technology requirements for the district.
- Negotiating with providers of hardware, software, and on-line services for preferential rates

- Partner with businesses
- Technology fundraising by the district, school, community, and/or parents

STEP 10. Technology Guide Evaluation:

This guide should be reviewed consistently by the following people and updated and/or changed based on the changing needs of the classroom environment, the school, or district:

- Assistant Superintendent of Curriculum of Instruction
- Board of Education members
- Technology Director and members
- Principals
- Technology/Media/Library Specialists
- Teachers
- Parents
- Community Leaders
- Community Member

Conclusion

After reviewing highly regarded research, it can be concluded that that school districts, although having faults of their own in term of technology spheres, offer much more in terms of technology and 21st century skills preparation than college and universities. One would hope that colleges and universities would prepare its pre-service teachers more for their profession than they actually do. Although school districts also have a long way to go to prepare its students, they are far ahead on the technology path than higher education institutions. Students at the elementary and high school level may not have proficiency in the skills to enter college and they certainly do not have the skills to become the next wave of teachers. This is not to mention that without the skills, they may not have a positive perception of technology and the benefits it has to offer to field of education.

The overall conclusion is that technology can be implemented successfully, but to create a district culture committed to learning for all students, administrators need to understand the dynamics of technology in the traditional teacher-student relationship. Technology serves to enhance the effectiveness of teaching but cannot replace the role of the teacher. Therefore, educators and administrators alike must be completely comfortable with all the uses of the tool in order to improve classroom instruction. The promise of technology for today's classrooms is tremendous, and teachers can be the bridge to better outcomes. A comprehensive professional development program that is technology-focused is essential to enriching the learning experience of students, in the

short term, and for the long term preparing them to become productive members of society. Although professional development is crucial, the biggest area of benefit is through teacher preparation programs. With technology as one of the focuses within these programs, teacher perceptions will become more positive, pre-service teachers will graduate with more knowledge on how to use the technology and understand the significance technology can have on students (Sutton 2011; Fuller 2000). With the billions of government dollars that are spent on education each year, professional development programs need to be instituted on a more in-depth and continual basis. Based on the studies examined, technology research should concentrate more on the colleges and universities in addition to professional development rather than the current types of technology in school and the amount of time and usage students have with technology.

Educators need to become aware that technology is an ever growing area within education. It is imperative that these educators be fully supported through acceptable pre-service preparation programs, ongoing professional development, and continual communication between colleges and universities. In addition to this, administrators and teachers must be held accountable for the effectiveness in their uses of technology as well as for knowledge of it. Successful integration will depend on the motivation, knowledge, and skills of educators to implement and utilize technology effectively to enhance learning. Although it may be challenging to keep up with the constant change of technology, all those involved with education: students, parents, teachers, administrators, and government officials need to work together for the common goal – to increase

student motivation, student learning, and student achievement. With a focus on technology specifically at the college and university level and on professional development, educators can keep “up to speed” on this ever changing issue resulting in better influencing students.

References

"100.5 Diploma Requirements." *Part 100 Regulations*. New York State Education Department, n.d. Web. 5 Aug 2013. <http://www.p12.nysed.gov/part100/pages/1005.html>.

"175 and 75 Hour Professional Development Requirement." *Office of Teaching Initiatives*. New York State Education Department, n.d. Web. 5 Aug 2013.

"A New Standard for Proficiency:." *NYSED: Operation and Management Systems*. New York State Education Department, 28 Jul 2010. Web. 4 Aug 2013.

"About BOCES." *MonroeBOCES1*. Monroe 1 BOCES. Web. 4 Aug 2013.

"About Pittsford Schools." *Pittsford Schools*. Pittsford Central School District. Web. 3 Aug 2013.

"Admissions Process." *Geneseo*. Geneseo the State University of New York. Web. 5 Aug 2013.

An, Yun-Jo and Reigeluth, Charles,."Creating Technology-Enhance, Learner-Centered Classrooms: K-12 Teahcers' Beleifs, Perceptions, Barriers, and Support Needs." *Journal of Digital Learning in Teacher Education*. 28.2 (2011): 54-62. Print.

Ansell, Susan, and Jennifer Park. "Tracking Tech Trends." *Education Week*. May (2003): n. page. <http://www.edweek.org/media/ew/tc/archives/TC03full.pdf>.

Bauer, J., & Kenton, J. “Toward Technology Integration in the Schools: Why It Isn't Happening.” *Journal of Technology & Teacher Education*, 13(4), (2005): 519-546.

Baylor, A.L., & Ritchie, D. “What factors facilitate teacher skill morale, and perceived student learning in technology-using classrooms?” *Computers and Education, 39*, (2002): 395-414.

"Best High Schools for STEM Rankings Methodology." *Education*. U.S. News and World Report, n.d. Web. 5 Aug 2013.

Bissetta, Amy. "APPR vs Technology." *Reflections of a Middle School Teacher*. N.p., 06 Mar 2012. Web. 28 Jul. 2013.

Bordbar, F. English teachers' attitudes toward computer-assisted language learning. *International Journal of Language Studies*, 4.3 (2010): 179-206.

Brunner, C. *Integrating technology into the curriculum: Teaching the teachers* (No. CTE-TR-25). 1992. New York: Bank Street College of Education, Center for Technology in Education.

"Characteristics of Excellence in Higher Education: Requirements of Affiliation and Standards for Accreditation." *Geneseo* . Geneseo the State University of New York. Web. 5 Aug 2013.

"Class of 2017." *Class of 2017 E-Newsletter*. 1 n. page. Web. 5 Aug. 2013. <http://www.geneseo.edu/orientation/class-2017-e-newsletter-issue-1>.

“Classroom Technology." *Computing and Information Technology* . Geneseo the State University of New York. Web. 5 Aug 2013.

"Collegial Circles." *Pittsford Schools*. Pittsford Central School District, n.d. Web. 5 Aug 2013.

“Computer Labs." *Computing and Information Technology* . Geneseo the State University of New York. Web. 5 Aug 2013.

"Conceptual Framework." *Geneseo* . Geneseo the State University of New York. Web. 5 Aug 2013.

"Course Offerings." *KnightWeb*. Geneseo the State University of New York. Web. 5 Aug 2013.

Cradler, John, Molly Freeman, et al. "Research Implications for Preparing Teachers to Use Technology." *Learning and Leading with Technology*. 30.1 (2002): 50-54. Print.
Dias, Laurie. "Integrating Technology." *International Society for Technology in Education*. 27.3 (1999): 10-13.

Downes, Toni. "Student-Teachers' Experiences in Using Computers During Teaching Practice." *Journal of Computer Assisted Learning*. 9 (1993): 17-33.

Dwyer, David, Cathy Ringstaff, and Judith Sandholtz. *Teaching with Technology: Creating student-centered classrooms*. New York: Teachers College Press, 1997.

"Eight Capital Region districts place in Top 30 among 455 upstate schools." *Business*

Review. 08 Jul 2013: n. page. Web. 29 Jul. 2013. <http://www.bizjournals.com/albany/blog/2013/06/upstate-new-yorks-top-school-districts.html>.

Ertmer, Peg, and Anne Ottenbreit-Leftwich. "Teacher Technology Change: How knowledge, beliefs, and culture intersect ." *Journal of Research on Technology in Education*. 42.3 (2009): 255-284. <http://www.eric.ed.gov/PDFS/EJ882506.pdf>.

Engageny. (n.d.). Retrieved from engageny.org

Entertainment Software Review Board. (2009). *How much do you know about video games?*. Retrieved from http://www.esrb.org/about/video-game-industry-statistics.jsp

Eunjoo, Oh, and Russell French. "Preservice Teachers' Perceptions of an Introductory Instructional Technology Course." *Electronic Journal for the Integration of Technology in Education*. (2004): n. page. <http://ejite.isu.edu/Volume3No1/Oh.htm>.

"Faculty." *Geneseo*. Geneseo the State University of New York. Web. 5 Aug 2013.

"Full-Time Faculty and Staff." *Ella Cline Shear School of Education*. Geneseo the State University of New York. Web. 5 Aug 2013.

Fuller, H. L. "First Teach Their Teachers: Technology Support and Computer Use in Academic Subjects." *Journal of Research on Computing in Education*, 32.4, (2000): 511.

Georgina, David, and Charles Hosford. "Higher education faculty perceptions on technology integration and training." *Teaching and Teacher Education*. 25. (2009): 690–696. <http://literacyachievementgap.pbworks.com/f/hghg.pdf>.

"Grade Level Pages." *Jefferson Elementary School*. Pittsford Central School District. Web. 4 Aug 2013.

"Graduation Rate Data." *NYSED: Information and Reporting Services*. New York State Education Department. Web. 4 Aug 2013. <http://www.p12.nysed.gov/irs/pressRelease/20130617/District-enroll-outcomes-and-diplomas-June172013.pdf>.

Gray, Lucinda, Nina Thomas, and Laurie Lewis. United States. U.S. Department of Education. *Educational Technology in U.S. Public Schools: Fall 2008 First Look*. Washington, DC: , 2010.

Hermans, R., Tondeur J., van Braak, J., & Valcke, M. “The impact of primary school teachers’ educational beliefs on the classroom use of computers.” *Computers in Education,* 18. (2008): 1499-1509.

Herr, N. (2007). *Television and health*. Retrieved from http://www.csun.edu/science/health/docs/tv&health.html

Hew, Khe Foon, and Thomas Brush. "Development of an Instrument to Measure Preservice Teachers' Technology Skills, Technology Beliefs, and Technology Barriers." *Computers in the Schools*. 25. (2008): 112-125.

"High School Program of Studies." *Pittsford Schools*. Pittsford Central School District, n.d. Web. 5 Aug 2013.

"High School." *Pittsford Schools*. Pittsford Central School District. Web. 5 Aug 2013.

Honan, E. “Barriers to teachers using digital texts in literacy classrooms.” *Literacy,* 42(1), (2008): 36-43.

Honan, E. Mapping discourses in teachers' talk about using digital texts in classrooms. *Discourse: Studies in the Cultural Politics of Education*, 31.2 (2010): 179-193.

"Instructional Technology Support Specialists." *Pittsford Schools*. Pittsford Central School District, n.d. Web. 5 Aug 2013.

"Instructional Technology." *MonroeBOCES1*. Monroe 1 BOCES. Web. 4 Aug 2013.

"Introductory Tech Tips for Students and Parents." *Barker Road Middle School*. Pittsford Central School District, n.d. Web. 5 Aug 2013.

"IR Chart." *Geneseo*. Geneseo the State University of New York, 16 Jan 2012. Web. 5 Aug 2013.

"IT Priorities 2012-2013." *Confluence*. Geneseo the State University of New York. Web. 5 Aug 2013.

"JRE Tech Benchmarks’ Site.” *Jefferson Elementary School*. Pittsford Central School District. Web. 4 Aug 2013.

"KEEP Foundation." *KEEP Foundation*. KEEP Foundation. Web. 4 Aug 2013.

Kim, K., Jain, S., Westhoff, G., & Rezabek, L. A Quantitative Exploration of Preservice Teachers' Intent to Use Computer-based Technology. *Journal of Instructional Psychology*, 35.3 (2008): 275-287.

Li-Ping Tang, Thomas, and Jill Austin. "Students' perceptions of teaching technologies, application of technologies,." *Computers & Education*. 53. (2009): 1241–1255.

"Library Curriculum: Elementary." *Pittsford Schools*. Pittsford Central School District. Web. 5 Aug 2013.

"Library Curriculum: Secondary." *Pittsford Schools*. Pittsford Central School District. Web. 5 Aug 2013.

"Library Workshops." *Milne Library*. Geneseo the State University of New York. Web. 5 Aug 2013.

"Memorandum of Understanding." *State University of New York at Geneseo and the State University of New York*. (2007): 1-25. Print. <http://www.suny.edu/provost/geneseo mou.pdf>.

"Mendon High School and Sutherland High School recognized for STEM programs." *Pittsford Schools*. Pittsford Central School District, 21 Jun 2013. Web. 4 Aug 2013.

"Middle School." *Pittsford Schools*. Pittsford Central School District. Web. 4 Aug 2013.

Mijares, Al. "Proposal to Present at Getting From Facts to Policy: An Education Policy Convening." *EdSource*. College Board, 09 Oct 2007. <http://www.edsource.org/assets/files/convening/CollegeBoard_brief.pdf>.

"Monroe 2 BOCES." *Pittsford Schools*. Pittsford Central School District. Web. 4 Aug 2013.

Morse, Robert. "Best High Schools for STEM Rankings Methodology." *U.S. News & World Report*. 18 Jun 2013: n. page. Web. 29 Jul. 2013. <http://www.usnews.com/education/high-schools/articles/2013/06/18/best-high-schools- for-stem-rankings-methodology>.

Mueller, J., Wood, E., Willoughby, T., Ross, C. and Specht, J. "Identifying discriminating variables between teachers who fully integrate computers and

teachers with limited integration." *Computers and Education*, 51. (2008): 1523-1537.

"myCourses 2012." *Confluence*. Geneseo the State University of New York. Web. 5 Aug 2013.

"myCourses." *Geneseo*. Geneseo the State University of New York. Web. 5 Aug 2013.

"NETS.T: Advancing Digital Age Teaching." *International Society for Technology in Education*. International Society for Technology in Education, n.d. <http://www.iste.org/standards/nets-for-teachers>.

Noeth, Richard, and Boris Volkov. "Evaluating the Effectiveness of Technology in Our Schools ." *ACT, Inc.* . (2004): n. page. <http://www.act.org/research/policymakers/pdf/school_tech.pdf>.

North, A.S., & Noyles, J.M. "Gender influences on children's computer attitudes and cognitions." *Computers in Human Behavior,* 18. (2002): 135-150.

"Online Resources." *Geneseo* . Geneseo the State University of New York. Web. 5 Aug 2013.

Parkay, Forest, and Beverley Hardcastle . *Becoming a Teacher*. 8. Upper Saddle River: Person, 2010. Print.

"Pedagogy of Hybrid Learning." *myCourses*. Geneseo the State University of New York. Web. 5 Aug 2013.

"Pittsford Central School District." *Education High Schools*. U.S. News and World Report. Web. 4 Aug 2013. <http://www.usnews.com/education/best-high-schools/new-york/districts/pittsford-central-school-district>.

"Pittsford Central School District." *Microsoft Case Studies: Microsoft Office Outloook Live*. Microsoft, 30 Jun 2011. Web. 4 Aug 2013.

"Pittsford District Success Summaries." *Pittsford Schools*. Pittsford Central School District. Web. 4 Aug 2013.

"Pittsford recognized as No. 1 district out of 455 upstate New York school districts." *Pittsford Schools*. Pittsford Central School District, 12 Jul 2013. Web. 4 Aug 2013.

"Pittsford Technology Standards." *Pittsford Schools*. Pittsford Central School District, n.d. Web. 5 Aug 2013.

"Pittsford." *Pittsford Schools*. Capital Computer Associates, n.d. Web. 5 Aug 2013.
"Podcasts." *Pittsford Schools*. Pittsford Central School District. Web. 4 Aug 2013.

"Professional Development." *Pittsford Schools*. Pittsford Central School District, n.d. Web. 5 Aug 2013.

"Professional Learning Initiatives." *Pittsford Schools*. Pittsford Central School District, n.d. Web. 5 Aug 2013.

"Research or Technology Consultations." *Milne Library* . Geneseo the State University of New York. Web. 5 Aug 2013.

Rideout, Victoria, Ulla Foehr, and Donald Roberts. "Generation M: Media in the Lives of 8-18 Year-olds." *Henry J. Kaiser Family Foundation.* (2010): n. page. <http://www.kff.org/entmedia/upload/8010.pdf>.

Richel, Matt. "In Classroom of Future, Stagnant Scores." *New York Times* [New York] 04 Sep 2011, New York A1. Print.

"Ruby Certificate." *Geneseo Opportunity for Leadership Development*. Geneseo the State University of New York. Web. 5 Aug 2013.

Ruling, L., & Overbaugh, R. C. School Environment and Technology Implementation in K-12 Classrooms. *Computers in the Schools*, 26.2 (2009): 89-106.

Shapka, J., & Ferrari, M. “Computer-related attitudes and actions of teacher candidates.” *Computers in Human Behavior, 19,* (2003): 319-334.

"Shared Staff." *MonroeBOCES1*. Monroe 1 BOCES. Web. 4 Aug 2013.

Sinclair, G.B. "Is Larry Cuban right about the impact of computer technology on student learning? ." *Nawa: Journal of Language & Communication*. 3.1 (2009): 46-54.

"Standard Five." *Geneseo* . Geneseo the State University of New York. Web. 5 Aug 2013.

"State University of New York at Geneseo and the State University of New York." *Geneseo*. Geneseo the State University of New York, n.d. Web. 5 Aug 2013. <http://www.suny.edu/provost/geneseo mou.pdf>.

"Stats &Facts 2012." *Confluence*. Geneseo the State University of New York. Web. 5 Aug 2013.

"Student Teaching Feedback and Evaluation." *Student Teaching*. Geneseo the State University of New York. Web. 5 Aug 2013. 5 Aug 2013.

"Student Teaching Handbook." *Student Teaching*. Geneseo the State University of New York. Web.

Sutton, S. R. "The Preservice Technology Training Experiences of Novice Teachers." *Journal of Digital Learning in Teacher Education*, 28.1. (2011): 39-47.

"SUNY Geneseo - U.S. News Best College Rankings." *Education Colleges*. U.S. News and World Report , n.d. Web. 5 Aug 2013.

Szuba , Tom, Andy Rodgers, et al. United States. U.S Department of Education. *Forum Unified Education Technology Suite*. Washington, DC: National Cooperative Education Statistics System, 2005. Print. <http://nces.ed.gov/pubs2005/tech_suite/index.asp>.

"Tech Quest 6." *Pittsford Schools*. Pittsford Central School District. Web. 4 Aug 2013.

"Technology Training 2011 - 2012." *Confluence*. Geneseo the State University of New York. Web. 5 Aug 2013.

Thomas, G. Scott. "Pittsford remains No. 1 in Rochester Area district rankings, while
HF- moves up to No. 2." *Buffalo Business First* 07 Jun 2013, n. pag. Web. 22 Jul. 2013. <http://www.bizjournals.com/buffalo/feature/schools/2013-nyschools/2013/06/rochester- area-school-district.html?page=all>.

"Title II: Higher Education Act Report." *Geneseo*. Geneseo the State University of New York, 08 Jun 2010. Web. 5 Aug 2013.

Tondeur, J., van Keer, H., van Braak, J. , & Valcke, M. "ICT integration in the classroom: Challenging the potential of a school policy." *Computers and Education,* 51.1., (2008): 212-223.

"TV12 Programs." *Pittsford Schools*. Pittsford Central School District. Web. 4 Aug 2013.

United States Department of Education . *No Child Left Behind Act of 2001, Pub. L. No. 107-110, Title II, Part D*. Web. <http://www2.ed.gov/policy/elsec/leg/esea02/index.html>.

United States Department of Educaton (2007). *State strategies and practices for educational technology: Volume i—examining the enhancing education through technology program.*

"Values, Vision and Strategic Initiatives." *Pittsford Schools*. Pittsford Central School District. Web. 4 Aug 2013.

Venezky, R. L. Technology in the classroom: Steps toward a new vision. *Education, Communication & Information*, 4.1 (2004): 3-21.

Walls, S., Kucsera, J., Walker, J., Acee, T., McVaugh, N., & Robinson, D. "Podcasting in education: Are students as ready and eager as we think they are?" *Computers and Education, 54.2,* (2010): 371-378.

"Websites for Students." *Pittsford Schools*. Pittsford Central School District. Web. 5 Aug 2013.

"What College Readiness Means in Technology: From the College Level Perspective." *Monroe 1 BOCES*. Capital Computer Associates, n.d. Web. 5 Aug 2013.

"Who We Are." *Project Lead the Way*. Project Lead the Way, n.d. Web. 5 Aug 2013.

Wolf, Mary Ann. "Culture Shift: Teaching in a Learner-Centered Environment Powered by Digital Learning." *Digital Learning Series*. (2012): 1-31. <http://www.all4ed.org/files/CultureShift.pdf>.

Wozney, L., Venkatesh, V., & Abrami, P. C. Implementing Computer Technologies: Teachers' Perceptions and Practices. Journal of Technology & Teacher Education, 14.1 (2006): 173-207.

Yoon, K.S., Duncan, T., Lee, S.W., Scarloss, B., & Shapley, K.L. U.S. Department of
Education. *Reviewing the evidence on how teacher professional development affects student achievement.* Washington, DC: Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational

Laboratory Southwest, 2007.
http://ies.ed.gov/ncee/edlabs/regions/southwest/pdf/rel_2007033.pdf

Zuniga, R.. Computer Technology Integration Into the Public School Classroom - A Qualitative Update. *Academic Leadership (15337812)*, 8.2 (2010): 1-17.

Appendix A. The ISTE National Education Technology Standards and Performance Indicators

NETS for Students

1.Creativity and Innovation *Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.*

a. Apply existing knowledge to generate new ideas, products, or processes
b. Create original works as a means of personal or group expression
c. Use models and simulations to explore complex systems and issues

d. Identify trends and forecast possibilities

2.Communication and Collaboration *Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.*

a. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media
b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats
c. Develop cultural understanding and global awareness by engaging with learners of other cultures
d. Contribute to project teams to produce original works or solve problems

3.Research and Information Fluency *Students apply digital tools to gather, evaluate, and use information.*

a. Plan strategies to guide inquiry

b. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media
c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks
d. Process data and report results

4.Critical Thinking, Problem Solving, and Decision Making *Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.*

a. Identify and define authentic problems and significant questions for investigation
b. Plan and manage activities to develop a solution or complete a project

c. Collect and analyze data to identify solutions and/or make informed decisions
d. Use multiple processes and diverse perspectives to explore alternative solutions

5.Digital Citizenship *Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.*

a. Advocate and practice safe, legal, and responsible use of information and technology

b. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity

c. Demonstrate personal responsibility for lifelong learning
d. Exhibit leadership for digital citizenship

6.Technology Operations and Concepts *Students demonstrate a sound understanding of technology concepts, systems, and operations.*

a. Understand and use technology systems
b. Select and use applications effectively and productively
c. Troubleshoot systems and applications
d. Transfer current knowledge to learning of new technologies

NETS for School Administrators

1. **Visionary Leadership.** *Educational Administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization. Educational Administrators:*

   a. inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital-age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders

   b. engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision

   c. advocate on local, state, and national levels for policies, programs, and funding to support implementation of a technology-infused vision and strategic plan

2. **Digital-Age Learning Culture.** *Educational Administrators create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students. Educational Administrators:*

   a. ensure instructional innovation focused on continuous improvement of digital-age learning
   b. model and promote the frequent and effective use of technology for learning

   c. provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners
   d. ensure effective practice in the study of technology and its infusion across the curriculum

   e. promote and participate in local, national, and global learning communities that stimulate innovation, creativity, and digital-age collaboration

3. **Excellence in Professional Practice.** *Educational Administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources. Educational Administrators:*

   a. allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration

   b. facilitate and participate in learning communities that stimulate, nurture, and

support administrators, faculty, and staff in the study and use of technology

c. promote and model effective communication and collaboration among stakeholders using digital-age tools

d. stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning

4. **Systemic Improvement.** *Educational Administrators provide digital-age leadership and management to continuously improve the organization through the effective use of information and technology resources. Educational Administrators:*

a. lead purposeful change to maximize the achievement of learning goals through the appropriate use of technology and media-rich resources

b. collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and student learning

c. recruit and retain highly competent personnel who use technology creatively and proficiently to advance academic and operational goals

d. establish and leverage strategic partnerships to support systemic improvement

e. establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching, and learning

5. **Digital Citizenship.** *Educational Administrators model and facilitate understanding of social, ethical, and legal issues and responsibilities related to an evolving digital culture. Educational Administrators:*

a. ensure equitable access to appropriate digital tools and resources to meet the needs of all learners

b. promote, model, and establish policies for safe, legal, and ethical use of digital information and technology

c. promote and model responsible social interactions related to the use of technology and information

d. model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools

NETS for Teachers

Effective teachers model and apply the National Educational Technology Standards for Students (NETS•S) as they design, implement, and assess learning experiences to engage students and improve learning; enrich professional practice; and provide positive models for students, colleagues, and the community. All teachers should meet the following standards and performance indicators. Teachers:

1. **Facilitate and Inspire Student Learning and Creativity.** *Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments. Teachers:*

    a. promote, support, and model creative and innovative thinking and inventiveness.
    b. engage students in exploring real-world issues and solving authentic problems using digital tools and resources.

    c. promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes.

    d. model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments.

1. **Design and Develop Digital-Age Learning Experiences and Assessments.** *Teachers design, develop, and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS•S. Teachers:*

    a. design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity.

    b. develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress.

    c. customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources.

    d. provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching.

2. **Model Digital-Age Work and Learning.** *Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society. Teachers:*
   - **a.** demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations.
   - **b.** collaborate with students, peers, parents, and community members using digital tools and resources to support student success sand innovation.
   - **c.** communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital-age media and formats.
   - **d.** model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning.

4. **Promote and Model Digital Citizenship and Responsibility.** *Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices. Teachers:*
   - **a.** advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources.
   - **b.** address the diverse needs of all learners by using learner-centered strategies and providing equitable access to appropriate digital tools and resources
   - **c.** promote and model digital etiquette and responsible social interactions related to the use of technology and information.
   - **d.** develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital-age communication and collaboration tools.

5. **Engage in Professional Growth and Leadership.** *Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources. Teachers:*
   - **a.** participate in local and global learning communities to explore creative applications of technology to improve student learning.
   - **b.** exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others.

c. evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning.
d. contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of their school and community.

APPENDIX B: Performance Indicators by Grade Level

Standard 1: Technology productivity tools: Students use technology tools to enhance learning, increase productivity, and promote creativity. Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publications, and producing other creative works.

	All students will:	K	1	2	3	4	5	6	7	8	9	10	11	12
1.1	**Develop keyboarding skills**													
a.	Assume correct posture		**I**	R	R	R	R	R	R	R	R	R	R	R
b.	Use space bar, return key, shift key, delete key		**I**	R	R	A	A	A	A	A	A	A	A	A
c.	Maintain homerow location and employ correct keystroking techniques (without this specificity, instead "demonstrate keyboard familiarity to find all letters, numbers, punctuation and standard symbols"				**I**	R	R	A	A	A	A	A	A	A
d.	Practice to increase speed				**I**	R	R	R	R	R	A	A	A	A
e.	Acquire punctuation and number techniques - Skip or pull out from c above						**I**	R	R	R	A	A	A	A
1.2	**Use a spreadsheet as a productivity tool**	K	1	2	3	4	5	6	7	8	9	10	11	12
a.	Understand and use the following terms: Cell, column, row, toolbar, cell reference						**I**	R	R	A	A	A	A	A
b.	Open, key, navigate, close, save, and print a spreadsheet						**I**	R	R	A	A	A	A	A
c.	Enter and edit text, numbers, and dates						**I**	R	R	A	A	A	A	A
d.	Modify columns / rows						**I**	R	R	A	A	A	A	A
e.	Format cells						**I**	R	R	A	A	A	A	A
f.	Cut / Paste data or cells							**I**	R	R	A	A	A	A
g.	Create charts							**I**	R	R	A	A	A	A
h.	Insert rows / columns							**I**	R	R	A	A	A	A
I.	Fill down / across / special							**I**	R	R	A	A	A	A
j.	Incorporate graphs in word processing or other documents							**I**	R	R	A	A	A	A
k.	Create formulas and utilize functions in problem solving including absolute and relative cell references										**I**	R	R	R
	Create fields and records and utilize sort and													

	l.	filter functions as a database										**I**	R	R	R
	m.	Mail and print merge records into a word processing document										**I**	R	R	R
1.3	**Use a word processor as a productivity tool**		K	1	2	3	4	5	6	7	8	9	10	11	12
	a.	Write letters, stories, and poems		**I**	R	R	A	A	A	A	A	A	A	A	A
	b.	Create, save, retrieve, print, and close document		**I**	R	R	A	A	A	A	A	A	A	A	A
	c.	Indent text using space bar and tab key		**I**	R	R	A	A	A	A	A	A	A	A	A
	d.	Use formatting toolbar		**I**	R	R	A	A	A	A	A	A	A	A	A
	e.	Adjust line spacing			**I**	R	R	A	A	A	A	A	A	A	A
	f.	Insert and manipulate clip art or photos				**I**	R	R	A	A	A	A	A	A	A
	g.	Create text boxes				**I**	R	R	A	A	A	A	A	A	A
	h.	Access drawing toolbar and use the functions				**I**	R	R	A	A	A	A	A	A	A
	I.	Cut, copy, paste, and delete text and objects				**I**	R	R	A	A	A	A	A	A	A
	j.	Utilize spell checker				**I**	R	R	A	A	A	A	A	A	A
	k.	Justify text				**I**	R	R	A	A	A	A	A	A	A
	l.	Type reports				**I**	R	R	A	A	A	A	A	A	A
	m.	Copy and paste a graph into a word processing document					**I**	R	R	A	A	A	A	A	A
	n.	Utilize grammar checker					**I**	R	R	A	A	A	A	A	A
	o.	Wrap text around images						**I**	R	R	A	A	A	A	A
	p.	Inset headers, footers, pagination						**I**	R	R	A	A	A	A	A
	q.	Create columns						**I**	R	R	A	A	A	A	A
	r.	Create newsletters and outlines						**I**	R	R	A	A	A	A	A
	s.	Add entries to bibliography						**I**	R	R	A	A	A	A	A
	t.	Inset page breaks						**I**	R	R	A	A	A	A	A
	u.	Find and replace text							**I**	R	R	A	A	A	A
	v.	Create and modify tables							**I**	R	R	A	A	A	A
	w.	Create resume								**I**	R	A	A	A	A

I = Introduced Students will practice skill

R = Reinforced Students will review then apply skill

A = Autonomous Students will apply skill independently

Standard 2: Technology communication tools: Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences. Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

		All students will:	K	1	2	3	4	5	6	7	8	9	10	11	12
2.1		**Enter and organize information using a multimedia**													
	a.	Open, start, and save a new presentation		**I**	R	R	A	A	A	A	A	A	A	A	A
	b.	Insert relevant graphics (clip art or digital images)		**I**	R	R	A	A	A	A	A	A	A	A	A
	c.	Add background elements to slide		**I**	R	R	A	A	A	A	A	A	A	A	A
	d.	Add transitions to a slide show		**I**	R	R	A	A	A	A	A	A	A	A	A
	e.	Add sound effects to a slide		**I**	R	R	A	A	A	A	A	A	A	A	A
	f.	Add text to a slide		**I**	R	R	A	A	A	A	A	A	A	A	A
	g.	Link slides and/or stacks together with buttons or other means				**I**	R	R	A	A	A	A	A	A	A
	h.	Add bulleted and numbered text to a slide				**I**	R	R	A	A	A	A	A	A	A
	I.	Record and insert student-made sounds into a slide or stack				**I**	R	R	A	A	A	A	A	A	A
	j.	Add animation to a slide or stack				**I**	R	R	A	A	A	A	A	A	A
	k.	Utilize various View options (slide, outline, slide sorter, notes page, and/or slide show)				**I**	R	R	A	A	A	A	A	A	A
	l.	Add video and or digitized movie clips to slide or stack					**I**	R	R	A	A	A	A	A	A
	m.	Create and modify slide or stack templates					**I**	R	R	A	A	A	A	A	A
	n.	Incorporate a music CD track to a slide or stack					**I**	R	R	A	A	A	A	A	A
	o.	Add student produced graphs to a slide or stack							**I**	R	R	A	A	A	A
2.2		**Communicate information to an audience using a multimedia presentation**	K	1	2	3	4	5	6	7	8	9	10	11	12
	a.	Create and run a multimedia presentation for a class project consisting of a series of slides/screens				**I**	R	R	R	R	R	R	R	R	R
	b.	Run a presentation manually				**I**	R	R	A	A	A	A	A	A	A
	c.	Set a presentation to auto-run						**I**	R	R	A	A	A	A	A
2.3		**Create digital movies**	K	1	2	3	4	5	6	7	8	9	10	11	12
	a.	Create and save a new digital movie project				E	E	E	E	E	E	E	E	E	E
	b.	Import video clips from an external source				E	E	E	E	E	E	E	E	E	E

	c.	Edit or crop video clips				E	E	E	E	E	E	E	E	E	E	E
	d.	Arrange video clips within a digital movie				E	E	E	E	E	E	E	E	E	E	E
	e.	Incorporate sound clips, recordings, and CD tracks into a digital movie				E	E	E	E	E	E	E	E	E	E	E
	f.	Incorporate still pictures into a digital movie project				E	E	E	E	E	E	E	E	E	E	E
	g.	Add transitions before and after video clips				E	E	E	E	E	E	E	E	E	E	E
	h.	Add title pages and text to a digital movie				E	E	E	E	E	E	E	E	E	E	E
	I.	Export digital video project to external source				E	E	E	E	E	E	E	E	E	E	E
2.4	**Communicate an interdisciplinary project to an audience**					E	E	E	E	E	E	E	E	E	E	E
2.5	**Enter and organize information using web pages**		K	1	2	3	4	5	6	7	8	9	10	11	12	
	a.	Create and save webpages into a site folder						E	E	E	E	E	E	E	E	
	b.	Add and format text including bulleted and numbered text in a web page						E	E	E	E	E	E	E	E	
	c.	Add backgrounds to web pages						E	E	E	E	E	E	E	E	
	d.	Use various view options as needed						E	E	E	E	E	E	E	E	
	e.	Link web pages together						E	E	E	E	E	E	E	E	
	f.	Insert relevant graphics (clip art or digital images)						E	E	E	E	E	E	E	E	
	g.	Add student produced graphs to web pages						E	E	E	E	E	E	E	E	
	h.	Add video or digital movie clips									E	E	E	E	E	
2.6	**Create a website presentation for a class project and**							E	E	E	E	E	E	E	E	
2.7	**Compose, open, reply, delete, and forward email**							F	F	F	F	F	F	F	F	

I = Introduced Students will practice skill
R = Reinforced Students will review then apply skill
A = Autonomous Students will apply skill independently
E = Encouraged Students will use technology when available
F = Future implementation

Standard 3: Technology research tools: Students use technology to locate, evaluate, and collect information from a variety of sources. Students use technology tools to process data and report results. Students evaluate and select new information resources and technological innovations based on the appropriateness to specific tasks.

	All students will:	K	1	2	3	4	5	6	7	8	9	10	11	12
3.1	**Utilize and understand basic research terms such as website, search engine, bookmark, web archive, and boolean searches**			**I**	R	R	A	A	A	A	A	A	A	A
3.2	**Gather information and conduct research using technology tools**													
a.	Access and utilize archived or bookmarked websites			**I**	R	R	A	A	A	A	A	A	A	A
b.	Use an online card catalog			**I**	R	R	R	R	R	R	A	A	A	A
c.	Access information from school corporation web sites				**I**	R	R	A	A	A	A	A	A	A
d.	Access and utilize search engines or online databases employing various search strategies				**I**	R	R	R	R	R	A	A	A	A
3.3	**Save research results for later use**													
a.	Print research results to local or network printer			**I**	R	R	A	A	A	A	A	A	A	A
b.	Record needed information for citation documentation				**I**	R	R	A	A	A	A	A	A	A
c.	Insert search results into word processing program				**I**	R	R	A	A	A	A	A	A	A
d.	Record specific research strategies performed for long term research projects										**I**	R	R	R

I = Introduced Students will practice skill

R = Reinforced Students will review then apply skill

A = Autonomous Students will apply skill independently

Standard 4: Technology problem-solving and decision-making tools: Students use technology resources for solving problems and making informed decisions. Students employ technology in the development of strategies for solving problems in the real world.

	All students will:	K	2	3	4	5	6	7	8	9	10	11	12
4.1	**Understand and use graphing software**												
	a. View and contribute to a group-created graph		R	R	A	A	A	A	A	A	A	A	A
	b. Understand the type of graph to use based on the data to be displayed		**I**	R	R	A	A	A	A	A	A	A	A
	c. Access and save a graphing project		**I**	R	R	A	A	A	A	A	A	A	A
	d. Enter data into the graphing program		**I**	R	R	A	A	A	A	A	A	A	A
	e. Create picture, bar, line, and pie graphs		**I**	R	R	A	A	A	A	A	A	A	A
	f. Add and format a title, legend (key), and data labels to a graph		**I**	R	R	A	A	A	A	A	A	A	A
	g. Copy and paste a graph into a multimedia presentation or word processing document				**I**	R	R	A	A	A	A	A	A
4.2	**Evaluate results of graphs produced from spreadsheets**					**I**	R	R	A	A	A	A	A
4.3	**Understand and use concept mapping webbing software**	K	2	3	4	5	6	7	8	9	10	11	12
	a. Access and save a concept-mapping project					**I**	R	R	A	A	A	A	A
	b. Enter text and/or data representing and supporting main concepts					**I**	R	R	A	A	A	A	A
	c. Convert a concept map into a text outline and visa-versa					**I**	R	R	A	A	A	A	A
	d. Print a concept map and insert it into another document					**I**	R	R	A	A	A	A	A
	e. Create, save, and print a chronological timeline					**I**	R	R	A	A	A	A	A
4.4	**Use technology resources (e.g., puzzles, logical thinking programs, writing tools, etc.) for problem solving, communication, and illustration of thoughts, ideas, and stories**	**I**	R	R	R	R	R	R	R	R	R	R	R

I = Introduced Students will practice skill

R = Reinforced Students will review then apply skill

A = Autonomous Students will apply skill indepen.

Standard 5: Social, ethical, and human issues: Students understand the ethical, cultural, and societal issues related to technology. Students practice responsible use of technology systems, information, and software. Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

	All students will:	K	1	2	3	4	5	6	7	8	9	10	11	12
5.1	**Describe some uses of technology in society (i.e., cash registers, grocery scanners, employee tags, etc.)**	**I**	R	R	R	R	A	A	A	A	A	A	A	A
5.2	**Respect privacy of staff and student files**	**I**	R	R	R	R	R	R	R	R	R	R	R	R
5.3	**Demonstrate appropriate care and use of all technology systems equipment**	**I**	R	R	R	R	R	R	R	R	R	R	R	R
5.4	**Work cooperatively and collaboratively with others when using technology**	**I**	R	R	R	R	R	R	R	R	R	R	R	R
5.5	**Understand and adhere to policies**													
a.	Established district, school, classroom, and computer lab policies	**I**	R	R	R	R	R	R	R	R	R	R	R	R
b.	Give credit to authors, electronic sources and copyright laws					**I**	R	R	R	R	R	R	R	R
c.	Hardware and software licensing agreements						**I**	R	R	R	R	R	R	R

I = Introduced Students will practice skill

R = Reinforced Students will review then apply skill

A = Autonomous Students will apply skill independently

Standard 6: Basic Operations and Concepts: Students demonstrate a sound understanding of the nature and operation of technology systems. Students are proficient in the use of technology.

	All students will:	K	1	2	3	4	5	6	7	8	9	10	11	12
6.1	**Understand the function of computer components and peripherals including monitor, keyboard, mouse, headphones, scanner, and printer**	**I**	R	R	A	A	A	A	A	A	A	A	A	A
6.2	**Understand the following software terms: Menu, icon, start, close, save, save as, file, scroll bar, cursor, file, select, open, launch, copy/paste**		**I**	R	R	A	A	A	A	A	A	A	A	A
6.3	**Understand the following network terms: login, password, server, network, group shared, network management software (not sure many know this list beyone password)**	**I**	R	R	R	A	A	A	A	A	A	A	A	A
6.4	**Understand the following Internet terms: Internet, World Wide Web, website, links, URL (location/address), home, and favorites**			**I**	R	R	A	A	A	A	A	A	A	A
6.5	**Be proficient in basic computer procedures**													
	a. Mouse and cursor manipulation	**I**	R	R	A	A	A	A	A	A	A	A	A	A
	b. Recognize icons and understand their functions	**I**	R	R	A	A	A	A	A	A	A	A	A	A
	c. Identify keyboard functions	**I**	R	R	A	A	A	A	A	A	A	A	A	A
	d. Activate computer for use (also shutdown, sleep, and reboot if applicable)	**I**	R	R	A	A	A	A	A	A	A	A	A	A
	e. Login and logout with network account name and password		**I**	R	R	R	R	R	**I**	R	**I**	R	R	R
	f. Launch, run, close, and quit applications		**I**	R	R	A	A	A	A	A	A	A	A	A
	g. Utilize pull down menus and commands		**I**	R	R	A	A	A	A	A	A	A	A	A
	h. Create, name, save, retrieve, and print a document		**I**	R	R	A	A	A	A	A	A	A	A	A
	I. Use keyboard shortcuts (maybe, aware of keyboard shortcuts; possibly name some such as copy, paste, undo...		**I**	R	R	A	A	A	A	A	A	A	A	A

	j.	Understand and demonstrate proper use of removable media (CD's, USB flash drive, etc.)		**I**	R	R	A	A	A	A	A	A	A	A	A	A
	k.	Manipulate window view and size			**I**	R	R	A	A	A	A	A	A	A	A	A
6.6	**Use digital technology equipment and associated software (video camera, scanner, and camera)**				**I**	R	R	R	R	R	R	A	A	A	A		
		I = Introduced Students will practice skill															
		R = Reinforced Students will review then apply skill															
		A = Autonomous Students will apply skill independently															

APPENDIX C: 21st Century Learning Standards

21st Century Learning Standards

Learning Standard 1. Learners use skills, resources, and tools to inquire, think critically, and gain knowledge.

1.1 Skills

Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.

1.1.2 Use prior and background knowledge as context for new learning.
1.1.3 Develop and refine a range of questions to frame the search for new understanding.
1.1.4 Find, evaluate, and select appropriate sources to answer questions.
1.1.5 Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.
1.1.6 Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.
1.1.7 Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, and point of view or bias.
1.1.8 Demonstrate mastery of technology tools for accessing information and pursuing inquiry.
1.1.9 Collaborate with others to broaden and deepen understanding.

1.2 Dispositions in Action

1.2.1 Display initiative and engagement by posing questions and investigating the answers beyond the collection of superficial facts.
1.2.2 Demonstrate confidence and self-direction by making independent choices in the selection of resources and information.
1.2.3 Demonstrate creativity by using multiple resources and formats.
1.2.4 Maintain a critical stance by questioning the validity and accuracy of all information.
1.2.5 Demonstrate adaptability by changing the inquiry focus, questions, resources, or strategies when necessary to achieve success.
1.2.6 Display emotional resilience by persisting in information searching despite challenges.
1.2.7 Display persistence by continuing to pursue information to gain a broad perspective.

1.3 Responsibilities

1.3.1 Respect copyright/intellectual property rights of creators and producers.

1.3.2 Seek divergent perspectives during information gathering and assessment.
1.3.3 Follow ethical and legal guidelines in gathering and using information.
1.3.4 Contribute to the exchange of ideas within the learning community.
1.3.5 Use information technology responsibly.

1.4 Self-Assessment Strategies

1.4.1 Monitor own information-seeking processes for effectiveness and progress, and adapt as necessary.

1.4.2 Use interaction with and feedback from teachers and peers to guide own inquiry process.

1.4.3 Monitor gathered information, and assess for gaps or weaknesses.

1.4.4 Seek appropriate help when it is needed

Learning Standard 2. Learners use skills, resources, and tools to draw conclusions, make informed decisions, apply knowledge to new situations, and create new knowledge.

2.1 Skills

Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.

2.1.2 Organize knowledge so that it is useful.

2.1.3 Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

2.1.4 Use technology and other information tools to analyze and organize information.

2.1.5 Collaborate with others to exchange ideas, develop new understandings, make decisions, and solve problems.

2.1.6 Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.

2.2 Dispositions in Action

2.2.1 Demonstrate flexibility in the use of resources by adapting information strategies to each specific resource and by seeking additional resources when clear conclusions cannot be drawn.

2.2.2 Use both divergent and convergent thinking to formulate alternative conclusions and test them against the evidence.

2.2.3 Employ a critical stance in drawing conclusions by demonstrating that the pattern of evidence leads to a decision or conclusion.

2.2.4 Demonstrate personal productivity by completing products to express learning.

2.3 Responsibilities

2.3.1 Connect understanding to the real world.

2.3.2 Consider diverse and global perspectives in drawing conclusions.

2.3.3 Use valid information and reasoned conclusions to make ethical decisions.

2.4 Self-Assessment Strategies

2.4.1 Determine how to act on information (accept, reject, modify).

2.4.2 Reflect on systematic process, and assess for completeness of investigation.

2.4.3 Recognize new knowledge and understanding.

2.4.4 Develop directions for future investigations.

Learning Standard 3. Learners use skills, resources, and tools to share knowledge and participate ethically and productively as members of our democratic society.

3.1 Skills

3.1.1 Conclude an inquiry-based research process by sharing new understandings and reflecting on the learning.

3.1.2 Participate and collaborate as members of a social and intellectual network of learners.

3.1.3 Use writing and speaking skills to communicate new understandings effectively.

3.1.4 Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.

3.1.5 Connect learning to community issues.

3.1.6 Use information and technology ethically and responsibly.

3.2 Dispositions in Action

3.2.1 Demonstrate leadership and confidence by presenting ideas to others in both formal and informal situations.

3.2.2 Show social responsibility by participating actively with others in learning situations and by contributing questions and ideas during group discussions.

3.2.3 Demonstrate teamwork by working productively with others.

3.3 Responsibilities

3.3.1 Solicit and respect diverse perspectives while searching for information, collaborating with others, and participating as a member of the community.

3.3.2 Respect the differing interests and experiences of others, and seek a variety of viewpoints.

3.3.3 Use knowledge and information skills and dispositions to engage in public conversation and debate around issues of common concern.

3.3.4 Create products that apply to authentic, real-world contexts.

3.3.5 Contribute to the exchange of ideas within and beyond the learning community.

3.3.6 Use information and knowledge in the service of democratic values.

3.3.7 Respect the principles of intellectual freedom.

3.4 Self-Assessment Strategies

Assess the processes by which learning was achieved in order to revise strategies and learn more effectively in the future.

3.4.1 Assess the quality and effectiveness of the learning product.

3.4.2 Assess own ability to work with others in a group setting by evaluating varied roles, leadership, and demonstrations of respect for other viewpoints

Learning Standard 4. Learners use skills, resources, and tools to pursue personal and aesthetic growth.

4.1 Skills

4.1.1 Read, view, and listen for pleasure and personal growth.

4.1.2 Read widely and fluently to make connections with self, the world, and previous reading.

4.1.3 Respond to literature and creative expressions of ideas in various formats and genres.

4.1.4 Seek information for personal learning in a variety of formats and genres.

4.1.5 Connect ideas to own interests and previous knowledge and experience.

4.1.6 Organize personal knowledge in a way that can be called upon easily.

4.1.7 Use social networks and information tools to gather and share information.

4.1.8 Use creative and artistic formats to express personal learning.

4.2 Dispositions in Action

4.2.1 Display curiosity by pursuing interests through multiple resources.

4.2.2 Demonstrate motivation by seeking information to answer personal questions and interests, trying a variety of formats and genres, and displaying a willingness to go beyond academic requirements.

4.2.3 Maintain openness to new ideas by considering divergent opinions, changing opinions or conclusions when evidence supports the change, and seeking information about new ideas encountered through academic or personal experiences.

4.2.4 Show an appreciation for literature by electing to read for pleasure and expressing an interest in various literary genres.

1. *Responsibilities*

4.3.1 Participate in the social exchange of ideas, both electronically and in person.

4.3.2 Recognize that resources are created for a variety of purposes.

4.3.3 Seek opportunities for pursuing personal and aesthetic growth.

4.3.4 Practice safe and ethical behaviors in personal electronic communication and interaction.

4.4 Self-Assessment Strategies

4.4.1 Identify own areas of interest.

4.4.2 Recognize the limits of own personal knowledge.

4.4.3 Recognize how to focus efforts in personal learning.

4.4.4 Interpret new information based on cultural and social context.

4.4.5 Develop personal criteria for gauging how effectively own ideas are expressed.

4.4.6 Evaluate own ability to select resources that are engaging and appropriate for personal interests and needs.

The above 21st Century Standards from the American Association of School Librarians. The original document is available: http://www.ala.org/ala/aasl/aaslproftools/learningstandards/AASL_LearningStandards.pdf.

APPENDIX D:

New York State Professional Development Standards and Indicators

The Ten Standards for High Quality Professional Development

- **Designing Professional Development**: Professional development design is based on data; is derived from the experience, expertise and needs of the recipients; reflects best practices in sustained job-embedded learning; and incorporates knowledge of how adults learn.

- **Content Knowledge and Quality Teaching**: Professional development expands educators' content knowledge and the knowledge and skills necessary to provide developmentally appropriate instructional strategies and assess student progress.

- **Research-based Professional Learning**: Professional development is research-based and provides educators with opportunities to analyze, apply and engage in research.

- **Collaboration**: Professional development ensures that educators have the knowledge, skill and opportunity to collaborate in a respectful and trusting environment.

- **Diverse Learning**: Professional development ensures that educators have the knowledge and skill to meet the diverse learning needs of all students.

- **Student Learning Environments**: Professional development ensures that educators are able to create safe, secure, supportive, and equitable learning environments for all students.

- **Parent, Family and Community Engagement**: Professional development ensures that educators have the knowledge, skill, and opportunity to engage and collaborate with parents, families, and other community members as active partners in children's education.

- **Data-driven Professional Practice**: Professional development uses disaggregated student data and other evidence of student learning to determine professional development learning needs and priorities, to monitor student progress, and to help sustain continuous professional growth.

- **Technology**: Professional development promotes technological literacy and facilitates the effective use of all appropriate technology.

- **Evaluation**: Professional development is evaluated using multiple sources of information to assess its effectiveness in improving professional practice and student learning.

Standard 1: Designing Professional Development

Standard: Professional development design is based on data, is derived from the experience, expertise and needs of the recipients, reflects best practices in sustained job-embedded learning, and incorporates knowledge of how adults learn.

Indicators:

- Professional development design begins with a needs assessment that is grounded in the analysis of multiple sources of disaggregated teaching and learning data.
- Professional development design is based on the learning styles of adult learners as well as the diverse cultural, linguistic, and experiential resources that they bring to the professional development activity.
- Professional development design is grounded in the New York State Learning Standards and student learning goals.
- The intended beneficiaries of professional development are substantively involved in all aspects of professional development design.
- Professional development design addresses the continuum of an educator's experience and level of expertise, and is based on an analysis of individual educator needs; current knowledge and skills; and district, building and educator learning goals.
- Professional development formats include, but are not limited to, lesson study, demonstrations, observations, analysis of student work and assessment data, collegial circles, feedback, action research, reflection, and opportunities for collaboration and problem solving.
- The format of professional development incorporates technologies to provide more extensive and diverse content, expand access and participation, and create virtual professional learning communities.
- Professional development is sustained over time and provides continued support such as follow-up, demonstrations, feedback on mastery of new knowledge and skills, peer coaching and mentoring, and continued opportunities for additional study.

Standard 2: Content Knowledge and Quality Teaching

Standard: Professional development expands all educators' content knowledge and the knowledge and skills necessary to provide developmentally appropriate instructional strategies and assess student progress.

Indicators:

a. Professional development includes learning experiences and resources to ensure that educators understand how the subjects they teach address the New York State Learning Standards and the relationships between the subjects they teach and the other subjects in the curriculum.

b. Professional development provides opportunities for educators to examine, observe, practice, and receive feedback on their use of research-based instructional strategies to improve their students' learning by utilizing methods such as peer review, coaching, mentoring, and modeling.

c. Professional development provides ongoing opportunities for educators to examine a variety of classroom assessments, practice using them in their classrooms, and analyze the results to 1) understand and report on student achievement based on New York State Learning Standards, 2) identify gaps in student learning, and 3) adjust instruction.

d. Professional development provides differentiated instructional strategies to meet the needs of diverse learners.

e. Professional development ensures that educators have the knowledge and skills needed to develop and foster the critical thinking, problem solving, literacy, and technological skills that students need to be successful in the 21st century.

f. Professional development provides the knowledge, skill, and opportunity for educators to make relevant connections between the subjects they teach and the applications of those subjects.

Standard 3: Research-based Professional Learning

Standard: Professional development is research-based and provides educators with opportunities to analyze, apply, and engage in research.

Indicators:

Professional development is based on current research in teaching, learning, and leadership.

- Effective professional development ensures that all educators have the knowledge, skill, and opportunity to apply research to instructional decision making.

  Professional development includes ongoing opportunities for educators to read and reflect on current research on topics that are of interest to them and that are consistent with state and local school improvement priorities.

  Professional development involves discussion of research design, data collection, and analysis to assist teachers in understanding how to interpret research findings, particularly in areas where there may be competing perspectives and conclusions.

  Professional development provides opportunities for educators to collaborate with higher education and other partners in action research to test their own hypotheses and to report the results about the impact of professional development programs or the effectiveness of particular instructional strategies and programs for educators and students.

Standard 4: Collaboration

Standard: Professional development ensures that educators have the knowledge, skill, and opportunity to collaborate to improve instruction and student achievement in a respectful and trusting environment.

Indicators:

a. Professional development provides skills that educators need to communicate effectively, to listen to the ideas of others, to exchange and discuss ideas, to work in diverse teams, and to share responsibility for work toward a common goal.

b. Professional development provides ongoing opportunities for educators to work with colleagues including teachers, principals, teaching assistants, librarians, counselors, social workers, psychologists, higher education faculty, and others critical to student success.

c. Professional development maximizes the use of technology to broaden the scope of collaboration.

Standard 5: Diverse Learning

Standard: Professional development ensures that educators have the knowledge and skill to meet the diverse needs of all students.

Indicators:

a. Professional development focuses on developing educators' knowledge of the learning styles, needs, and abilities of their students, as well as the diverse cultural, linguistic, and experiential resources that their students bring to the classroom.

b. Professional development provides opportunities for educators to develop the knowledge and skills necessary to design and implement differentiated instructional and assessment strategies that utilize diverse student, family and community resources, and that meet diverse student learning needs.

c. Professional development provides opportunities for educators to examine their practice in setting and maintaining high expectations for all students to enable them to attain high levels of achievement.

Standard 6: Student Learning Environments

Standard: Professional development ensures that educators have the knowledge and skill to create safe, secure, supportive, and equitable learning environments for all students.

Indicators:

2 Professional development provides opportunities for educators to create a safe, inclusive, equitable learning community where everyone participates in maintaining a climate of caring, respect, and high achievement.

3 Professional development provides opportunities for educators to collaborate with school psychologists and social workers to develop effective strategies for student behavior and classroom management, and to seek creative solutions to conflicts.

4 Professional development provides opportunities for educators to analyze and use data about student behavior (such as discipline referrals, suspension information, school climate surveys, and social-emotional data) to refine educational practices and promote optimal learning environments.

Standard 7: Parent, Family and Community Engagement

Standard: Professional development ensures that educators have the knowledge, skills, and opportunity to engage and collaborate with parents, families, and other community members as active partners in children's education.

Indicators:

a. Professional development provides opportunities for educators to develop communication and collaboration skills that enable them to build partnerships with parents, guardians, and the community.

b. Professional development enhances educators' knowledge of varying cultural backgrounds of students, families, and the community, and of how the diversity of these cultural backgrounds can serve as foundations and resources for student learning and success.

c. Professional development includes opportunities for educators to develop skills and strategies that use technology to strengthen partnerships with parents, families, and the community.

Standard 8: Data-driven Professional Practice

Standard: Professional development uses disaggregated student data and other evidence of student learning to determine professional development learning needs and priorities, to monitor student progress, and to help sustain continuous professional growth.

Indicators:

a. Professional development ensures ongoing opportunities for all educators to learn how to analyze and collect multiple sources of student data throughout the year, to monitor student progress and adjust instructional practice.

b. Professional development provides educators with the opportunity to examine all relevant student data, including Individual Education Plans (IEPs), at the beginning and throughout the academic school year, in order to design effective instruction.

c. Professional development provides educators with current, high quality data analysis presented in a clear, understandable format, to promote optimal student learning.

d. Professional development provides opportunities for educators to use results from local, state and national assessments; student work samples and portfolios; school climate, parent, and teacher surveys; and student behavior data to guide their instruction.

e. Professional development provides ongoing opportunities for educators to use disaggregated student data by race, gender, English language learning, special needs, eligibility for free or reduced price meals, and other factors in order to improve student learning.

Standard 9: Technology

Standard: Professional development promotes technological literacy and facilitates the effective use of all appropriate technology.

Indicators:

3.3 Professional development ensures ongoing educator and student technological literacy.

3.4 Professional development provides ongoing opportunities for educators to learn about new and emerging technologies useful in professional teaching practice.

3.5 Professional development facilitates the ability of educators to apply technologies to create optimal and equitable learning environments.

3.6 Professional development promotes technology as a tool to design learning opportunities, to evaluate the effectiveness of instruction, and to monitor student learning.

3.7 Professional development encourages educators to engage with students in using available technology as it relates to curricular activities, and to assist students in using technology in innovative ways.

3.8 Professional development provides educators with opportunities to learn and use technology for communication and collaboration.

3.9 Professional development addresses the legal and ethical uses of technology.

Standard 10: Evaluation

Standard: Professional development is evaluated using multiple sources of information to assess its effectiveness in improving professional practice and student learning.

Indicators:

a. Resources are provided to plan and conduct ongoing evaluation of professional development.

b. Professional development evaluation uses multiple measures to assess effectiveness of the knowledge and skill acquired in improving professional practice and student learning (such as the use of new learning in instructional planning, the use of student data for the development and adaptation of teaching strategies, or the enhanced student performance following the application of a different teaching strategy).

c. Professional development evaluation includes the use of multiple methods and techniques that provide information to ensure ongoing improvements in the quality of the professional development experience (such as participant reactions, surveys, focus groups, interviews, reflective journals, portfolios, or information about student behavior or performance).

d. Professional development evaluation results are reported to key stakeholder groups in a manner that promotes effective use of the evaluation data for improving both individual educator practice and building- and district-wide professional development plans.

APPENDIX E: Technology Professional Development

1. Using technology to support instruction:
2. Understanding the 21st Century Skills
3. Integrating Technology into pedagogy:
    a. Content specific:
    b. Math
    c. Science
    d. ELA
    e. Social Studies
    f. Special Areas:
        i. Physical Education
        ii. Music
        iii. Library
        iv. Art
    g. Assessment creation and analysis of data to inform instruction
    h. Technology within special education
    i. Behavioral management
4. Using technology in software applications
    a. Smartboards
    b. SMART Response Clickers
    c. Microsoft Office
        i. Word
        ii. Excel
        iii. Powerpoint
        iv. Publisher
5. Success Maker
6. Inspiration
7. Teacher Websites
    a. Virtual Fieldtrips
    b. Using Mobile Devices
        i. Tablets
        ii. e-readers
        iii. i-pods
        iv. cell phones
    c. Apps
    d. Edmodo
    e. Castle Learning
    f. MovieMaker
    g. Video Technology
    h. Document Cameras
    i. Websites and Resources – learning valuable few websites and resources online
    j. Establishing online courses

k. Creating e-portfolios
l. Digital Citizenship
m. Wikis
n. Infinite Campus
o. Blogging
p. Podcasting
q. Searching the Internet
r. Collaborating online
s. Adobe Suite
t. Digital Textbooks
u. Webquests
v. Google and its tools
w. First in Math
x. Study Island
y. E-mail
z. Skype
aa. Moodle
bb. Google Drive
cc. Libraries – Follet and Safari Montage

APPENDIX F: Software and Hardware Technology Systems

District Supported Technology Systems:

- Hardware options for technology use within instruction:
    - Interactive Whiteboards – Teachers and students are using SMART Boards to enhance the curriculum. The students become actively engaged in the learning process by manipulating phrases, objects, and specific vocabulary. The teachers have the ability to preplan dynamic lessons that they can reconstruct as the students engage in the lesson. After the lessons are completed, they may easily print new notes and use them as a study guide or upload the notes to their class webpage.
    - Tablets –Implement grades 3-5 iPad initiative. In this initiative educators will possess the ability to use the iPad in alignment with our 21st Century information age educational philosophy.
- Teachers and students use a tablet with a remote desktop app to interact with a computer using a projector. This is often a more cost-effective alternative to an interactive whiteboard – particularly at the high school level where hands-on manipulation is not as imperative as in the lower grade levels. It is able to be passed around the classroom from student to student, or used by the teacher. The teacher has the freedom to teach from anywhere in the classroom. The tablet allows the teacher and students to operate the computer from anywhere in the room by writing in SMART Notebook, advancing a PowerPoint presentation, or doing anything else you might need to do at the computer.
- The technology department will focus on advancing the use of tablets in the elementary grades and then focus on secondary.
- Video Conference Equipment - Teachers and students have the ability to interact with students or content providers around the world. This technology enhances global learning along with cooperative learning. When connecting to each other, students can tutor their peers and learn in an environment where they teach each other. They become the empowered by the ability to teach and steer their learning. Teachers and students can use the content providers as a resource to experts in the field they are studying.
- Wireless Laptop Labs - Teachers and students are able to use a wireless laptop cart as a tool to enhance their curriculum in the classroom. The cart allows both students and teachers to be multimedia accessible throughout the day The students can engage in digital photography, movie making, and music production,

along with other tools such as word processing and Internet access. Teachers are able to teach using thematic based learning. Through this type of teaching students are able to produce work that stretches across all subject areas.

- Fixed Labs **-** Teachers and students have the ability to schedule lessons on a regular basis. During this time they are able to access the Internet, Microsoft Office Suite, and use software that is age-appropriate and supports their curriculum. Students visit the lab with their teacher whenever it is appropriate in their curriculum. The fixed labs provide a setting where hands-on computer instruction can take place for an entire class at the same time.

- Student Response Systems – Teachers and students have the ability to interact and navigate through student-managed assessments using multiple-choice questions. Each remote is numbered and assigned to a student. Students are able to answer questions based on teacher prompts, or based on questions projected onto a screen. The results of student answers can be accessed immediately and shared with the class, in addition to being stored for teacher use at a later time. The teacher can track how an individual student is doing, not just the entire class, and individual results are only shared between the teacher and the individual student. This system is very portable and can be

- Personal Electronic Devices
    - Furthermore we must seize the opportunity to leverage the power of these Mobile Information Devices to improve student learning and engagement.
    - Finally, as we continue to foster good citizenship, we should be preparing our students to be ready to use these devices in an acceptable and respectful manor that supports a conducive learning environment.

        - Mobile Information Devices are to be used in a way to positively impact instruction;
        - Mobile Information Devices may not be used in a manner that will jeopardize the privacy or safety of either staff or students;
        - Mobile Information Devices are not to be used in any manner that will jeopardize the integrity of any test or assessment situation;
        - Students who do not use the devices in an appropriate manner will be subject to disciplinary action;
        - The safe keeping of a Mobile Information Device is the sole
            - responsibility of the student who brings the device into school;
- Various software programs are used to support curriculum and instruction:

- Microsoft Office Suite is the primary software tool students and staff use
- Boardmaker allows you to create printed materials (visual schedules, etc)
- Ready-made activity templates or activities can be customized to meet targeted areas/needs (activity downloads available online). The software works seamlessly with adaptive equipment (adaptive keyboard switches). Includes: Text-to-speech (TSS) and Word Prediction;

- Various software programs are used throughout the district to support Administrative Activities. The Informational Technology Team will research systems that integrate the major systems of the district to foster more efficiency and strengthen performance management systems:
  - Infinite Campus-student management system (SMS) to streamline student administration, centralize and update student data, improve communication and provide tools for date-driven decision making;
  - Intranet utilizing platforms such as Microsoft Share Point and Google Drive to integrate systems' communication and collaboration.
  - MyLearningPlan- a web-based professional development tracking system providing evidence of learning, individual and team learning plans, manage and approve out-of-district activities;
  - Edline - provides district communications with innovative design, content management, which increases the amount and speed of communication with all members of the community;
  - APPR management systems

- Technology will be integrated into K-12 curriculum and instruction to enhance instruction and comprehension of NYSED Content Standards in the following ways:

    - Proposing a minimum of two technology integration teachers to provide integration training to district instructional staff, support ongoing technology-focused school programs, and initiate and implement new technology integration programs and practices;
    - Librarian Media Specialists are crucial to integration of technology in their buildings;
    - Staff members, including teaching assistants, administrators, clerical staff and teachers, will receive professional development on technology topics as outlined in the professional development plan;
    - Summer curriculum projects will be designed to train teachers to effectively integrate technology into their curriculums;
    - User group meetings (collegial circles) will be held for teachers using new technologies in their instruction;
    - Education software programs are used;
    - Video Conferencing between classes, podcasting, and virtual fieldtrips
    - Teacher webpages, wikis, blogs, and other social media under the guidance of our social media regulations;

- District Network Information- Local Area Network (LAN) as well as Wireless access is provided throughout districts.