

Teachers' Perceptions of on the Impact of Technology in the K-12 School Environment

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Abstract

The common aphorism that *education is the key to success* transcends the mere idea that traditional classroom preparation is sufficient for kindergarten to twelfth grade (K-12) students' academic achievement. The vast change in technology has had a great impact on instructional methods and teaching curriculums in preparing students to become more advanced, in order to compete in the global technological environment. Over the past years, there has been a failure to provide an environment that taps into the intellectual potential of most students in a K-12 school setting (Tozer, Senese, & Violas, 2006). This is primarily attributed to some teachers' perceptions of education technology and their reluctance to embrace school reform as some teachers have become complacent in their traditional ways of teaching (Borman & Greenman, 1990). On the contrary, with the current school reforms that include technology in education and with more educators joining the bandwagon, the education system seems to be showing more promise for students' learning.

With the introduction of the computer and other assistive technology in education around the early 1980s, research has proven that technology in schools has enhanced teaching and learning (Anderson-Inman & Horney, 2007; Essex, 2008; Tozer, et al, 2006). Furthermore, a classroom in which students are able to take charge of their learning and become active participants, resulted in academic success (Volker, 1992). From the different learning theories that have emerged, it was discovered that classroom technology has become a great contributor to the academic success of students by catering to the diverse needs of the student population. In addition, when technology was incorporated in the classroom, it was found to be vital to a student's literacy and helped to close the achievement gap (Kumar, 2002). The purpose of this study is to explore teachers' perspectives on the current state of incorporating technology in today's classrooms; the impact technology has on student literacy and academic achievement; and to determine whether technology addresses the diverse needs of the students in the 21st century K-12 classrooms.

This qualitative research will utilize a case study design by examining and analyzing relevant written records of case researches and empirical studies conducted over the past decade in education technology. The grounded theory design will be explored as a means of strengthening the study through the discovery from data and the possible generation of new

theories that could explain the development of a particular phenomenon in the use of classroom technology.

The research findings suggests that based on teachers' perceptions, the K-12 student-centered classroom supported with education technology versus a teacher-lead traditional classroom, had a greater positive impact on student's motivation to learn, which in turn yielded greater academic success. This parallels the findings of researchers who claimed that students were highly motivated when they had the opportunity to take charge of their learning, particularly when supported by technology and interactive multimedia (Arone & Grabowski, 1992). Other findings suggested that interactive multimedia created a learning environment that yielded academic success (Passerini, 2007). In addition, many researchers conceded that there was a significant difference in students' academic achievement in a technology rich classroom when compared to the traditional classroom because of its ability to motivate learners, provide autonomy, and contribute to students' social development (Arone & Grabowski, 1992; Keller, 1983; Passerini, 2007). Although the integration and implementation of classroom technology showed positive developments in teaching and learning, perceived impedance by teachers such as lack of funding, poor infrastructure and resources, resistance to reform, support for implementation and integration in school and curricula, and training and professional development for teachers were identified (Jennings, 2012).

Introduction/Background

Gradually, text-based education is beginning to catch up to the technology age and a complacent workforce lacking technical skills will become a past phenomenon. According to Jean Piaget, a Swiss cognitive psychologist, "the principal goal of education is to create men who are capable of doing new things, not simply of repeating what other generations have done" (Scarpello, 2008, p. 310). In other words, the success of the global economy depends on the advancement of technology; therefore, classrooms are heavily encouraged to move beyond the traditional way of preparing students to the *new school of technology* (Leimkuhler, 2009). Now, more than ever, it is necessary to call for an abandonment of the traditional classroom that has existed since the industrial age to one that will prepare K-12 students to function in a technologically driven society. Moreover, throughout the past years, there has been a failure to provide a learning environment that took advantage of the intellectual potential of most students (Tozer, Senese, & Violas, 2006).

The traditional methods of teaching involved text-based (Passerini, 2007; Vaca and Vaca, 2002), face-to-face (F2F) instruction (Dabbagh, 2002), lectures (Okolo & Naidoo, 2005), and teacher-directed instruction (Rock, et al, 2008). These approaches were referred to by Friend and Bursick (1999) as a *one size-fits-all approach to education*, which Lipsky (2005) claimed brought about meager performance on standard assessments. This idea lead teachers to believe that traditional direct instruction and textbooks, although they offered pedagogical methods that were instructionally sound and defensible, were proven to be ineffective in preparing students for today's rapidly changing society (Mosher, 2008). For centuries, many thought that the old-fashion methods of teaching were effective, especially since this drove the economy to transform overtime. However, this transformation was attributed to the innovation of technology, particularly with the introduction of the computer in the 1980s (U.S. Department of Labor, 2013). The computer was later proven to be instrumental in students' literacy and learning (Tozer, et al, 2006; Ely, 2008).

Criticisms made concerning reservations about the traditional classroom revealed that the disadvantage to this type of classroom was that many teachers tend to teach to the middle (Haager & Klinger, 2005). If this was the case, there is a high probability that the diverse needs of many students were not met due to specific learning needs not catered to in the traditional classroom setting. It was further noted that traditional instruction failed to meet the instructional needs of students, especially those with disabilities performing below grade level (Friend & Bursick, 1999). This finding was supported by Lipsky (2005), who explored the adverse impact of education technology on students with disabilities. From this standpoint, one could understand the reasoning behind Rock, et al.'s (2008) proposal for differentiating instruction to meet the diverse needs of students, and his recommendation of assistive technology use for students in inclusion classrooms who were not achieving success from traditional instruction. Findings from other studies conducted also supported the theory that assistive technology yields academic success (Anderson-Inman and Horney, 2007; Essex, 2008).

Present-day classrooms continue to change rapidly, because of the introduction of more innovative classroom technologies (Dearing & Daugherty, 2004; Ely, 2008), which has transformed the classroom into a more student-centered or self-directed classroom that offers students more autonomy and contributes greatly to their academic success (Kumar, 2002). However, this constant technology reform has been impeded by factors which included and are not limited to lack of funding, poor infrastructure and resources, resistance to reform, support for implementation and integration in school and curricula, and training and professional development for teachers (Jennings, 2012). Nonetheless, even with such challenges, over the years several studies in the field of education technology have documented evidence on the positive effects of technology on literacy and students' achievement. In addition, studies show that when trained teachers utilized technology in their classrooms, it had a positive impact on the students' attitude and academic achievement (Wenglinisky, 2005). Is there a possibility for teachers to accept the integration of technology into their traditional classrooms and overcome related obstacles in order to positively impact student's academic achievement?

Statement of Problem

The traditional classroom does not seem to adequately prepare K-12 students to deal with the demands of a rapidly changing society in which technology is at the forefront, despite findings that the introduction of technology in K-12 education environment increased students' literacy and academic achievement. Because of this reasoning, the need for K-12 schools to invest in, implement, and incorporate technology [in instruction] is fundamental. Without K-12 schools advancing to twenty-first century classrooms and teaching students the technological skills necessary to achieve their academic pursuits, students may not be able to compete successfully or prime themselves towards certain chosen career paths. Teachers who have shown willingness to explore the integration of education technology continue to face numerous technology-related challenges stemming from infrastructure, implementation, training, and funding. In addition to this, many school systems are not capable of adapting to the changes. Educators in the school system are the principals in measuring students' progress and any impedance they face; however, results from evaluations may be biased based on the educators' perceptions on integrating technology in classroom instruction. Because there are high expectations for students to achieve at an advanced level, a predicated reform needs to occur to phase out the traditional methodology of classroom instruction to a more visible

technologically driven one that will prove to be instrumental. The complexity identified herein is the issue of moving beyond the traditional classroom and adopting technology at each grade level, K-12.

Purpose of Study

The purpose of this qualitative study was to determine the impact of educational technology on K-12 students' academic achievement and to explore teachers' perceptions and some of the challenges they face in integrating educational technology into twenty-first century classrooms. The focal point of the study was to collect case data from scholarly research and empirical studies conducted mainly over the last decade, to establish possible relationships between teachers' perceptions about instructional technology and students' academic achievement. The data that was gathered and analyzed was also used to compare the impact of the transformation and shift from the traditional classroom to one that is more technologically driven.

The collection of research data examined for this study revealed surmounting literature covering the concept of education technology and teachers' perceptions, as well as a demonstrated need to upgrade traditional classrooms to more technologically equipped classrooms in order to cater to the learning needs of all students. However, these studies provided insufficient or no recommendations to address specific findings in these areas. This study was conducted to bring awareness to the impact and challenges of implementing technology in the new age classroom and to make recommendations on how K-12 teachers' perceptions can be influenced and what they can do to overcome many of the obstacles they face.

Review of Literature

Technology has become the backbone of the global economic system and therefore it is necessary for K-12 schools to prepare students for a productive future in an advancing technological society. Society has placed the responsibility of students' cognitive development in the hands of qualified teachers. There seems to be a general consensus that in order for society to move forward, teachers are tasked with the development of young minds. Therefore, it is incumbent upon the government and school systems to adequately train and support teachers and provide them with the necessary advanced tools to lead students in K-12 schools toward academic success.

Resistance to Instructional Technology and Reform

The education system has changed overtime and this was immediately evident in some K-12 classrooms. Whenever change of any kind is introduced in education, teachers have always been at the forefront, acting as catalysts for education reform (Kahveci, Sahin, & Genc, 2011). However, the transition from traditional education to technology education has not been an easy feat for teachers (Jennings, 2012). These changes were met with great resistance by teachers who were afraid to embrace new pedagogical practices (Clark, 2000). The pedagogical practices referred to would likely be a shift from the traditional classroom setting that many teachers are more accustomed to. Clark (2000) associated teachers' negative perceptions to students' perceived misuse of classroom technology. A similar finding by Collins (1990) rationalized teachers' negative perspective towards educational technology indicating that

teachers feel as if they were giving up the management of their classroom to a computer and students will no longer depend on them for lead instructions. Teachers' resistance also stemmed from their discomfort with adapting to innovative technology (Levin & Wadmany, 2008). The aforementioned findings are supported by Hannafin and Savenye (1993) who stated that teachers' resistance to education technology had a negative impact on students achievement as students are not able to reap the benefits of a new age classroom proven to positively impact their performance. From the standpoint of being an experienced educator, the popular question that is often expressed by some teachers has been, why fix a system if it is not broken? However, many of these teachers tend to complain constantly about the lack of resources and access for students in the education system and have also articulated concerns about student achievement.

Lack of Funding, Resource, and Infrastructure

With the early success of instructional technology and its ability to better prepare students for higher education or work-life, some government agencies and K-12 school leaders have tried to increase efforts in providing schools with funds to upgrade classrooms, improve school infrastructure to facilitate technology, and restructure school curriculum and standards to accommodate instructional technology. School leaders have realized that in order to boost students' academic achievement, there has to be a large investment in technological equipment and resources necessary to enhance students' learning at differentiated levels (Daugherty, et al., 2008). The findings of Foltos (2002) established that increased government funding for classroom would lead to abundant classroom use by teachers and students and improve teaching and learning. This would eventually have a positive impact on student achievement overtime. Although there had been much investment in educational technology, not much thought was given to the physical structure of some schools. Daugherty, et al. (2008) and Aduwa-Oglebaen (2008) acknowledged this behavior as being unprepared to house technology, particularly after identifying that many school buildings were dilapidated and out-dated. Lack of funding to improve school infrastructure placed limitations on the distribution of technology throughout the K-12 school systems (Chikasanda, Otrell-Cass, & Jones, 2010). The system of reform that was created to ensure excellence in classrooms was not adequately funded (Neil, 2008). As a result, this had an adverse impact on the implementation of technology and student achievement.

Primarily, concerns that surround education technology were centered on the cost of technology integration and implementation (Neil, 2008). It is believed to be a general awareness that K-12 schools undergo extreme financial pressure; therefore, these schools are less likely to expend money on technology programs that may later seem unnecessary (Pierce & Ball, 2009). On the contrary, some critics argued that it was not the lack of funding or resources that hindered the integration of technology in K-12 schools; it was teachers' perceptions and utilization of classroom technology that greatly impacted their ability to affect student achievement. This claim is supported by recent studies conducted in countries such as Malawi and Jamaica, which represented similar education systems (Chickasanda, Otrell-Cass & Jones, 2010; Jennings, 2011). The studies found that teachers' perceptions of education reform concerning technology in education were quite in its implementation. Teachers in both the studies displayed negative attitude towards resource and technology (RT), which was attributed to the lack of proper resources and support, curriculums and support texts, and teachers' need for more guidance on how to infuse career education into RT. Consequently, it was questionable as to whether the RT that the schools invested in adequately prepared students for external exams (Jennings, 2011).

In a similar study conducted to test the impact of educational technology universally, two countries were studied: the United States (US) and Singapore. Results from the study done in the US did not support the theory that educational technology enhanced learning, while in Singapore teachers reported significant achievement growth. The difference, however, was not a matter of availability of resources, but a matter of teachers' perceptions and how resourcefully and effectively technology was used in the classroom. Singapore invested more heavily in computers when compared to the US; however, US students utilized classroom technology more frequently. These results reflect inadequate use of integration of technology as tool for teaching and learning (Alsafran, 2012). These findings demonstrated that technology integration was unrelated to the availability of funding, but relied more so on the willingness of teachers to utilize classroom technology in a way that will have a positive impact on students' achievement. Based on experience, when effective teaching and learning does not occur in a technology-rich classroom, this is usually due to some other factors that goes beyond a teacher's inability to access resources. Foltos (2001) deduced that teachers did not believe in the impact of instructional technology and its connection to academic achievement. Pajares (1992) agreed that there is a connection between what teachers believe about educational technology and their use of it in the classroom.

Technology in School Curricula

Technology reform does not only get scrutinized because of issues with funding, but with it comes a new curricula and standards that teachers have to adhere to. This posed additional challenges, especially for teachers who have not embraced the new system of education technology, either because they were not comfortable with it or they lacked the confidence to integrate information technology in their curriculum (Levin & Wadmany, 2008). Many teachers have focused more on teaching to test in a standard traditional way and allowing curriculum to drive their level of technology integration instead of exploring the modernism of education technology (Cowan, 2008). Results from the study done in Malawi on technical education—where the vision was to achieve technology education integration in schools—revealed that the traditional curriculum has placed limitations on teachers' freedom and negatively affected their perception of education technology and the ability to integrate it in the classroom (Chickasanda, OtreI-Cass, & Jones, 2010; Overbaugh & Ruiling, 2008). From the Malawian study, teachers expressed discontent regarding the out-dated curriculum that still existed despite the technological advancements and the requirement of specialized training for the curriculum. However, when a new curriculum incorporating technology was initiated, some teachers found it difficult to put into practice due to lack of reinforcement, and other related challenges (Chickasanda, OtreI-Cass, & Jones, 2010; Clark, 2000).

Research that focused on the challenges teachers faced, which ultimately shaped their perceptions of educational technology, found that school leaders did not encourage teachers to enhance their computer literacy skills causing them to become discouraged. The restraint by the teachers deterred their encouragement of students' use of the technology program. On the other hand, the teachers who were successful in the study, attributed their success to the support of the principal and the technical support team. According to Clark (2000), it would be extremely challenging for teachers if school leaders were not supportive of the integration of computer technology. Clausen (2007) found that when teachers received technology access and support for instructional technology or the curriculum design supports the use of instructional technology, teachers' perceptions changed and their use of instructional technology increased. For example,

in a case study reviewed, two teachers had a negative reaction towards education technology at first, but when they received support from their administrator or were given autonomy to integrate technology in their instructional plans, they were less apprehensive and perceived support with educational technology was instrumental in their students' achievement (Niederhauser, Lindstrom & Strobel, 2007). Leadership is observed as the most integral factor influencing the effective incorporation of technology in education (Aduwa-Oglegbaen, 2008). For technology integration to be successful, teachers will require adequate time for implementation for it to have a positive impact in students (Clark 2000; Pierce & Ball, 2009).

Professional Development

Many critics conceded that if technology is to be successfully combined with pedagogy, the technique used to train teachers needs to be reexamined (Kahveci, Sahin, & Genc, 2011). Teachers need receive pre-service along with professional development that focuses on their mindsets (Clark, 2000; Pierce & Ball, 2009; Littrell, Zagumny, & Zagumny, 2005). If teachers are not provided with the necessary resources to integrate technology according to the required guidelines, preparing them to use technology will be futile (Aduwa-Oglegbaen, 2008). The nucleus of good teaching with technology according to Koehler and Mishra (2008) involves three core components: *content*, *pedagogy*, and *technology*. A teacher must master all three components in order to successfully integrate advance technology into instruction. However, in order for this to happen, it would require teachers to be professionally trained facilitators to improve the value of student's education and have a direct impact upon their learning (Clark, 2000). Other studies also indicated teachers' perceptions of technology and their decisions to use it was based on whether or not they received proper computer training. Teachers with adequate training in education technology tend to be more optimistic when compared to those who did not acquire the fundamentals necessary to use the computer and question whether instructional technology has an impact on students' learning (Clark, 2009; Jennings, 2012; Kahveci, Sahin, & Genc, 2011; Novak & Knowles, 1991; Pierce & Ball, 2009; Russel, et al., 2003).

In a sample research conducted by Ebenezer, et al. (2012), it was found that the teachers evaluated in the sample perceived that students' improvement in class was closely linked to the use of technology, which the teachers were apprehensive to use at first. The levels of apprehension teachers displayed were due to their lack in the skills necessary for implementation. However, it was perceived that the rationale for the significant progress in students' work had to do with the adequacy of training, which increased the teachers' confidence with technological application. Another study, which involved sixty-six teachers who varied in age, gender, race, and educational background and experience, suggested that teachers perceived technology to be a necessary component in the classrooms; hence, teachers should be trained to use it (Clark, 2000). Most educators believed that instructional technology would have been mandatory because of its assumed ability to reach more students based on their varying educational needs and because of the visual and audio effects. However, for the students to learn the necessary skills, it would depend on the teacher who was given pre-service and ongoing training in classroom technology and one who has the ability to infuse technology into the curriculum effectively (Littrell, Zagumny, & Zagumny, 2005).

Discussion

Clark (2000), Levin and Wadmany (2008), Jennings (2012), expressed teacher's negative perception and reluctance to embrace education technology by claiming that teachers displayed this negative attitude because they felt as if they were giving up control of the classroom to computers. Daugherty, et al. (2008), Aduwa-Oglebaen (2008), Chikasanda, Otrell-Cass, and Jones (2010), Neil (2008), Pierce and Ball (2009), linked teachers negative perceptions of education technology to inadequate funding and out-dated infrastructure, because of poor investment in classroom technology, which affected student achievement. The extent to which support for the integration of technology in school curricular impact students achievement is explained by Cowan (2008), Overbaugh and Ruiling, (2008), Chickasanda, Otrell-Cass, and Jones (2010), Pierce and Ball (2009), and Clark (2000), who agreed that most schools have not updated their curriculum to include technology and in some cases where curriculums were updated, there is little or no leadership or infrastructural support for innovative classroom technology. On the contrary, Niederhauser, Lindstrom, and Strobel (2007) and Clausen (2007) purported that when teachers received support from school leaders, they reacted more positively towards education technology, which lead to higher student achievement. In order to impact students' learning in a positive way, Clark (2000), Littrell, Zagumny, and Zagumny (2005), Kahveci, Sahin, and Genc (2011), and Pierce and Ball, (2009) argued that it was essential for teachers to receive adequate training on infusing education technology in instructional plans. Furthermore, research studies done by Novak and Knowles (1999), Russel, et al. (2003), Clark (2009), Pierce and Ball (2009) Jennings (2012) and Kahveci, Sahin, and Genc (2011) indicated that trained teachers had a greater impact on student achievement than those without training.

The introduction of technology in instruction was found to have a major impact on achievement in K-12 schools. As a result, many schools are now integrating technology in the classrooms, thus, indicating the power of technology in education. In schools where there is a higher level of implementation in technology, students reached a higher level of academic success because teachers who had a high degree of mastery in the area of classroom technology and were able to deliver it confidently in instruction. This helped to increase students' motivation and changed their attitudes toward advance technology in the classroom. In addition, schools that invested in technology to support pedagogy and receive strong support from school leaders, eventually saw results in student academic success. Moreover, teachers' attitudes about computers and related technologies could positively or negatively influence students' attitudes towards technology while creating an impact on student achievement (Clark 2000; Sheingold & Hadley, 1990).

Many skeptics have asked the questions: *Is it really technology that causes high academic achievement? Can computers alone teach students? What is the teacher's role in the equation?* The answer may not rest only in technology integration, but in the role of the technology literate teacher that in turn affects learning outcomes in the 21th century K-12 classrooms. In order to utilize technology to perform its necessary functions, there has to be a supporting system. Although the State and federal government made provision for schools to obtain technology, much work is still needed with implementation and integration. This is why some researchers were skeptical about the ability of technology to effect achievement in a positive way, without considering the missing components needed to attain success.

It is undeniable that technologically wired classrooms can impact students in many ways that will lead to academic achievement. However, these classrooms are continuously

undervalued because in the twenty-first century K-12 classroom, many educators overlook their roles as facilitators while the computers perform their jobs. The role of an educator is to provide students with the skills needed to achieve in academia and to advance into a fast paced, technologically advanced society. Technology is a great tool to help students access the outside world, beyond what they can achieve from text-based learning; therefore teachers need adequate training in order to help students transfer instructional content into real life experiences. If this is not achieved, appropriate and adequate teaching and learning is not taking place because the reason for infusing technology into instruction is so the students benefit in a meaningful way. Educators therefore need to use technology to help students develop their weaknesses and become motivated toward learning.

Despite the general consensus that teacher training is essential to technology integration and not much has changed with K-12 schools' physical structure or curriculum design and delivery of instruction to alleviate challenges for teachers, the negative perception of technology and lack of support for technology can be rectified if school officials allocate more funds into the classroom (Davenport, 2008). Moreover, in implementing technology to assist with teaching and learning, Pierce and Ball (2009) insists that teachers need to adjust their instructional practices, because teachers who do not have much experience with technology will possibly struggle with the mental construct or precept of imparting the knowledge or skill (Chickasanda, Otrell-Cass, & Jones, 2010) to students in the twenty-first century classroom. It is clear that technology is here to stay and if teachers do not embrace it, they are doing the education system a great injustice and if it is to be used as an essential tool in the classroom, then teachers need to change their mindsets and prepare technology in a way that is applicable (Jennings, 2012) to the twenty-first century K-12 classrooms. Students need to acquire certain skills in order to go out into the workforce and schools need to make sure that there are adequate technological resources provided for students and teachers willing to develop young minds (Clark, 2009).

In situations where schools experience lack of funding, teachers and school officials should find a way to get community members and local businesses to support their school's vision and invest in the future of the students. Businesses should invest in technology programs in school. After all, these are the same students who may be working in these local businesses. In a way this will help students to achieve academically, help to build their communities, and contribute to the global economy.

While the standards for teachers have risen over the years, there are still teachers who remain unproductive in the classroom. From observation, a great number of school districts previously hired novice teachers because of a shortage of teachers. Now, most school districts have teacher certification and advanced education programs for teachers. However, some teachers still emerge from those programs unable to apply themselves effectively in the classroom, thus, negatively impacting student achievement.

Recommendation and Implication for Further Research

First, to facilitate technology, members of the school boards need to ensure that everyone is on board with the concept of educational technology, including administrators, teachers, parents, students, and even the wider community. Teachers need to be retrained and have on-going staff development. Schools need to wire classrooms and update the technology in the school. The curriculum needs to be redesigned to incorporate technology in a meaningful way and also to provide teachers with a little freedom – room for creativity. Lee, (2005) suggested

that teachers should also train students to use technological tools so that they can use the tool effectively to achieve learning outcomes, because students who are especially inexperienced with classroom technology, may not reap the benefits. The author also proposed that teachers must get together and do action research, because it is their responsibility and duty to the students and their profession to find ways to improve their practice and ensure student academic achievement. Secondly, how teachers view technology in the classroom should be evaluated, because their perceptions influence their attitude and the decisions that they make in the classroom with regard to instructional technology. To address the problem, teachers' attitudes need to be realigned. Teachers' appreciation of education technology in K-12 classrooms could improve their resourcefulness and ability to create curriculums to design programs that offer profound subject matters, which could be a deviation from a program focusing on direct instruction and norms to practices that support students' intellect (Chickasanda, Otrell-Cass, & Jones, 2010).

Furthermore, the results of the research study demonstrated significant differences between the traditional and the technology-rich classroom and the impact of technology on student achievement in each classroom. More research is needed in this field to get rid of all the skepticisms on whether or not education technology impacts students' achievement. Doing research in the field of educational technology should be the undertaking of educators active in the field, which will allow for more valid and accurate reports on teaching and learning in the classrooms and identify why students fail to achieve academic success despite the current educational reforms.

For instructional technology purposes it is suggested that, technology integration in primary education be studied separately from technology integration in secondary education. This would be helpful because delivery of instruction affects learning outcomes and it would be good to see the differences at each level and how teachers utilize technology to engage student lead them to a level of mastery. Teachers' influence is critical on decisions about introducing – and especially about using – innovative technologies and new methods (Kolderie, 1990). Therefore, it is suggested that teachers receive sufficient opportunities for in-service training, workshops and other formal training in technology before they introduce technology to the students (Lee, 2005). Teachers' perceptions and attitudes influence students' attitudes as well, therefore teachers must be very knowledgeable and confident in their implementation of technology.

As technology becomes more predominant in schools, it is suggested that schools begin to restructure their infrastructure and curriculum to incorporate technology and find ways to invest in educational technology outside of State funding. In addition, for future research, it is suggested that the sample be augmented. It would be beneficial if the study focused on a larger sampling of K-12 schools while making an allowance for urban, sub-urban and charter school environments, gender, students' ethnic and financial backgrounds, second language learners, and students with special needs, in order to determine if these specific factors also influence student achievement regardless of the integration of education technology; and teachers' perception of educational technology and its impact on student achievement. The data from this sample will allow for the collection of more accurate data and improve the validity of the research questions.

Conclusion

The literature review of various case studies and scholarly articles indicated that teachers perceived there was a significant relationship between students' academic achievement in a

technology rich classroom when compared to the traditional classroom setting. Teaching and learning are definitely enhanced by technology and allow students to experience learning on a higher level. The factors that affected the implementation and integration of technology and its ability to impact academic achievement in a positive way were resistance to instructional technology and reform, lack of or inadequate school funding, resource, and infrastructure, lack of or little support for integration and implementation in school curricula, and lack of staff development (pre-service and in-service). Teachers' mindsets were also discussed and how their perception of education technology can impact students' learning in a negative or positive way. There seems to be a consensus by most researchers that technology had a tremendous impact on education and student achievement when they are able to overcome instructional barriers. It was also indisputable that technology has its advantages and disadvantages even though some critics were skeptical about the potential for technology to impact student achievement in a positive way. It is predicted that in the near future, K-12 schools will be revolutionized and the roles of schools and teachers dramatically, and traumatically, changed.

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