Tablet Technology Learning Outcomes in Elementary Education

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ABSTRACT

With the implementation of Common Core Standards in 44 of the 50 United States classroom technology has become increasingly important. As early as first grade students are asked to, "…use a variety of digital tools to produce and publish writing, including in collaboration with peers" (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010, pp. CCSS.ELA-Literacy.W.1.6) The use of tablet technology in the classroom meets this need. For the purposes of this research tablet technology will be defined as "A general-purpose computer contained in a single panel. Its distinguishing characteristic is the use of a touch screen as the input device" (The Computer Language Company, Inc., 2013). This paper reviewed current literature on the topics of mobile learning (m-Learning), technological pedagogical practices and information communications technology (ICT) in classroom settings. This paper also examined the learning outcomes achieved through tablet technology initiatives in the elementary school environment, in an urban area of Northern New England, using a qualitative approach. Learning outcomes were measured through teacher interviews and quantitative changes in student assessment data. The key finding suggests that tablet technology in combination with quality applications and properly trained teachers can positively affect learning outcomes.

INTRODUCTION

The grand challenge facing America's schools is "the empowerment of all children to function effectively in their future, a future marked increasingly with change, information growth, and evolving technologies" (Peng, Su, Chou, & Tsai, 2009, p. 180). This study states that "By the end of the decade or sooner, the transition to ubiquitous computing will become a pervasive force that changes the ways of human communication" (Peng, et al., 2009, p. 171). Web 2.0 technologies are opening the doors for user generated content to be shared with the world and allowing Internet applications to be accessed from any web enabled device (Ziff Davis, LLC, 2014). These shifts allow our communities to become classrooms and our classrooms to become communities. The changes brought about by Web 2.0 technology have made an impact in education because, "Web 2.0...has the potential to blur the boundaries between formal and informal learning environments and become an integral part of the process of learning and teaching" (Terras & Ramsay, 2012, p. 820). Cutting edge, ubiquitous technology is a powerful tool that can offer learning opportunities to all children so that they can better survive in the twenty-first century – in terms not just of work, communications, and learning, but of life, as well (Peng, et al., 2009, p. 181).

LITERATURE REVIEW

BENEFITS FOR ALL STUDENTS

In their 2005 study *Uses and Effects of Mobile Computing Devices in K-8 Classrooms* Swan, van 't Hooft, Kratcoski and Unger explored student motivation to learn, engagement in learning activities, and support for the learning process when using mobile computing devices. These researchers discovered implications for student engagement and special needs student learning. This research found that mobile technology can enhance the learning process both inside and outside of the classroom. "Most teachers interviewed agreed that their students' motivation to learn and engagement in learning activities was improved by the use of mobile computing…" (Swan, van 't Hooft, Kratcoski, & Unger, 2005, p. 106). They found that students have "…increased motivation due to mobile device use [that] leads to increases in the quality and quantity of student work" (Swan, et al., 2005, p. 110). This study indicates that students who spend more time using technology "…collaborate and communicate more, and benefit from having a portable readily accessible tool" (Swan, et al., 2005, p. 100). Students have the ability to adapt the use of mobile computing devices to their individual needs. This research shows evidence that the use of mobile devices can lessen "…the gap in conceptual understanding levels between regular and special needs students…" (Swan, et al., 2005, p. 109). The researchers suggest, "…that special attention needs to be paid to classroom logistics, equipment maintenance, technical support, and perhaps professional

development for teachers using mobile computing options" (Swan, et al., 2005, p. 110). This study suggests that regualr and special needs students can benefit from the use of mobile computing devices. Swan, et al.'s research implies that school districts nation wide can use educational technology to fill the educational gap often found between regular and special education students.

CHALLENGES OF MOBILE LEARNING

The Five Central Psychological Challenges Facing Mobile Learning written by Melody M. Terras and Judith Ramsay in 2012 brings to light the implications of Web 2.0 and the need for digital literacy using their research about memory, cognitive resources, cognition, metacognition and learner differences. These researchers point out that:

> "Mobile devices have a number of unique characteristics such as portability, connectivity, convince, expediency, immediacy, accessibility, individuality and interactivity and hence offer the potential of educational applications above and beyond those of traditional information and communication technology."
>
> (Terras & Ramsay, 2012, p. 882)

An understanding of human capacity is important when moving forward with educational technology practices. Digital literacy is imperative if students are to learn from mobile technology. This research calls for application developers to remember the context dependent nature of human memory when creating

educational applications. The researchers also discuss the need for humans to be able to filter out unnecessary information in order to make full use of our limited cognitive resources. Web 2.0 tools allow for the distribution of cognition because "…learners continually construct and reorder and rearrange their understanding while they interact with [numerous] educational materials" (Terras & Ramsay, 2012, p. 825). Metacognition matters in this context because learners need to know how they learn best and use their executive functioning skills to manage their learning. In regards to individual learning differences, Terras and Ramsay say, "It is important to understand the *different ways* that technology may be used, as *different* uses and the *differing* underlying motivations may impact *differentially* on academic performance" (Terras & Ramsay, 2012, p. 826). The five psychological challenges that Terras and Ramsay bring up are important to note when implementing mobile educational technology. Educational technology allows for differentiation in teaching and learning styles.

SUBJECT SPECIFIC STUDIES

Kiger, Herro, and Prunty, in their 2012 study, *Examining the Influence of Mobile Learning Intervention on Third Grade Math Achievement*, suggest that coupling "business as usual" curriculum with a mobile device may be a cost-effective lever to improve student achievement. Mobile technology is ubiquitous in the lives of most students causing "… schools to reconsider instructional and operational practices" (Kiger, et al., 2012, p. 62). Apple's

"iTechnology" is being incorporated in many schools to facilitate student learning because of its "...versatility (e.g., e-reading, calculating, mapping, video and audio recording, Internet browsing, gaming), familiarity to students, and affordability" (Kiger, et al., 2012, p. 63). This study involved using mathematics applications with students. The criteria for the applications is as follows: "curriculum alignment, authentic skill practice, operational ease, and attractiveness to students" (Kiger, et al., 2012, p. 68). Teacher preparation took place so that teachers would be comfortable with the technology and they decided to do math facts practice for 10 minutes a day across all of grade three. At the conclusion of the study students were tested on multiplication facts; it was found that "...coupling "business as usual" curriculum with a mobile device may be a cost-effective lever to improve student achievement" (Kiger, et al., 2012, p. 76). This research implies that "...effective implementation of mobile learning depends on administrative and school commitment and adequately trained teachers and matters of pedagogy, instructional technology integration, classroom management/ facilitation, and mobile device operation" (Kiger, et al., 2012, p. 77).

In their study *1:1 Mobile Inquiry Learning Experience for Primary Science Students: A Study of Learning Effectiveness* Looi, et al. (2011) noticed a significant shift in classroom culture. Students began asking their own questions and had a changed mindset about not being afraid of asking questions that may be deemed as 'stupid' by their peers and their teacher. When doing

mobilized lessons "…students were found to learn science in a personal, deep and engaging way as well as developed positive attitudes towards mobile learning" (Looi, et al., 2011, p. 269). When using mobile devices students were observed taking part in self-directed learning and collaboration. As a result of this intervention students performed better on traditional science assessments than the class without the intervention. This study effected the teacher's practice by allowing more time to reflect on lessons, more time to observe students when using the mobile devices, and the educator became more inclined to allow students to construct their own learning.

MOBILE LEARNING

Peng, Su, Chou, and Tsai state in their 2009 research, *Ubiquitous Knowledge Construction: Mobile Learning Re-defined and a Conceptual Framework*, that:

"As ubiquitous computing appears to represent the future of education technology, it is crucial for educators to be prepared to use such force to enrich teaching and learning in the classroom. Teacher training focusing on mobile vision and competencies is desirable in order to facilitate the transformation of pedagogy."

(Peng, Su, Chou, & Tsai, p. 172)

They also point out that technology is a mind tool, an intellectual partner with the ability to engage a learner's thinking and knowledge construction. When

technology is used in this way it enables learners to learn in an authentic and intentional way. This research comes to the conclusion that "ubiquitous technology seems to be a powerful tool that can offer learning opportunities to all children so that they can better survive in the twenty-first century – in terms not just of work, communications, and learning, but of life, as well" (Peng, et al., p.181). Using this type of ubiquitous technology in schools will enable students to become lifelong learners. The convergence of technology and learning may, "empower people to manage their own learning in a variety of contexts throughout their lives" (Peng, et al., p. 178). The researchers also point out that, "By the end of the decade or sooner, the transition to ubiquitous computing will become a pervasive force that changes the ways of human communication" (Peng, et al., p. 171). Peng, et al. (2009) also bring to light a few of the consequences of rapid technological advancement. One major issue is the lack of theoretical framework for mobile learning programs. They also state that, "...certain problems stem from unreliable mobile communication, such as loss of connection, different bandwidth variability, heterogeneous systems and devices, possible security risks, lower power supplies, [etc.]" (Peng, et al., p. 178). This article discusses several relevant issues such as educational digital divides, classroom management, network literacy, and the need for pedagogically sound educational tools. This research also asserts that learning is highly individualized and based on self-regulatory strategies and collaboration with

others.   Mobile technology allows for ubiquitous knowledge construction, therefore empowering people to become lifelong learners.

Li, Pow, Wong, and Fung in their 2009 study *Empowering Student Learning Through Tablet PCs: A Case* Study state that,

"The primary motivation for integrating ITC into teaching and learning is the belief that it supports students in exploring and articulating thoughts, knowledge construction and theory building, collaboration, negotiation of meanings, reflection, meaningful learning through accessing authentic information and immersing themselves in complex and contextualized learning situations."

(Li, Pow, Wong, & Fung, 2010, p. 171)

This research states that successful Information Communications Technology (ITC) implementation relies on seven factors. These factors are: teachers' attitudes and beliefs, skills and pedagogies, assessment, resources, school culture, professional development, and leadership. This type of technology should be used to develop lifelong learners. Li, et al. (2010) call information literacy a pivotal pursuit "…essential for people to cope with the rapidly evolving changes in the information age" (Li, et al., 2010, p. 173). A Chinese Language teacher from Hong Kong who cooperated inthis study found that "… [students] are less afraid of making mistakes as the computer allow[s] them to undo everything… I find the writings of the group of students seem to be more

creative and richer in terms of their content…" (Li, et al., 2010, p. 177). This was a study done on an individual school with Tablet PC implementation since 2005. A positive impact was found in cognitive, metacognitive, affective, and sociocultural learning as a result of Tablet PC usage.

Mark Prensky, in his two part study from 2001 entitled *Digital Natives, Digital Immigrants*, discusses the concepts of neuroplasticity and the need to adapt modern pedagogy to fit the needs of modern learners. Prensky (2001) states that "Today's students are no longer the people our educational system was designed to teach" (Prensky, Digital natives, pt 1, 2001, p. 1). The arrival of digital technology such as cell phones, laptops and video games has changed the way that modern learners process their learning. This article calls attention to a very insightful comment by Dr. Bruce Berry of Baylor College of Medicine. Dr. Berry states that "Different kinds of experiences lead to different kinds of brain structures" (Prensky, Digital natives, pt 1, 2001, p. 1). He goes on to define digital natives as people born with in the latter part of the 20th century who are regularly exposed to digital media such as video games, computers and cell phones. Digital immigrants are those people that were born before desktop or laptop computers were found in every home and before video games were able to hook up to a television set. Prensky suggests that digital immigrants have an 'accent' when using technology. Some examples of this accent are, "reading a manual for a program rather than assuming the program itself will teach [you]…[or] needing to print out a document written on the computer in

order to edit it" (Prensky, Digital natives, pt 1, 2001, p. 3). This article implies that the biggest problem in education today is the digital immigrant educator's inability to learn the language of digital natives. Prensky asks that educators reconsider both their methodology and their content; this could allow digital natives to be fully engaged in the learning process. 21st century educators need to teach students two types of content, according to Prensky. These are legacy and future content. Legacy content is traditional content, such as reading, writing and arithmetic, and future content is digital and technological. Prensky points out that using properly focused educational video games can increase learner engagement and knowledge. In part two of this article Prensky tells us that, "The environment and culture in which people are raised affects and even determines many of their thought processes" (Prensky, Digital natives, pt 2, 2001, p. 4). Many educators claim that students of digital native generations are unable to pay attention; Prensky claims that they are unwilling to pay attention due to lack of engagement. Educators are not speaking the language of the students. Prensky believes that one solution to this dilemma is the use of educational video games. The United States Department of Defense uses educational technology to train soldiers for combat, stating, "We know that the technology works. We just want to get on with using it" (Prensky, Digital natives, pt 2, 2001, p. 6). Digital immigrant educators need to take the time to learn the new language of learning so that they are able to continue to,

"…communicate their still valuable knowledge and wisdom…" (Prensky, Digital natives, pt 2, 2001, p. 6).

METHOD

This study examines the learning outcomes of tablet technology in an elementary school environment. Through a qualitative and quantitative exploration of data the investigator began to research: What is the effect of tablet technology on learning outcomes in the elementary school environment?

INVESTIGATOR EXPERIENCE

The primary investigator is a current Junior, a member of the local ASCD chapter at Southern New Hampshire University, and has taken a course in educational technology integration.

PROTOCOLS

The researcher worked closely with Dr. Audrey Rogers, Associate Professor in the School of Education, to complete necessary paperwork for seeking IRB approval (see Appendix B). An Assurance of Principle Investigator was signed by Dr. Margret Ford, interim Dean of the School of Education at Southern New Hampshire University, and included with the IRB paperwork. The study was approved by the Office of the Provost and Senior Vice President for Academic Affairs at Southern New Hampshire University in Manchester, New Hampshire on February 14, 2014. Upon approval the researcher obtained a recommendation for a cooperating teacher from Susan Whitney, Office Coordinator, Teacher

Certification at the School of Education. A study overview (see Appendix D) was sent to the cooperating teacher in addition to a letter of consent insuring anonymity and confidentiality (see Appendix C). An initial interview occurred on February 20, 2014 and a follow-up interview and classroom observation took place on March 5, 2014.

LIMITATIONS

This study is local and limited in scope because it took place in one school and analyzed only the fourth grade students. The interviews that took place were the opinions of one teacher. The observation done in the study is from the researcher's frame of reference. It should be noted that as a pre-service teacher the primary investigator had limited experience in the classroom environment and with the use of educational technology.

SETTING

The cooperating school in this study is located in an urban area of Northern New England. The case study was completed with a cooperating 4th grade teacher. The teacher had 14 years of teaching experience with certification in Elementary and Early Childhood Education and a degree in Applied Computer Science. The study included data from the 4th grade students attending the school from the 2010-2011 thru 2013-2014 school years with an average yearly grade size of 65 students. Specifically this data was the

English Language Arts and Mathematics portion of the New England Common Assessment Program scores.

CLASSROOM TABLET USE

During the 2011-2012 school year the 4th grade at this school started using tablet technology on a daily basis during reading and mathematics lessons. The tablet program was funded through a School in Need of Improvement grant. During the first two school years of this program the ratio of tablets to students 2:1. Two classrooms would share a set of tablets, with teachers alternating lesson times so tablets would be available. For the 2013-2014 school year the students have a 1:1 tablet ratio and have access to them during the entire school day.

DATA COLLECTION

Data was collected in three ways. The school based personnel responsible for technology was interviewed, a 4th grade class was observed and state wide testing data was collected for the 2010 through the 2013 school years.

According to the classroom teacher interviewed, on a typical day the students use the tablet throughout the day. They would start by coming and doing math facts through www.xtramath.com. Then they would leave the classroom for a specialist activity. When they reenter the classroom the students do writing activities using Google Drive to store, edit and share their documents. Next, they do a 30 minute math enrichment activity with a variety of

applications found by the teacher or the district technology consultant. Then, they do math time with their books, the document camera, and the white board. During mathematics students can use the whiteboard application on the tablets to work out problems. After math the students move into reading time. The students use three centers for reading, one is always technology based making use of a variety of web sites and tablet applications. In the afternoon they do science and social studies, because of the lack of applications in these areas they only use the tablet occasionally for these subjects. Throughout the day students are allowed to use their tablet to check the weather, work out math problems, and complete unfinished work in reading or writing.

The classroom observation took place during the second half of the 2013/2014 school year. Students had continuous access to tablets while at school and were highly capable users. Tablets were kept on student desks for continuous use throughout the day. The tablets took the place of paper and pencil; students took reading quizzes using the tablets. During reading lessons students separated into ability groups and rotated around the classroom between 3 stations. One of the stations made use of tablet technology; the students used iPad2 tablets. Students were allowed to use a tablet or net book to access www.Raz-Kids.com. Of the students that used this center 50% chose to use a tablet over a net book. Raz-Kids is an online reading site with leveled books and quizzes to accompany each reading selection (Learning A-Z, 2014). This site allows teachers to access detailed student and class reports. The
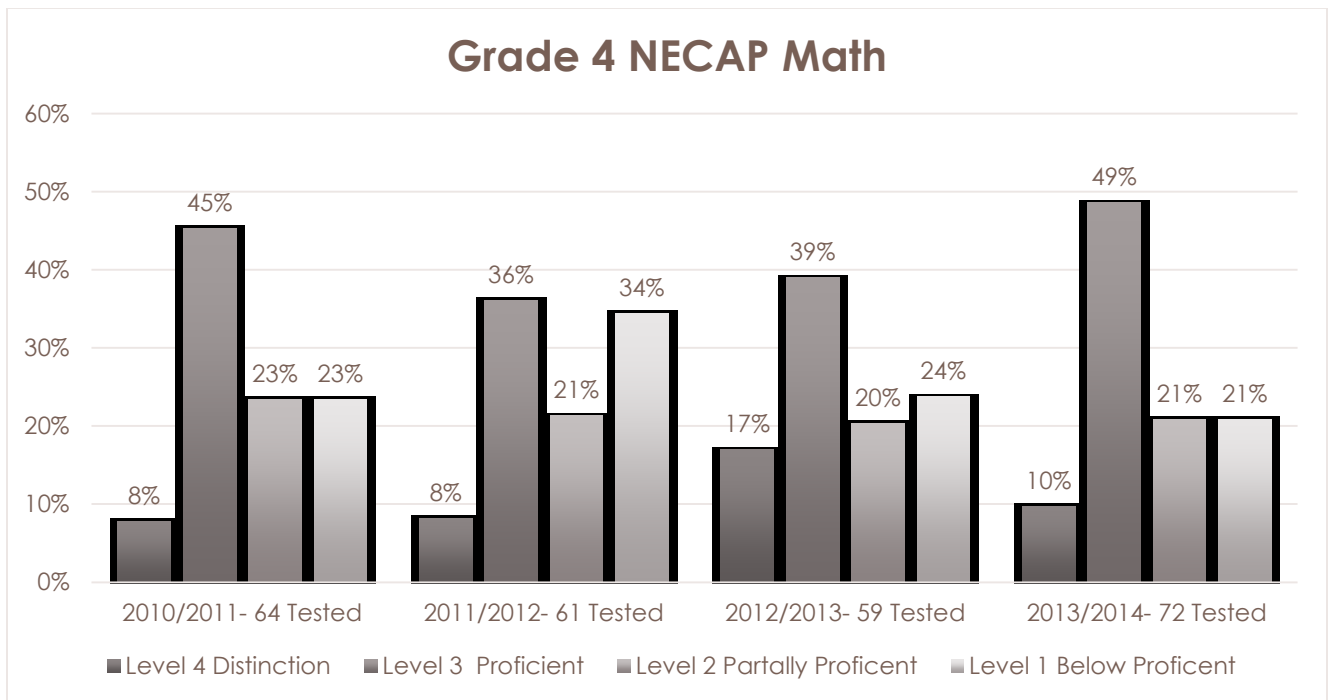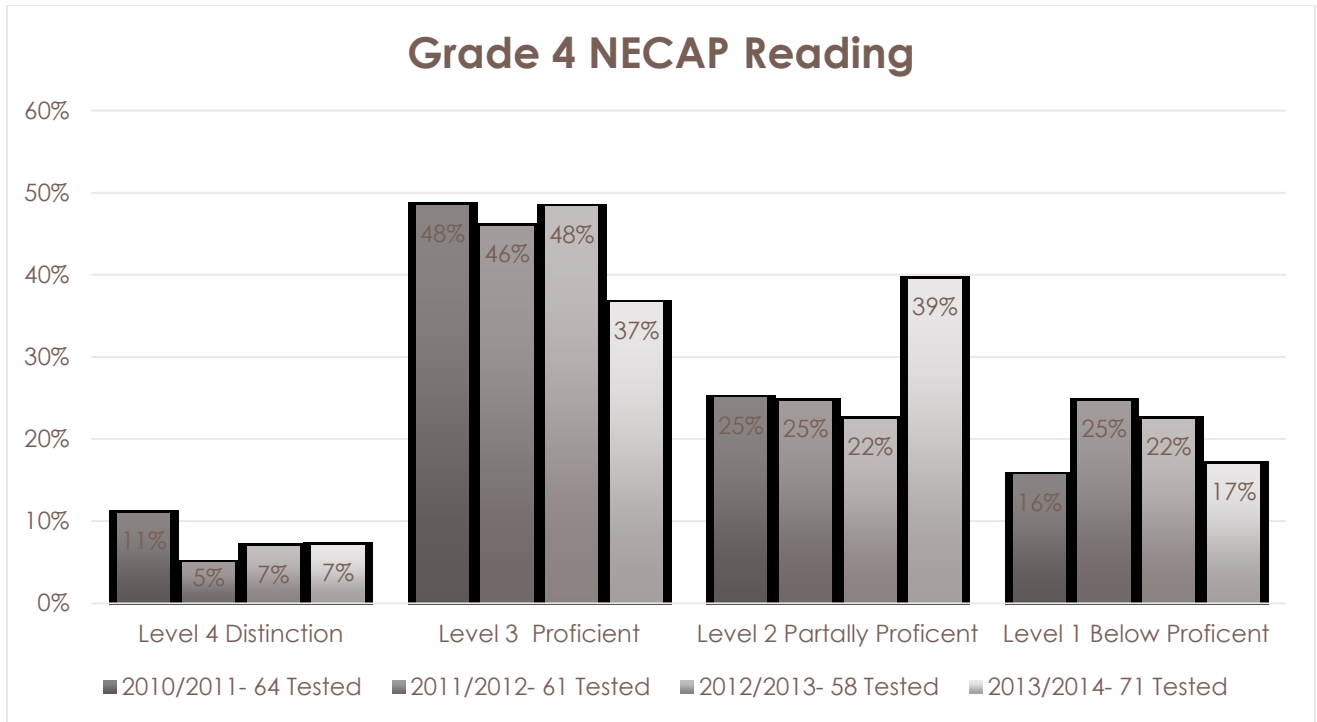
students may read the books, listen to the books and record their own reading through this tablet application or on the web site. This application is available anywhere a student can access the internet.

Schools in the New England region of the United States use the New England Common Assessment Program (NECAP) yearly to assess student progress. In the state of New Hampshire adequate yearly progress (AYP) is measured based on NECAP scores, an alternate assessment (for those unable to take the NECAP) and one other indicator chosen by individual school districts. AYP is a measure put in place by the United States Department of Education in 2002 to rate schools based on yearly academic progress (Paige, 2002). The school studied has been placed in school in need of improvement status because of failure to meet AYP. Schools in need of improvement are eligible for special grants used to improve their educational outcomes. Any school with this status can apply for these funds and they are able to choose how to spend the monies to best meet the educational needs of their student body. The school in this study applied for a school in need of improvement grant and chose to use the funds to start a tablet technology program during the 2011-2012 school year. The following data covers one year prior to the tablet program, 2010-2011, through the 2013-2014 school year.

NECAP mathematics and reading scores were used to analyze academic outcomes of the tablet technology program at this school. The NECAP tests are

designed to measure student performance on grade level expectations (GLE) developed and adapted by [New England states] (NECAP). The data in the charts below goes back four years to give an accurate portrayal of program outcomes. During the 2010-2011 school year students did not have tablet access. As previously stated during 2011-2012 and 2012-2013 students had limited daily access. For the 2013-2014 school year students had 1:1 full day access to tablet technology. The data is as follows (Measured Progress, 2014):

Grade 4 NECAP Reading

	Level 4 Distinction	Level 3 Proficient	Level 2 Partially Proficent	Level 1 Below Proficent
2010/2011- 64 Tested	11%	48%	25%	16%
2011/2012- 61 Tested	5%	46%	25%	25%
2012/2013- 58 Tested	7%	48%	22%	22%
2013/2014- 71 Tested	7%	37%	39%	17%

THEMES

The NECAP assessment test measures students based on four levels of proficiency. Proficient with distinction, or level 4, is the highest level achieved on the NECAP test, this means that the student is able to compete all testing areas beyond the proficiency level. Level 3 is proficient, this means that the child has achieved competency and is on grade level in the majority of the tested areas. Partially proficient, or level 2, means that the student is below level in a few subject areas. Substantially below proficient, or level 1, states that the student is below level in a majority of the subjects tested.

FINDINGS

Rising math scores. One important thing to note is that initially math scores in the proficient level dropped by 9%, but the scores for distinctive stayed the same at 8%. The school started the tablet program during the 2011/2012 school year. Math scores in the proficient area rose by a total of 4% from the 2010-2013 testing windows. From 2012 to 2013 math scores rose by 11%. During the same time frame 2010-2013, partially proficient and below proficient levels dropped by 2% each. The cooperating teacher suggested that scores continue to grow because of an increased focus in mathematics achievement school wide and the use of beneficial tablet applications within the classroom.

Stable reading scores. Between the 2010 and 2014 testing windows the proficient reading scores dropped by 11%. During the first three years of testing proficient scores stayed within 2 percentage points. The below proficient scores between 2010 and 2011 rose by 9%. Since that point they have gone down and as of 2013 are only 1% above the scores in 2010. The percentage of partially proficient students has risen by 14% between 2010 and 2013.   The level of students receiving distinction has stayed at a steady 7% for both 2012 and 2013. According to the teacher interviewed reading scores have stayed the same because of an inability to find effective tablet applications that meet the educator's specific criteria.

The findings suggest an increase in math scores and a stagnation in reading scores. It should be noted that grade size went from 58 to 71 students

between the 2012-2013 and 2013-2014 school years. The input of the cooperating teacher suggests that if applications with the capability to assess, monitor and give students level specific tasks are used frequently test scores would increase. This is evidenced in the math assessment scores, because the tablet application used in this subject meets the teacher's criteria of assessment, monitoring and leveling student tasks.

CHALLENGES TO IMPLEMENTATION. DURING THE INTERVIEW PORTION OF THE CASE STUDY THE COOPERATING TEACHER BROUGHT UP A FEW ISSUES WITH TABLET USE. THESE ISSUES WERE ABOUT FINDING APPROPRIATE APPLICATION SOFTWARE, INTERNET SAFETY, AND THE LACK OF A FLASH PLAYER ON THE IPAD 2 HER STUDENTS CURRENTLY USE. THE FIRST ISSUE IS THE LACK OF EDUCATIONAL APPLICATIONS AVAILABLE ON THE TABLET WITH AN ASSESSMENT PIECE, MONITORING ABILITY, AND INDIVIDUAL LEVELING FOR STUDENTS. THE TEACHER NEEDS TO KNOW WHEN A STUDENT IS USING AN APPLICATION, FOR HOW LONG AND WHAT THEY LEARNED WHILE USING THE APPLICATION. THE COOPERATING TEACHER, WITH THE ASSISTANCE OF THE DISTRICT TECHNOLOGY CONSULTANT, HAVE FOUND APPLICATIONS MEETING THIS CRITERIA IN THE SUBJECTS OF READING AND MATHEMATICS. THEY HAVE BEEN UNABLE TO FIND APPLICATION PROGRAMS MEETING THIS CRITERIA IN THE SUBJECTS OF SCIENCE AND SOCIAL STUDIES TO DATE.

Another issue noted by the cooperating teacher is the ability to put applications on the iPad. Currently the tablets have to be individually plugged in to a charging dock for application programs to be downloaded. The school will switch to a new wireless system before the next school year. The fact that iPads do not have a flash player available makes it difficult to use certain web sites.

Internet safety and connectivity are issues anytime the World Wide Web is being utilized. The cooperating school district has a technology team that is responsible for internet filtering programs, known as firewalls, to protect the students from unauthorized web pages.   The district also has a network upgrade plan in place to provide the internet bandwidth necessary for the continued use of educational technology in schools district wide.

IMPLICATIONS

This exploration offers many implications for students and teachers. Students in classrooms that use tablet technology can be offered immediate assessment and feedback on their work. Proper selection of tablet applications with leveling abilities allows students to be taught at their specific learning level. This offers all students the opportunity to learn new material at their own pace. Using tablets in the classroom prepares students for life in the 21st century workplace where technology is omnipresent and widely utilized in daily tasks.

Teachers who use tablets in their classroom have the opportunity to provide their students with a paper free environment. Proper application selection can lead to higher learner outcomes from students. Teachers can use tablets to take their class on virtual field trips and make the world their classroom. Teachers have the ability to create lessons on the go for students, allowing them to access learning anywhere any time. They can create a

learning environment that allows everyone to be engaged and learning when using tablet technology.

CONCLUSION

Tablet technology is a pervasive force in education today. When properly utilized it can increase learner engagement and outcomes as well as making educational materials omnipresent. Further research is necessary in the area of tablet technology and its effects on educational environments. The United States Department of Education last did a comprehensive study on technology in education in 2008 entitled *Educational Technology in U.S. Public Schools: Fall 2008* (National Center for Education Statistics, 2010) and on how teachers use technology in 2009 entitled *Teachers' Use of Educational Technology in U.S. Public Schools: 2009* (National Center for Education Statistics, 2010). Both of these studies are extremely outdated because of the rapid development of new technologies. Further research is needed to discover the qualities needed in a successful educational tablet applications. The effects of teacher training and comfort with technology on tablet implementation, also need to be studied. In addition, comprehensive studies about whole class learning outcomes when using tablet technology need further study.

This exploration has cemented my belief in research based practice for my future classroom. I plan to use the skills I have procured during this

exploration to collect information in my future classroom so that I may reflect on my practice as a teacher and the learning outcomes of my future students.

This research has the ability to greatly impact the community. Our local schools and school districts nationally can use information learned here to apply for grants and use tablet technology to improve learning outcomes. The information in this study will be shared with the local school district (via the cooperating teacher) and may be presented to the school board. This research can impact the way that teachers choose applications for their classrooms and the way that applications are created for education.

REFERENCES

Appleinsider Staff. (2013, October 28). *Notes of interest from Apple's Q4 2013 conference call*. Retrieved from AppleInsider: http://appleinsider.com/articles/13/10/28/notes-of-interest-from-apples-q4-2013-conference-call

Beauchamp, G., & Kennewell, S. (2010). Interativity in the clasroom and its impact on learning. *Computers & Education, 54*, 759-766.

Boticki, I., Looi, C.-K., & Wong, L.-H. (n.d.). Supporting mobile collaborative activities through scaffolded flexible grouping. *Educational Technology & Society, 14*(3), 190-202.

Chen, H.-Y., & Jang, S.-J. (2013). Exploring the reasons for using electric books and technologic pedagogical and content knowledge of Tiawanese elementary mathmatics and science teachers. *The Turkish Online Journal of Educational Technology, 12*(2), 131-141.

Elmorshidy, Ph. D., A. (2012). Mobile learning - a new success model. *Journal of Global Business Management, 8*(2), 18-27.

Falloon, G. (2013). Young students using iPads: app design and content influences on their learning pathways. *Computers & Education, 68*, 505-521.

Huang, Y.-M., Liang, T.-H., Su, Y.-N., & Chen, N.-S. (2012). Empowering personalized learning with an interactive e-Book learning system for elementary school students. *Education Technology Research Development*, 703-722.

Hwang, G.-J., & Chang, H.-F. (2011). A formative assessment-based mobile learning approach to improving the learning attitudes and achievement of students. *Computers & Eudcation, 56*, 1023-1031.

Kiger, D., Herro, D., & Prunty, D. (2012). Examining the influence of mobile learning intervention on third grade math achievement. *Journal of Research on Technology in Education*, 61-82.

Lan, Y.-J., Sung, Y.-T., Tan, N.-c., Pin, C.-P., & Chang, K.-E. (n.d.). Mobile-divice-supported problem-based computational estimation instruction for elementary school students. *Educational Technology & Society, 13*(3), 55-69.

Learning A-Z. (2014). *Overview*. Retrieved from Raz-Kids: http://www.raz-kids.com/main/ViewPage/name/index

Li, S. C., Pow, J. W., Wong, E. M., & Fung, A. C. (2010). Empowering student learning through tablet PCs: a case study. *Education Information Technology, 15*, 171-180.

Looi, C.-K., Zhang, B., Chen, W., Seow, P., Chai, G., Norrist, C., & Soloway, E. (2011). 1:1 mobile inquiry learning experience for primary science students: a study of learning effectiveness. *Journal of Computer Assisted Learning*, 269-287.

MacMillian Publishers. (2013). *Buzz word*. Retrieved from MacMillian Dictionary: http://www.macmillandictionary.com/us/buzzword/entries/m-learning.html

McClanahan, B., Williams, K., Kennedy, E., & Tate, S. (2012). A breakthrough for Josh: how use of an iPad facilitated reading improvement. *TechTrends, 56*(3), 20-28.

Measured Progress. (2014). *Assessment and AYP public reporting site*. Retrieved from New Hampshire Department of Education: http://reporting.measuredprogress.org/NHProfile/default.aspx

Murray, O. T., & Olcese, N. R. (2011). Teaching and learning with iPads, ready or not? *TechTrends, 55*(6), 42-48.

National Center for Education Statistics. (2010, April). *Educational technology in U.S. public schools: Fall 2008* . Retrieved from U.S. Department of Education: http://nces.ed.gov/pubs2010/2010034.pdf

National Center for Education Statistics. (2010, May). *Teachers' use of educational technology in U.S.* . Retrieved from U.S. Department of Education: http://nces.ed.gov/pubs2010/2010040.pdf

National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *The standards*. Retrieved November 15, 2013, from Common Core State Standards Initiative: http://www.corestandards.org/the-standards

Paige, R. (2002, July 24). *Stronger accountability: key policy letters signed by the education secretary or deputy secretary*. Retrieved from U.S. Department of Education: http://www2.ed.gov/policy/elsec/guid/secletter/020724.html

Peng, H., Su, Y.-J., Chou, C., & Tsai, C.-C. (2009). Ubiquitous knowledge constriuction: mobile learning re-defined and a conceptual framework. *Innovations in Technology and Education International*, 171-183.

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon, 9*(5), pp. 1, 3-6.

Prensky, M. (2001). Digital natives, digital immigrants part 2. *On the Horizon, 9*(6), pp. 1, 3-6.

Roschelle, J. (2003). Keynote paper: unlocking the learning value of wireless mobile devices. *Journal of Computer Asssisted Learning*, 260-272.

Siegle, PhD, D. (2012). Embracing e-Books: increasing students' motivation to read and write. *Gifted Child Today, 35*(2), 137-143.

Swan, K., van 't Hooft, M., Kratcoski, A., & Unger, D. (2005). Uses and effects of mobile computing devices in K-8 classrooms. *Journal of research of Technology in Education, 38*(1), 99-112.

Terras, M., & Ramsay, J. (2012). The five central psycological challenges facing effective mobile learning. *British Journal of Educational technology*, 820-832.

The Computer Language Company, I. (2013, 11 15). *Encyclopedia*. Retrieved from PCMag: http://www.pcmag.com/encyclopedia/

The Computer Language Company, Inc. (2013, 11 15). *Encyclopedia*. Retrieved from PCMag: http://www.pcmag.com/encyclopedia/

Ziff Davis, LLC. (2014). *Encyclopedia*. Retrieved from PC Magazine: http://www.pcmag.com/encyclopedia/term/56219/web-2-0

APPENDIX A

GLOSSARY OF TERMS

m-Learning- Mobile Learning. Learning through the use of mobile handheld devices such as mobile phones and handheld computers. (MacMillian Publishers, 2013)

e-Books- Electronic Books. The electronic counterpart of a printed book, which can be viewed on a desktop computer, laptop, smartphone or e-book reader (The Computer Language Company, Inc., 2013).

ITC- Information Communications Technology. It includes both information technology and telecommunications (The Computer Language Company, Inc., 2013).

Web 2.0- Second generation web. A world wide web that is user generated and has virtual storage (i.e. cloud computing) (The Computer Language Company, Inc., 2013).

Tablet Technology- "A general-purpose computer contained in a single panel. Its distinguishing characteristic is the use of a touch screen as the input device" (The Computer Language Company, Inc., 2013).

Tablet PC- A handheld designed to function like a portable writing instrument. It included handwriting recognition for converting characters to text as well as the

capability of storing handwritten words and annotations as images (The Computer Language Company, Inc., 2013).

APPENDIX B

FEBRUARY 3, 2014

Dear Southern New Hampshire University Internal Review Board,

This letter is a request for a review of a research project titled: Tablet Technology Learning Outcomes in Elementary Schools. The purpose of this research study is to discover the effect of tablet technology on learning outcomes. I will focus on working with up to three cooperating teachers at the elementary level. I will conduct two interviews and a classroom observation with the cooperating teachers. At the conclusion of the study I will compare student assessment data from the class with tablets with data from a class without tablets to determine the tablet lesson learning outcome.

I am requesting an Expedited Review. The proposed program meets the definition of minimal risk because the teachers will not be participating in activities that would cause them any harm or discomfort than those they ordinarily encounter in their daily lives. Furthermore, the research falls into category five. The research during this study will employ only interviews and observations. Informed consent will be required from all participating teachers.

I am the Principal Investigator in this research study. I am a currently an undergraduate student at Southern New Hampshire University and will be graduating in December of 2015. I will be receiving my B.A. in Elementary and General Special Education. Dr. Audrey Rogers, Associate Professor of Education at Southern New Hampshire University, will supervise me during this research study.

I have attached the Assurance of the Principal Investigator, the letter to the teachers and/or school administrators, and the application checklist.

If there are any questions, please do not hesitate to contact the following:

Jennifer Rea	Dr. Audrey Rogers
Principal Investigator	Research Supervisor
B.A. Elementary and Special Education	Associate Professor of Education
Southern New Hampshire University	Southern New Hampshire University
(978) 857-3835	(603) 668-2211 ext. 2492
Jennifer.rea@shu.edu	a.rogers@snhu.edu

Thank you for your time and consideration,

Jennifer Rea, Principal Investigator
Southern New Hampshire University

APPENDIX C

LETTER OF CONSENT

Dear School Administrator,

I am conducting a research project with the purpose of discovering the learning outcomes associated with the use of tablet technology. I am writing to ask if you have any teachers interested in cooperating for this study. I have included a brief overview of the study with this letter.

If a teacher agrees to participate for the purposes of my study, I would like to do two informational interviews and observe a lesson being taught using tablet technology. Any information that is provided during the interviews or observation would be kept strictly confidential and anonymous. The data will be stored on my private computer. The potential risks for participating in the study are minimal.

Your participation would be strictly voluntary; refusal to participate will involve no prejudice or penalty. If a teacher agrees to participate and then changes their mind, they may withdraw the interview at any time.

As an undergraduate student, I will be supervised by Dr. Audrey Rogers, Associate Professor of Education at Southern New Hampshire University. If you have questions, comments or concerns, you may contact:

Jennifer Rea

Principal Investigator

B.A. Elementary and

Special Education

Southern New Hampshire

University

(978) 857-3835

jennifer.rea@snhu.edu

Dr. Audrey Rogers

Research Supervisor

Associate Professor of

Education

Southern New Hampshire

University

(603) 668-2211 ext. 2492

a.rogers@snhu.edu

Thank you for your consideration.

Sincerely,

Jennifer Rea

Principle Investigator

Southern New Hampshire University

School Administrator Consent Form

Please fill out the form below and sign. Please keep the above letter for your records.

Jennifer Rea – Principal Investigator

Department of Education

Southern New Hampshire University

By signing below, you certify that you have read and fully understand the purpose of this research study and the risks and benefits.

I _____, consent /agree to participate in this research project.

_____   _____
                  Signature   Date

APPENDIX D

STUDY OVERVIEW

CONTACT

Jen Rea, principle investigator, Jennifer.rea@snhu.edu or Dr. Audrey Rogers, research advisor, a.rogers@snhu.edu

WHY THIS TOPIC?

With the implementation of Common Core Standards in 48 of the 50 United States classroom technology has become increasingly important. As early as first grade students are asked to, "…use a variety of digital tools to produce and publish writing, including in collaboration with peers" (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010). The use of tablet technology in the classroom meets this need.

RESEARCH QUESTION

What is the effect of tablet technology on learning outcomes?

WHAT IS A TABLET?

For the purposes of this research tablet technology will be defined as "A general-purpose computer contained in a single panel. Its distinguishing characteristic is the use of a touch screen as the input device" (The Computer Language Company, 2013).

COOPERATING TEACHER'S ROLE

This research will involve the cooperating teacher(s) integrating tablet technology into one of their lessons. There will be a 20 minute pre lesson recorded verbal interview. The researcher will observe the classroom of cooperating teacher(s) during a section of the lesson. At the conclusion of the lesson a second 20 minute recorded verbal interview will be conducted. The researcher will also be asking for an overview of student assessment data including only the pass/ fail rate of the class using tablets and another class who has done the same lesson without tablets (this could be from a previous year or another teacher's class).