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CALIFORNIA STATE UNIVERSITY, SAN MARCOS

English Language Learners' Reading Self-Efficacy and Achievement
Using 1:1 Mobile Learning Devices

A dissertation submitted in partial satisfaction of the
requirements for the degree of Doctor of Education

in

Educational Leadership

by

Jennifer L. Walters

Committee in charge:

      University of California, San Diego
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      California State University, San Marcos
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2012

The dissertation of Jennifer L. Walters is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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Chair

University of California, San Diego

2012

DEDICATION

To English language learners in classrooms across America who deserve rich, challenging, and innovative learning opportunities.

To the many teachers in public education who acknowledge the gifts within English language learners and actively strive to open up those gifts each and every day.

EPIGRAPH

Success: To laugh often and love much; to win the respect of intelligent persons and the affection of children; to earn the approbation of honest critics and endure the betrayal of false friends; to appreciate beauty; to find the best in others; to give of one's self, leave the world a bit better, whether by a healthy child, a garden patch, or a redeemed social condition, to have played and laughed with enthusiasm and sung with exultation; to know even one life has breathed easier because you have lived—this is to have succeeded.

-Thoreau

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• My father, who provided me with a phenomenally strong work ethic that his three daughters have each attempted to emulate in her own way.

• My dissertation study partners, for providing critical support and laughter when it was most needed.

• My mother, who believed that I could do anything.

VITA

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ABSTRACT OF THE DISSERTATION

English Language Learners' Reading Self-Efficacy and Achievement
Using 1:1 Mobile Learning Devices

by

Jennifer L. Walters

Doctor of Education in Educational Leadership

University of California, San Diego, 2012
California State University, San Marcos, 2012

Professor Amanda Datnow, Chair

Handheld technology devices allow users to be mobile and access the Internet, personal data, and third-party content applications in many different environments at the users' convenience. The explosion of these mobile learning devices around the globe has led adults to value them for communication, productivity, and learning. Outside of the school setting, many adolescents and children have access to, or own mobile devices. The use of these individual devices by children on a daily basis in schools is a relatively new phenomenon, with just four percent of elementary students doing so in classrooms in 2010 (Gray, Thomas & Lewis, 2010). This mixed methods study researched a one-to-one implementation of percent devices in fourth- and fifth-grade elementary classrooms. The focus was to explore the mobile learning device's relationship to English language learners' reading achievement, to English language learners' self-efficacy in reading, and to explore the benefits and limitations of the device's daily use, as perceived by the students.

The hypothesis was that the practice of reading and related literacy activities with mobile learning devices would augment English learners' vicarious learning experiences, and thereby effect student cognitive engagement, reading self-efficacy, and reading academic achievement. This study used validated surveys and assessments to measure students' beliefs about reading and their knowledge of reading. Additionally, English language learner interview data were also collected and analyzed to uncover perceived benefits and limitations of utilizing 1:1 mobile learning devices daily for literacy activities.

Analysis of the data revealed significantly elevated levels of self-efficacy in reading for the experimental group with 1:1 handheld technology, while academic gains in reading for the experimental and control groups were statistically similar. Students in the experimental group described a virtually-enhanced socio-cultural context for communicating and learning with the handheld technology. Implications for practice, policy, and future research are discussed.

Chapter 1

Context of the Study

In the United States, students learning English as a second language comprise 10.5 percent of the student population. The English Language Learner (ELL) population is largely concentrated in six southwestern states in the United States. In many other states the ELL population has increased exponentially, with 300 percent or higher ELL growth rates reported from 1995 to 2005 in Alabama, Indiana, Kentucky, Nebraska, North Carolina, South Carolina, and Tennessee. Nationally, approximately 79 percent of English Language Learners are from Spanish-speaking Hispanic backgrounds. In California 85 posttest of the state's ELL students are Spanish-speaking and 1.6 million children or 25 percent of the K-12 school population are ELLs. The state has the fastest growing ELL student population in the nation. In addition to the ELL students' challenge of acquiring English while learning academic content, high percentages of ELL students are economically disadvantaged (85%). Many ELL students also cope with the challenge of being newcomers to the United States and to its public education system.

As schools work to address the social-emotional and learning needs of ELL, school systems are also held accountable by the state and federal governments for demonstrating academic achievement progress. Current federal and state accountability systems call for all students to reach pre-determined academic proficiency levels in English-language arts and mathematics on an annual basis. Proficiency is defined by a 12-year increasingly challenging national formula. Proficiency is assessed by state-established standardized achievement tests. The No Child Left Behind Act of 2001 (NCLB) specifically establishes ELL as a nationally significant student subgroup whose

academic progress must be monitored and improved upon, as measured by Annual

Measurement Achievement Objectives (AMAO). Each state sets standards to measure

annual progress in learning English, the attainment of English language proficiency, and

making Annual Yearly Progress (AYP) in the academic content areas of English-

language arts and mathematics.

As a recognized federal student subgroup population, ELL score significantly

lower in reading on the National Assessment of Educational Progress in grades 4, 8, and

12 than non-ELL students. On the 2009 NAEP Reading Assessment, where the scale

ranges from 0 to 500, the average scale score for non-ELL fourth-grade students was 224,

while the ELL average score was 188 (with a standard error of .3 and .8, respectively).

This national achievement variance continues and expands in higher grades. At grade 8,

for example, non-ELLs scored at 267 and ELLs scored at 219 (with standard errors of .2

and 1.0). At grade 12 non-ELLs scored at 288, and ELLs scored at 247 (with standard

errors of .6 and 2.4) (Kersachy, 2009).

Unfortunately, English Learners' achievement on California's standardized

exams, the California Standards Tests, demonstrates a similarly significant reading

achievement discrepancy as on the national NAEP exam when compared to the other

student ethnicity subgroups. Californian ELL students make up 50 percent of the tested

grades 2-11 public school student population. In 2009, the expected/required national

level for achievement in English-language arts was that 45 percent of all student

subgroups would be "proficient" or above on unique grade level state assessments.

White students exceeded this federal reading target with 69.9 percent scoring

"proficient," while only 33.3 percent of ELL students scored "proficient" or above.

Additional learning opportunities and supports must be put into place within public educational systems so that English Language Learner students may acquire, practice, demonstrate, and apply their English reading knowledge in meaningful ways.

A number of interventions are underway in California to provide additional ELL learning opportunities and thus increase the number of English language learner students meeting No Child Left Behind English-language arts proficiency levels. Systemic interventions include: (1) the development and implementation of state English-language arts content standards and English Language Development standards; (2) common textbook-based core curriculum adoptions, with specific strategies for ELL and below-grade level students; (3) reading intervention classes and reading intervention textbooks for students achieving two or more years below grade level; (4) directed pacing guides for the required textbook-based instruction; (5) the expansion of the school day through before- and after-school supplemental instructional programs; (6) tiered levels of additional support during the school day known as "Response to Intervention - RtI"(Barnett et al., 2004; Rosa-Lugo et al., 2010) ; (7) an emphasis on frequent formative assessments; (8) the advent of student data warehousing systems to assist educators with the monitoring of student learning and to assist with data-driven dialogues; (9) an emphasis on collaborative teacher planning processes, known as professional learning communities, to collectively analyze student data and strategize on future teaching and learning plans (DuFour , 1998); and (10) the use of a variety of technology-assisted instruction programs to remediate specific ELL student skill gaps.

One type of technology-assisted instruction support that is being implemented to improve the achievement of students is the utilization of mobile learning devices (MLD)

to deliver content to individual students, to groups of students, and to facilitate learning between groups of students and their teacher. An example of a mobile learning device is the Apple Company's iPod touch. It is a handheld computer with a multi-touch interface. The iPod touch has Internet accessibility, audio, video, and voice capability, and built-in WiFi capacity allowing for third party content applications (e.g., curriculum, audio-books, podcasts, lectures, movies, and games).

This dissertation studied the learning benefits and limitations that one-to-one mobile technology devices provided when utilized to support English language learners' reading skills on a daily basis in upper grade elementary school classrooms. This work helps inform policy and practice regarding the use of mobile learning devices as a vehicle to improve literacy outcomes for the growing national population trend of English language learners. The concept of elementary students utilizing mobile technology devices for teacher-facilitated learning activities within a classroom setting on a regular basis is a relatively new phenomenon (Wellings & Levine, 2009). Extensive past research on technology-enhanced learning has looked at how technology was integrated into classrooms, but had largely focused on stand-alone computers or computers housed in a classroom lab environment for supplemental use (Litchfield, 2007). This body of research has revealed limited integration success.

A 2010 national study reported that in 2008 just 4 percent of elementary classrooms had any kind of handheld technology learning environment. The average student-to-handheld device ratio within classrooms with this mobile technology was 21:1 (Gray, Thomas & Lewis, 2010). Over the last fifteen years, early mobile learning device (MLD) research has largely been done at the university and secondary school levels.

Accessibility due to the complexity of the device, initial high cost of early mobile devices, and inconsistent wireless access largely limited research to the early adult and adult populations. Early MLD research indicated the devices may increase the personalization of learning, learners' time dedicated to the task of learning, and enhance social cognitive elements of learning, such as connectivity and collaboration (Vahey & Crawford, 2002). Additional findings of easy adaptation/appropriation, increased motivation and engagement were found in particular research with elementary students (Swan, 2005).

Some MLD research has been conducted with disenfranchised populations and with second language learners (Naismith, Lonsdale et al., 2005). Kulkulska-Hulme's study in 2006 looked at MLD's mediating role between engaged teaching and learning practices and the more spontaneous user-driven informal teaching and learning practices that occur in daily life. This study found four key ways that mobile learning devices (MLD) are being used in classrooms. They included supporting communication, delivering and supporting content, and also for content creation, for encouraging personal engagement, and for deepening contextual learning.

Further research is warranted, particularly at the elementary education level, since young children's access, utilization, and adoption of MLD is a relatively new phenomenon coinciding with technology's "confluence of positive factors: matured technology, teacher buy-in, and low price points" (Project Tomorrow, 2009). With the advent of the tactile "touch" screens, the use of mobile learning devices has proven quite intuitive to younger users. More focused elementary-level research is necessary in order to know if similar research findings related to the social cognitive elements of learning

will prevail. The growing availability of age-appropriate content applications is another critical supporting factor for this timely research study to be conducted.

In addition to previously cited classroom-based studies, several examples of mobile technology research projects supporting very young children's learning were completed by the Sesame Workshop (Druin, 2009). It is relevant to mention these MLD studies in that they examined how MLD played a role in language and literacy acquisition in a child's first language. Prior research had shown that there was a similarity in how a learner develops communicative competence in their first language and how a learner develops communicative competence in a second language. Saunders and Goldenberg described second language learning as a "social process: language develops largely as a result of meaningful interaction with others, much as a first language does" (Saunders, et al., 2010). In that language learning was found to be both social and cognitive, and that it took place in particular socio-cultural settings, it is reasonable and necessary to study how the addition of mobile learning devices into learning contexts, and the extension of MLD as learning contexts in and of themselves, may impact ELL students' language learning.

One Sesame Workshop project targeted eighty middle and lower-income parents and their three- and four-year old children. Parents were given a video-capable phone with Internet connectivity, and they agreed to receive text messages, audio messages targeted to parents, audio messages for the children, and letter literacy videos for the children. The research sought to determine if literacy content access and prompting with MLD would encourage active involvement of parents and caregivers in the children's language and literacy learning. Findings demonstrated that both income groups had a

greater likelihood to participate in letter identification activities after the study. Moreover, following their participation, lower-income parents showed greater likelihood to participate in real word letter-sound activities, such as identifying signs, letters, and sounds in the vegetable section of a grocery store (Horowitz et al., 2006). Additionally, 50% of middle-income parents and 75% of lower-income parents believed that the watching of the alphabet video clips on MLD helped their children learn their letters. Seventy-five percent of all participant parents said they believed the MLD could be an effective learning tool when used in this way.

A second current Sesame Workshop research project used the iPod touch as an MLD intervention instrument (Sesame Workshop, 2007). The intervention involved the delivery of personalized learning lessons based on an assessment data-tracking system. The individualized student lessons were delivered first via a computer, and later via an iPod touch to see if a MLD can assist in effectively alleviating literacy deficiencies in kindergarten, first-grade and second-grade students. The initial web-based application was called Multimedia Reading Environment with Adaptive Delivery (mREAD) and included 120 students in a Title I school. Literacy deficiencies and remediation lessons were identified by the DIBELS test (Dynamic Indicators of Basic Early Literacy Skills), and were administered over eight-week periods (Kaminski & Good, 1998). Compared to a national sample, at-risk mREAD students needed less literacy support by the end of the year, with the biggest literacy learning effect seen for first graders. In transferring the mRead application to the iPod touch, the renamed iREAD application for the iPod touch was able to store the students' data locally and then upload it to a server-based data system, proving to be an "ideal platform for mobile interface usability research" (Revelle,

2009). Final research results are not yet available on the usability testing with the iREAD mobile literacy games.

These studies offer some insight for integrating mobile technology into the classroom, particularly in the areas of participation, personalization of practice, and the extension of MLD-acquired learning into other contexts. Overall, however, researchers have noted a lack of, and the need for, more empirical research on mobile technology learning devices in general (Swan, et al., 2005; Traxler, 2005; Sharples, 2006; Roschelle, 2003). This is true to an even greater extent at the elementary education level, and with the specific population of English language learner students. As mentioned previously, the lack of research in the past may have been due to the limited access of mobile technology in elementary schools. The ways most students communicate and learn within the four walls of traditional elementary classrooms are devoid of the active, expanded ways in which mobile learning devices afford the same students access to media, communication opportunities, and learning when they are not in school. The Pew Center on the Internet and American Life, for example, documented the fact that more than half of American teenagers online were producing their own content and one third of those teens shared the content beyond their immediate friends and family (Quitney-Anderson & Rainie, 2008). There is a great dissonance between a largely teacher-directed classroom with rows of relatively silent youth, and the students' out-of-classroom world of interaction, connectivity, and mobility. This is even more apparent for English language learners who usually exhibit reticence to participate in all-English classroom environments, given their limited listening, speaking, reading, and writing abilities in English. Jenkins (2008) references this phenomenon in American schools as

the "participation gap," and argues that the emerging forms of participatory culture must be a critical factor addressed in future school reform.

Given the significant differences between English language learners' reading achievement and their English-only peers' achievement and the active learning gap between students' school lives and their digital lives outside of school, there was a need to research whether handheld technology in schools might be a promising literacy intervention for ELL. Specific documented MLD benefits exist such as personalization, mobility, and increased collaboration (Zurita, 2004; Johnson et al., 2009; Liu, 2003; Motiwalla, 2005; Sharples, 2005; Naismith et al., 2004; Litchfield, 2007). It was critical that these benefits be researched in terms of their transfer and effects for English Language Learner students, as they specifically learn literacy skills in a second language. The research reported here intends to study ELL's achievement in reading and its relationship to the additive participatory culture factor of one-to-one mobile learning device implementations.

An additional critical area for research was the relationship between students' levels of self-efficacy in literacy learning (reading) and the individual use of mobile learning devices for literacy activities. Research on the role of student efficacy and student reading achievement over the past three decades has demonstrated that students who find success in literacy in their early years of learning are likely to experience future success since future performance success directly relates to past performance success, academic self-concept, and self-efficacy (Ma, 1999; Marsh, 1993, Bandura, 1986). Self-efficacy as a component of motivation research was relevant to this study in that ELL students face many barriers to academic success including poverty, transiency, a variety

of first language educational experiences, and a variety of qualitatively different second language acquisition experiences. The possible relationship between a mobile learning device, which includes the presented content and the MLD's interface capabilities, and an ELL student's belief of success in English reading was crucial to explore.

This study filled a specific knowledge gap regarding the daily use of individual mobile learning devices with facilitated teacher instruction in traditional classrooms and the supporting or constraining effects on English language learners' achievement in reading. The particular mobile learning device used by individual students on a daily basis was the Apple Company's *iPod touch*. This powerful personal digital assistant (PDA), with video and audio capability, has a touch interface that brings user's connectivity to the Internet, and provides access to many third-party content applications. Available content applications can be customized with specific grade level curricular content and to students' instructional levels and functional abilities.

Statement of the Problem

English language learners need additional rich learning opportunities to facilitate and accelerate their acquisition of English, and to be able to use their developing English skills in academic content environments. A great need exists for ELL to practice speaking, listening, reading, and writing English. Mobile technology devices are profoundly changing human beings' access to information worldwide, and changing the manner in which human communication transpires. It may be possible for ELL to speak more, listen more, read more, and write more as students use individual mobile learning devices for literacy activities. Thus far, it is unknown what impact the integration of mobile learning devices such as the iPod touch may have on daily classroom literacy

routines, on ELL students' self-efficacy, upon their acquisition of English, and ultimately upon their achievement in reading. The theory of action was as follows: English language learner students' practice of reading and related literacy activities with the daily support of 1:1 mobile learning devices could augment students' vicarious learning experiences, and thereby effect students' cognitive engagement, self-efficacy, and reading performance.

Research Questions

This study investigated the following questions:

1. How does the reading achievement of English language learners who utilize 1:1 mobile learning devices compare to the reading achievement of matched ELL students who do not have access to mobile learning devices?

2. In what ways do mobile learning devices impact English Language Learners' self-efficacy about reading when compared to a matched sample of ELL students' self-efficacy about reading who do not utilize mobile learning devices?

3. What benefits and limitations do elementary-aged English language learners identify with the 1:1 use of mobile learning devices for literacy learning?

This study was conducted in two phases within a singular school district implementing 1:1 mobile learning devices. In phase one, a quasi-experimental design was used where ELL in classes implementing the 1:1 MLDs were matched with ELL in comparable classes not using the devices. Comparability of classes was defined by teacher characteristics and the requirement of a 35 percent minimum class composition of ELL students. In this phase of the study, fourth- and fifth-grade students' achievement and self-efficacy in reading were measured and analyzed by sets of classes using

individual MLD on a daily basis and those not using MLD. Reading achievement data was gathered at two points during the school year, Month 1 and Month 8. Student self-efficacy was measured over the same time period via a pre-post survey designed especially to measure fourth- through sixth-grade students' self-perception in reading. Approximately 435 students participated, with 295 ELL students utilizing mobile learning devices and 140 ELL participants not utilizing mobile learning devices.

The second phase of the study involved the gathering of qualitative ELL student data through post-study focus group interviews. ELL student interview data was collected in order to document and describe the MLD learning environments and the ELL students' perceptions as to what degree, if any, the MLD utilization impacted their acquisition and mastery of English. The student ELL voice was designed to be an important qualitative research component to this study, in addition to the measurement and comparison of reading achievement and reading self-efficacy. ELL student feedback regarding daily MLD use during language arts instruction was analyzed and categorized in order to identify common student-generated themes. Student interview data transcription, coding, and careful analysis allowed for the identification of teacher and student behavioral patterns and emerging themes.

Significance of the Study

This study extended current research on computer assisted instruction research by focusing on 1:1 handheld devices in elementary classrooms. The study uniquely sought to investigate whether or not MLD utilized in a personalized daily classroom implementation model would assist educators in meeting the educational imperative to: 1) increase ELL students' English-language arts achievement; 2) to increase the students'

engagement and belief in their own learning (self-efficacy), and; 3) to address the ELL learning inequities in current school systems.

Findings from this research provided valuable data for educators, researchers, and policymakers in two ways. The research explored the handheld technology phenomenon itself in terms of its acceptance and utilization in elementary classrooms. Beyond this mobile learning device study's quantitative contributions, the triangulated documentation of "how" the new technology of mobile learning devices, the *iPod touch*, impacted the motivation of ELL students from the learners' perspective is additive to MLD research. This research helped lay the groundwork for future MLD investigations with regard to ELL and possibly other traditionally underserved student populations, and/or other mobile learning devices, and/or other content areas beyond reading/language arts.

The findings serve to inform policymakers and practitioners regarding the extent to which MLD may be able to provide high quality, low-cost, strengths-based language interventions in order to more effectively address the persistent achievement gap existing in the United States. The study's importance must also be considered from an international geo-political perspective, given the existing American education achievement gap between lagging American student achievement and student achievement in most industrialized countries (Wagner, 2008; Kerachsky, 2008). Because the achievement gap for below-proficient students historically widens with the number of years a student attends school, this particular elementary school level MLD study provided some early data as to possible MLD significance as a viable early intervention support to ELL students' long-term academic success. Lastly, the undeniable rapid explosion of this powerful informational technology, along with its high level of

availability, accessibility, and desirability, demanded the study of it potential use in a complex and challenging system such as that of public education.

Review of the Literature

A discussion of the global use of mobile technology devices begins this chapter. Included is a definition of mobile learning devices (MLD), the national policy context for the use of MLD in educational settings, and a discussion of learning theories related to MLD. As the theoretical foundation for this MLD study, Bandura's (1986) social cognitive theory will be presented, with particular attention to self-efficacy as a primary focus of this study. An examination of the nature of the mobile learning device's relationship with teachers, students, mobile learning, and student achievement will follow, with brief reviews of pedagogical practices related to MLD, and pedagogical practices related to second language learners' acquisition of second language reading skills. Finally, the future teaching-learning use of MLD will be discussed.

Mobile technology devices have become important tools in major sectors of the world, including health, banking, politics, and citizen journalism (Freedom HIV/AIDS, 2008; Corbett, 2008; Kornblut, 2008; Meredith, 2008; CNN, 2009). For example, an HIV/AIDS education campaign has successfully reached people in India via 40 million mobile technology handsets. In Kenya, a mobile technology device-based banking program gained 200,000 new customers in one month. In the 2008 United States presidential election, Barack Obama successfully used text messaging and constituents' use of mobile technology devices to broaden his campaign. Additionally, immediate communication capabilities now afford the world new insights via citizen journalists as evidenced in the cases of the Mumbai 2008 terrorist attack and public dissent during Iran's 2009 presidential election. The use of mobile technology devices is profoundly

changing human beings' access to information worldwide, and the manner in which communication transpires between human beings. What potential impacts on teaching and learning might the integration of mobile technology learning devices have for teaching and learning in elementary classrooms? This literature review provides a foundational summary of research findings related to the use of mobile technology learning devices in elementary educational settings.

The concept of students utilizing mobile learning devices for instructional activities in classrooms on a regular basis raises a number of issues and concerns. Although some early research has been done at the university and secondary levels of education, there is, in general, a lack of empirical research on mobile technology learning devices, in general, and to an even greater extent at the elementary education level (Traxler, 2005, Sharples, et al., 2006). This is due, in part, to the rapid evolution of mobile technology devices over the last thirty years. Along with the significant evolution of the technology itself, the exponentially expanding availability of mobile technology devices has been a challenge for researchers. What was once considered an adult-only tool has become an available, desirable tool with accessible age-appropriate content for youth. School-aged children are utilizing smart phones at growing rates. Currently in the United States, 19 percent of children in grades kindergarten through second grade access mobile technology devices with Internet capability, with 14 percent of children in grades three to five, and 24 percent of children in grades six to eight (Shuler, 2009).

What Is a Mobile Technology Learning Device?

For this review, the working definition of a mobile technology learning device is a handheld, portable computing instrument with Internet or some other network access,

which allows for mediated activity for information access and learning in multiple

contexts. The definition is a compilation of other researchers' definitions (Naismith et

al., 2004; Sharples, 2005; Traxler, 2005). The most common mobile learning devices are

personal digital assistants (PDAs), mobile phones, tablet personal computers (PCs),

laptops, and handheld game consoles. Mobile learning devices are portable and typically

personal in nature in that they are not usually shared. However, mobile learning devices

have a network capability that allows desired information to be easily shared. On any

given mobile learning device (MLD), content can be imported from an external source

such as the Internet, can be created by the singular user of the personal device, or it can

be co-created and manipulated by a group of users. Content can be retained for personal

use, shared for multiple users' use, published for a specific targeted audience, or open-

sourced to a broader electronic audience. The mobile learning device factor of portability

makes the accessing of human interaction, content, and services available at the user's

discretion, anytime, anywhere (Trifonova & Ronchetti, 2003).

Some research has been conducted with a variety of mobile devices including

tablet personal computers, laptops, and handheld games. However, this mobile

technology device research review focuses on the personal digital assistant (PDA), also

known as the smartphone, the *iPod touch,* the *iPhone*, the *Blackberry* or the *Droid*.

These devices have similar collective characteristics including: (1) connectivity to the

Internet; 2) the ability to interface with other similar devices; (3) enhanced capacities and

flexibility with audio, video; and (4) the ability to download third-party applications. The

next section serves to outline the national context for MLD technology and its utilization

in academic settings for teaching and learning.

The Policy Context for Mobile Learning Devices

Significant achievement gaps exist in the United States between middle to high socio-economic income students and students of low socio-economic status. Likewise, significant achievement gaps exist between different student ethnic groups. Asian and White students achieve at higher rates than Black, Hispanic, and other ethnic minority populations (Baldi et al. 2007; Kerachsky, 2009). Repetitive key concepts at the heart of American educational reform efforts to close the achievement gap include: (1) the need to raise student, teacher, and parent personal expectations and accountability for learning, (2) the defining of new shared visions, in terms of a national education agenda, and (3) the ability for the country to maintain and enhance its status as a globally competitive nation (Race to the Top, 2010).

Educational researchers and economic analysts contend that a global intellectual achievement gap between the United States' student achievement levels and that from other nations is an even more serious national educational challenge (Public Agenda Foundation, 2006; Wagner, 2008). While our country has remained relatively flat on some educational indicators, such as high school graduation rates and college admission rates, other nations have significantly surpassed the United States (Christensen, 2008; Friedman, 2005). It is argued that the United States must improve the education levels of all its citizenry in order to regain and sustain its ability to economically compete on a global scale. Technology plays an important role in this regard.

A documented digital divide exists in the United States in terms of which citizens, and thereby which children of citizens, have access to electronic information in their homes and schools. Elementary institutions of learning, as equity access points, are not

effectively addressing the achievement gap that exists between different student groups within the United States, or the global achievement gap that exists between American students and their peers in other countries, or the technology availability gap between American students.

Since the 2001 No Child Left Behind Act, traditional public education classroom practices have emphasized mathematics and reading content standards. Practices and content have further converged to align with correlating mandated state assessments and accountability measures to assess identified levels of proficiency. From the ultimate goal of proficiency, great emphasis has resulted in early remediation, intervention, and acceleration. This 'seek and fix' subtractive educational model has narrowly focused learning on a limited scope of curricular content standards. In the meantime, Wagner maintains the United States has lost sight of "the universe, in which our children must compete and succeed, [the one being] transformed by groundbreaking and evolving technologies, as well as by the stunning growth of countries such as China, India, Thailand, the Philippines, and many more"(Wagner, 2009).

A 2010 National Education Technology Plan is a 5-year action plan developed as a leadership guide by the federal government. It calls for "applying technologies used in our daily personal and professional lives to the entire school system in order to improve student learning, accelerating and scaling up the adoption of effective practices, and using data and information for continuous improvement" (www.ed.gov/technology/netp-2010). This call for learning powered through technology is intended to transform education and meet two clear goals of the Obama administration. These include: (1) raising the proportion of college graduates from a current level of 41 percent of the population

holding a two- or a four-year degree to 60 percent of the population by 2020; (2) closing the achievement gap so that all students graduate from high school ready to succeed in college and careers.

Five policy goals encompass the national plan for technology with recommendations for states, districts, the federal government, and other stakeholders. Technology is designated to play a central role in the national education plan: (1) to leverage engaging and empowered learning opportunities; (2) to assist in cost-effective ways to measure learning outcomes and support continuous learning; (3) to assist in the expansion of teachers' capacity to shift to a model of connected teaching (vs. isolated data-poor teaching practices and resources); (4) to support the adoption of a comprehensive infrastructure to enable learners greater access via technology, and; (5) to redesign the education system to improve personalization and productivity (www.ed.gov/technology/netp-2010, page 3).

Specific to mobile technology devices, the report denotes "the growing disparity between students' experiences in and out of school," and declares, "Our leadership in the world depends on educating a generation of young people who know how to use technology to learn both formally and informally." A key plan recommendation includes supporting efforts to "ensure that all students and educators have 24/7 access to the Internet via devices, including mobile devices, and that states, districts, and schools adopt technologies and policies to enable leveraging the technology that students already have" (www.ed.gov/technology/netp-2010, page 7).

U.S. Education Reform Results

Billions of federal and state dollars have been spent on No Child Left Behind educational reforms since 2001. In spite of national programs such as *Reading First*, *Prevention and Intervention Programs for Children and Youth Who Are Neglected, Delinquent, or At-Risk*, *Comprehensive School Reform*, and *Preparing, Training, and Recruiting High Quality Teachers and Principals*, national student achievement has improved only slightly over past decades, and has not improved significantly from achievement attained earlier this decade (NCLB, 2001; Kerachsky, 2009). The 2008 achievement gains in reading and mathematics, according to the National Center for Educational Statistics, were significant on the National Assessments of Educational Progress (NAEP) for 9- and 13-year olds from 2004 and 1973, but not significantly different for 17-year olds. The oldest group of students, who would theoretically have benefited from long-term reform efforts for the longest period of time, did not. Achievement gaps, between Black students and White students, and between Hispanic students and White students, reported a smaller discrepancy in achievement levels from 1973 to 2004 (with one exception for all three age groups in both areas of English and Mathematics). Unfortunately, the achievement gaps were not narrowed for Black and Hispanic student groups between 2004 and 2008.

Overall, stagnant United States' student achievement continues upon analysis of comparable international measurements of achievement, such as the Trends in International Mathematics and Science Study, TIMSS, (Kerachsky, 2008) and the Program for International Student Assessment, PISA (Baldi et al. 2007). The TIMSS reports positive 2007 math and science knowledge trends for fourth- and eighth-grade

American students over 1995 assessments results. However, when compared to other countries' 2007 achievement levels, three countries at grade four, England, Hong Kong, and Latvia, made greater gains and scored higher or not measurably different than the United States. For eighth-grade students, the Czech Republic, Hungary, Japan, and Singapore scored higher than or not measurably different than the United States, and Lithuania made greater 2007 gains than the United States.

In the Program for International Student Assessment (PISA), the literacy of fifteen-year olds was measured in the area of mathematics in 2003 and in the area of science in 2006. Fifty-seven countries participated in the 2006 assessment in which the United States students had a lower average science literacy score than twenty-two other countries (489 on a scale from 0 to 1,000). The most challenging science subtest for American students was "explaining phenomena scientifically." In the 2003 PISA mathematics assessment, the United States students had a lower average mathematics score than thirty-one countries (474 on a scale from 0 to 1,000). Countries performing at similar levels in mathematics as American students included Spain, Azerbajan, Portugal, the Russian Federation, and Croatia. Some educational researchers believe reform resources and efforts have been too limited to the standards movement without regard as to how the real world works, and call for "disruptive innovation" and the "liberating of learning" to challenge students to read, think, and write critically in order to solve real global challenges (Christensen, 2008; Moe & Chub, 2009).

Innovative educational reform in the United States. Technology has played a relatively small role, thus far, in American education reform. Public schools receive "Enhancing Education Through Technology" funds from the federal government, and

some states have independently supported additional technology resources at varying

levels. For example, in the state of Maine, a statewide one-to-one laptop initiative is

underway in grades 6-12. Sadly, the federal funding stream for technology has declined

greatly over the last seven years, with the No Child Left Behind Act shifting significant

educational resources to school wide reforms. This shift was intended to ensure

children's access to scientific-based instructional strategies. Much smaller scale

technology-based reforms have resulted, with many being privately funded or supported

via charter and private school enterprises. An increased competition has resulted

amongst school systems to provide quality innovative education programs with

technology that are personalized to individual students and of value to discerning parents.

Recent 2009 federal educational initiatives, via *Race to the Top* funding, had the

potential to draw national attention to technology through the *Investing in Innovation and

Education Technology* competitive grants. The available funding amounts of $650

million for broadly defined "innovative programs," and $300 million for educational

technology, compared to $7.85 billion available for the development of assessments for

national common core state standards and school improvement grants, were reflective of

the government's current standards-based priorities.

Some small-scale pilots for utilizing mobile technology learning devices in

elementary-aged classrooms are underway (Shuler, 2009). It is imperative that these

projects be adequately studied for learning effects and possible large-scale

implementation. Some large-scale mobile technology device pilots have begun at the

university level, with open courseware and assistive tools at Abilene Christian

University, the University of Oklahoma, and Stanford University (Chen, 2009). No such

large-scale programs were found at the elementary school system level. Shuler and

Project Tomorrow's *Learning in the 21ˢᵗ Century: Taking it Mobile!* survey report

identified school systems that are at the forefront of small early implementation projects

(Shuler, 2009; Project Tomorrow, 2010). Where MLD have been researched in larger

systemic ways, designs have typically limited MLD utilization to closed content systems

vs. an open-architecture approach whereby individual teachers and learners have access

to third-party applications throughout the study (Soloway et al., 2001).

The 2009 Horizon Report, generated from the New Media Consortium and the

Consortium for School Networking, confirmed mobile technology devices as emerging

technologies in the United States, predicting a near-term adoption for colleges and

universities, and a mid-term adoption of two to three-years for K-12 education systems

(Johnson et al. 2009). Although mobile learning devices hold the promise of providing

low-cost interactive technology access for every student to improve learning, public

funding for the devices and the necessary broadband access remain a challenge.

Learning Theories Associated with Mobile Technology Learning Devices

There is not a singular learning theory typically associated with mobile

technology. However, there are several relevant learning theories associated with mobile

technology devices (Traxler, 2005). Along with the MLD, applications and processes

supporting the MLD learning environments are depicted in well-established learning

theories. Mobile technology can directly impact the degree to which learning

environments are learner-centered, knowledge-centered, community-centered, and

assessment-centered (Naismith et al., 2004).   Each of these learning environments

provides some unique pedagogical advantages (Bransford et al., 1998).

Three theories of learning are particularly well suited to mobile device-supported learning (Patten et al., 2006). They are constructivist learning, contextual learning, and collaborative learning. More research needs to be done through these theoretical lenses in order to understand the potential of mobile devices, along with understanding the MLD-altering role of social practices of teaching and learning (Roschelle, 2003).

Constructivist learning is the active process in which learners construct new ideas or concepts based upon their past and/or current knowledge. It adapts well to mobile devices (Bruner, 1966; Naismith et al., 2004). The devices not only provide learners with supportive recording and reflective tools, but they also can provide realistic environments in which learning may occur. Perhaps even more compelling support of constructivist learning is the handhelds' capacities, with a well-designed application, to be interactive and to create a new environment, unique from both the traditional classroom with minimal technology support for the teacher, and from computer-assisted instruction supporting the singular learner.

Participatory simulations are examples of such constructivist "interdependent learning," where each learner has a networked device and actively defines the simulation outcome (Colella et al., 1998). Colella's Virus Game, in which student decisions determine the destiny of a virus and a society, is depicted as exemplary amongst researchers of this kind of social participative learning (Naismith et al., 2005). However, Naismith (2004) cautions that the transferability of this kind of specific MLD learning to more generalized learning situations may have limitations.

Mobile technology devices can successfully enhance contextual or situated learning largely due to the tool's ability to bring so many different contexts and

environments to the learner (Zurita & Nussbaum, 2004; Sharples et al., 2005; Sharples et al., 2006). Patten categorizes applications providing these environments as "micro world" (Patten et al., 2006). Zhao strongly extends and supports the authentic contexts that technology and mobile devices provide to users, acknowledging that many go beyond real world contexts into virtual world contexts. To this extent, he calls for digital competence skills to be explicitly taught in schools so that children can competently and safely navigate these emerging learning micro world environments (Zhao, 2009). Learning practices such as problem-based learning and case-based learning are also included under contextual learning. Research indicates MLD as a tool to strongly support these kinds of learning environments (Naismith et al., 2004; Shuler, 2009; Trifonova, 2003).

In a similar way to learning with mobile learning devices being contextual in nature, the extent to which English learner students acquire and practice the English language in classrooms is also contextual in nature. Thus, the social learning theory of Albert Bandura (1976), later known as social cognitive theory (1986), lays the foundation for this proposed study. Bandura explained, "Social learning theory approaches the explanation of human behavior in terms of a continuous reciprocal interaction between cognitive, behavioral, and environmental determinants" (Bandura, 1977b, p.vii). Bandura's eventual model of *triadic reciprocality* stated that an individual's behavior, cognitive and self-belief factors, and environmental factors exert influence upon each other. This learning theory was further described as occurring in a cyclic interdependent manner. Bandura believed that humans can and do exercise control over their own behavior through this interdependent system. Five specific human capabilities were

identified as part of the social cognitive process. They include symbolizing, forethought, vicarious learning, self- regulation, and self-reflection (Bandura, 1986).

One's ability to symbolize experiences with his environment over time contributes to meaning making. Bandura (1986) maintained that the ability to symbolize results in humans interpreting past events, relating to current events, and predicting future events. As a person adapts his behavior within environments, he co-creates meaning. Bandura asserted that a human's forethought allows for this adaptability. Another component of social cognitive learning, vicarious learning, was one's ability to observe the causal nature of others' behaviors and learn from them, without actually having to personally experience the actions or resulting effects. Bandura's behaviorist component to his theory was self-regulation. It refers to people's ability to control their own behaviors and over time, establish behavioral standards for themselves. The fifth interdependent component is self-regulation, which refers to an individual's ability to reflect upon his/her own actions, experiences, and thoughts. Bandura theorized that this self-reflection in different environments, with different individuals, affords a person the ability to develop a set of beliefs about themselves. The reciprocal processes of symbolizing, forethought, vicarious learning, self-regulation and self-reflection develop one's self-efficacy.

Self-efficacy is central to Bandura's social cognitive theory. As a component of self-regulation, Bandura described self-efficacy as, "people's judgments of their capabilities to organize and execute courses of action required to attain designated types performances" (Bandura, 1986, p.391). Bandura believed self-efficacy to be an influential mediator of human functioning and future human performance Bandura, 1977, 1982).

Other researchers support this notion that self-perceptions are likely to motivate or inhibit learning, especially when the learning is narrowly defined (Schunk, 1982; Zimmerman, & Ringle, 1981). Self-efficacy beliefs have been central to studies of academic motivation and performance (Pintrich & Schunk, 1995). "Research findings over the last 20 years have generally supported Bandura's (1986) contention that efficacy beliefs mediate the effect of skills or other self-beliefs on subsequent performance attainments"(Pajares, 2007, p. 22).

Many self-efficacy studies have centered on specific domains of learning, including mathematics, writing performance, and reading (Schunk, 1981; Pajares & Johnson, 1994; Shell, Murphy & Bruning, 1989, respectively). Pintrich and De Groot studied the mediating role of self-efficacy in cognitive engagement and found that increasing self-efficacy might lead to increased student use of cognitive strategies, and increased student performance (Pintrich & De Groot, 1990). It is a reasonable theory of action to consider that the juxtaposition of English learners' use of mobile learning devices for reading support may relate to English learners' self-efficacy levels about reading in English and ultimate achievement in English reading.

Traxler (2005) depicts mobile learning devices as mediating tools and Bandura depicts self-efficacy as a mediating tool. The social cognitive theory lends itself to researching self-efficacy implications of mobile learning devices. Although the importance of self-efficacy should not be confused with one's knowledge or actual skill level, Henk and Melnick (1995) point out that "self-efficacy judgments are thought to affect achievement by influencing individual's choice of activities, task avoidance, effort

expenditure, and goal persistence." This may provide a relevant connection to understanding educational uses of mobile learning devices.

Current self-efficacy research maintains Bandura's model of four basic contributing factors to one's self efficacy, each of which must be included when estimating or measuring a person's capabilities to perform a particular task. These four factors include: (1) the performance or mastery level of a task; (2) the effects of performing a task-an observational comparison; (3) social feedback from others; and (4) the physiological reactions/effects from the performance of the task. Of the four factors contributing to one's self-efficacy, Bandura theorized and other research has supported, that performance or mastery of a task is the most influential factor (Bandura 1997). The research reported here builds upon this theory by measuring the reading mastery impacts and reading motivation impacts from mobile learning devices with ELL students, and compares those same measures of English learners receiving similar instruction without mobile learning devices. It is important to note that the four self-efficacy factors do not operate in isolation from one another, but rather coexist and tend to overlap with one another (Marshall & Weinstein, 1994). These factors are found in most general self-efficacy assessments, as well as more specific domain self-efficacy measurement tools. A number of reading studies, in particular, highlight the importance of affective influences, such as engagement and self-efficacy upon reading (Foertsch, 1992; Athey 1985; Morrow & Weinststein, 1986). This study utilizes a reading self-efficacy survey tool that includes the four self-efficacy components, was designed specifically for reading, and for the adolescent age range being examined.

Although not directly applied to this research project, some additional learning theories have been used to study mobile learning devices. For instance, the collaborative learning theory aligns well with mobile learning devices when activities and/or applications specifically utilize the electronic communication and transmission capabilities related to data sharing. These capabilities lend themselves to a variety of collaborative social contexts including small groups, project teams, whole classes, and publishing information to open sources, to include students' parents, a class on another continent, or as a posted resource to a learning community (wiki, blog) that is Internet-based (Zurita & Nussbaum, 2004). Thus, collaborative learning with technology devices may increase the degree to which the learning is student centered and community centered, while not diminishing the importance of knowledge or assessment in the learning process (Zurita, 2003). Computer device-supported collaborative learning may draw upon several different learning theories, including the Social-cultural Psychology Theory and Activity Theory (Vygotsky, 1978; Engestrom, 1987). This is particularly true when utilized in a social networking context in which new learning is acquired on the basis of group members' contributions (Swan et al., 2005).

A slightly more specific learning theory, conversation theory, has been connected to collaborative learning activities supported by MLD (Pask, 1976). This is a logical coupling when one considers the evolution of what Naismith refers to as "shared conversational learning space" that technology devices provide for learners. With the onset of greater audio and voice capabilities, this will be an exciting area for further research, with great potential research prospects for second language learners (Zurita, 2003; Naismith et al. 2004; Attwell & Savill Smith, 2003; Kukulska-Hulme, 2007).

The relationship between the learning theory of behaviorism and mobile technology devices is part of a continuum begun with technology via stand-alone computers. Behaviorism highlights the fact that mobile computing devices can be utilized in a basic technology role, as in computer-assisted instruction for "predictable interactive functions" (Naismith et al., 2004). Mobile device applications, for example, to practice multiplication facts or enhance vocabulary skills exemplify this stimulus-response-feedback-reinforcement model of behaviorism. This kind of MLD-supported activity mirrors already existing classroom technology with stand-alone computers. However, with individual devices, increased differentiation of practice can occur simultaneously with handheld tools for each learner, and the time and duration of practice can vary based upon the learner's needs.

Efficient delivery of specific content can be optimized in this learning environment. Roschelle (2003) cites additional handheld benefits including whole classroom response applications, and learner anonymity within a number of respondents, which allow for the immediate monitoring and adjusting of instruction by the instructor and more immediate feedback for the learners.

Lastly, although this research will not center on learning outside of the formal classroom, it would be incomplete to not identify the strong relationship between mobile technology devices and informal and lifelong learning theories. The devices have the potential to embed learning in different ways into everyday life, outside of formal learning (Tough, 1971). It is a fact that mobile learning devices bring individual and collective informal learning into classrooms. With mobile devices largely prohibited in K-12 schools, and digital utilization data revealing high volume use by children, one

must infer that informal learning is taking place at very high rates in learning environments other than schools. An example of this voluminous utilization is the data that the average 2- to 11-year old streams more online video than the children's parents-nearly two hours per month (Common Sense Media, 2009).

Mobile Learning Device Relationships with Teachers, Students, and Achievement: The School-Mobile Technology Schism

Ironically, the advent of technology has leveled the international economic and educational playing fields due to increased access to knowledge from the Internet platform. Yet in the United States, and perhaps in other countries, a substantial level of skepticism prevails regarding technology access in classrooms to create rich, productive, and stimulating teaching and learning environments. Research illustrates the conflict between the growing presence of cell phones (MLD) and the perception of parents and teachers of the devices being "counter-productive, a disruption, and distraction" in the teaching-learning process. For example, ninety-three percent of children 6- to 9-years old live in homes with a cell phone, with 30 percent of the children having their own cell phone (Sesame Workshop, 2003). It is predicted that 54 percent of American 8- to 12-year olds will have cell phones within the next three years (Center on Media and Health, 2008). More than 10 percent of 4- and 5-year olds currently use a cell phone in some capacity (NDP Group 2008). At the same time, 85 percent of surveyed teachers saw cell phones as a "distraction," with 64 percent of them stating they have "no place in school" (Joan Ganz-Cooney Center & Common Sense Media, 2008). As this negative teacher perception is quantified, the acquisition of mobile devices with Internet access (smart phones) is exploding. In one year alone, purchases of smart phones grew from 9 percent

of handheld purchases made to 19 percent (NDP Group, 2008).   Further exacerbating this irony is the fact that out of the more than 100,000 available third-party applications for Apple's iPhones and iPod touches, five out of the top-ten content applications voluntarily purchased in 2009 were characterized as "educational" and targeted children (Shuler, 2009). There has, however, been a recent shift in parents' perception regarding MLD utilization in classrooms. When asked if they would financially support the purchase of an MLD specifically for in-class use, general parent response was favorable at 62 percent, with impoverished parental support at the 75 percent level. Compared to Schuler's 2009 parental survey data revealing reticence about handhelds for classroom use, this demonstrates an increasing level of parental support for the utilization of technology at school and even for the concept of "BYOT"—Bringing Your Own Technology to school (Project Tomorrow: Speak Up Survey, 2010).

Current MLD utilization in public schools across the United States starkly contrasts with trends in student MLD ownership and parental interest in future MLD integration in education. Presently, the utilization of mobile technology devices in classrooms is largely banned. Administrative policies prohibit the use of handheld electronic devices during the school day for fear of causing instructional disruptions. Some permissive policies allow MLD use before- and after-school and in some cases, during lunchtimes and passing periods. Public schools' school board policies and technology acceptable-use guidelines focus on stand-alone computers, Internet access, and privacy issues. Little to no consideration is given to policies for mobile learning devices as potential learning tools (see Appendices A and B, Escondido Union School District, 2009; Escondido Union School District, 2003).   More research regarding

educational benefits and limitations of the utilization of mobile learning devices inside classrooms is needed as the natural convergence of this new technology from students' pockets and backpacks to the formal schoolhouse steps is a national goal and appears inevitable.

Interactive Classroom Relationships. Early MLD research suggests that relationships between the teacher and students can shift dramatically when mobile learning devices and mobile learning tasks are introduced into a classroom (Naismith, 2004; Sharples et al., 2006; Roschelle, 2003). There are differences in agility and comfort with the technology itself, as depicted by the coined generational phrases of "digital natives" for students growing up with technology tools, and "digital immigrants" for users (veteran teachers) who have assimilated technology tools as adults (Prensky, 1991). Digital natives are more likely to be comfortable with the electronic media and more able to adapt to the new social learning contexts than the teacher. For some teachers, mobile learning devices could be considered a challenge to traditional teaching practices. Naismith, Sharples, and Roschelle have researched the teacher's role and the use of MLD. All suggest that in MLD-enhanced learning environments, teachers' roles become more of facilitative guides, assisting students with learning activities and resources, rather than the traditional role of primary transmitters of knowledge (Naismith, 2004; Sharples et al., 2006; Roschelle, 2003).

Other changes in relationships have also been documented in studies of mobile learning devices. Zurita and Nussbaum (2003) conducted a study of first grade students utilizing mobile devices in a constructivist-learning environment of math and language problem-solving games. The study found enhanced student-to-student relationships with

handhelds. When compared to students in the same learning environment without the technology support, significant student face-to-face collaboration and a reduced need for teacher support were evidenced benefits (Zurita & Nussbaum, 2003).

One important MLD utilization characteristic described in research is the role augmentation of students becoming active co-teachers, in addition to learners in the classroom. Roschelle and Pea identify three specific ways in which students with handhelds interact with each other. These include interactions via classroom response system applications, participatory simulations, and collaborative data gathering. This has been characterized as "a distributed peer-to-peer network topology" (Roschelle & Pea, 2002). The learner's experience with mobile learning devices with multiple learners is a unique phenomenon, and suggests the importance of further study with a social-cultural lens (Traxler, 2005).

Mobile Learning Device Research

The evolution of mobile technology devices (MLD) has been rapid. In 1991, Weiser coined the term "ubiquitous computing" to characterize the extent to which technology was becoming so prevalent on a daily basis in our society that it was no longer noticed as a part of the environment (Weiser, 1991). Less than two decades later, seventy-seven percent of the experts surveyed in a 2008 Pew/Internet survey believed the mobile computing device will be the most common Internet platform on a global scale by 2020 (Pew, 2008). A review of mobile technology device research revealed ongoing efforts: 1) to define mobile learning (Traxler, 2005); 2) to compare and contrast it with electronic learning (Trifonova, 2003; Trifonova & Ronchetti, 2003); 3) to study its impact on formal and informal learning processes; 4) to understand the personalization

and appropriation aspects of the tool (Swan et al., 2005; Roschelle & Pea, 2002); 5) to study student interaction (Litchfield, 2007); 6) to study the relationship between technology devices and student learning time (Motiwalla, 2005); 7) to understand the relationship of mobile learning devices and current learning theories (Kukulska-Hulme, 2007; Kukulska-Hulme & Shield, 2007; Liu et al., 2003; Sharples, 2005); 8) to evaluate applications for effective pedagogy (Patten et al., 2005); 9) to measure content knowledge acquisition and; 10) to study how the tool can be successfully integrated into teacher practice (Weiser, 1991; Maag, 2006; Edmunds, 2008; Quitney-Anderson & Rainie 2008) .

The majority of mobile technology research has been conducted over the last two decades. However, at this point in time, no conformity exists as to how to measure its effects in the classroom (Wellings & Levine, 2009; Sharples, 2006). Most research supports the concept that mobile learning cannot be defined as simply portable electronic learning, nor is it its own distinct entity from electronic learning or other forms of learning. Rather, mobile learning is believed to be a blend of learning theories with a variety of pedagogical underpinnings (Sharples et al., 2006). There is agreement that mobile learning is defined as a form of learning and teaching through a mobile technology device (Trifonova, 2003; Traxler, 2005). When utilized as a mediating tool, mobile learning device attributes include learning in different contexts, constructing knowledge, changing the behavior patterns of how learning and work are done, and impacting the context of learning (Sharples et al., 2006).

Early mobile learning device research identified characteristics of mobile technology devices. Like conventional stand-alone computers, mobile devices can

deliver a variety of instructional media including programs designed for remediation, acceleration, simulations, and applications (Roschelle & Pea, 2002). However, mobile devices' low cost-benefit ratio make them a more likely tool to be used in classrooms on a daily basis, and thus, to be more easily embedded into ongoing learning activities and teaching protocols (Project Tomorrow, 2010). This is a significant difference over the occasional supplemental use of desktop computers as stand-alone machines in classrooms or within weekly student visits to computer lab environments (Soloway, 2001).

The potential for collaboration with mobile technology devices was introduced in the discussion of teacher and student relationships. Because MLD users can readily interact with each other, this technology is qualitatively different than previous computer-assisted instruction. Teachers report increased student engagement time working with technology, higher levels of student motivation, more communication and collaboration between students, and a noteworthy accessibility benefit (Vahey & Crawford, 2002). This study involved teachers' and students' yearlong use of *Palm* handhelds in 100 K-12 classrooms throughout the country. The goals of this early MLD research were to: (1) determine whether classroom teachers found handheld computers a useful education tool and (2) to aggregate the knowledge base of a large set of teachers utilizing handheld technology in their classrooms. Ninety percent of participating teachers found MLD to be an effective instructional tool and cited early benefits that over time have become common research-based themes: the portable nature of MLD, the higher levels of personal learning encouraged by MLD use, greater student responsibility, and the MLD's increased capability for collaboration (Vahey & Crawford, 2002).

The portability of mobile technology devices provides an asynchronous environment that impacts the learning context and potentially enhances learning opportunities for students inside and outside of the formal classroom (Inkpen, 2001; Sharples, 2002; Soloway et al., 2001). Students have reported that they enjoy using mobile devices because of their ease of use (van'tHooft, Diaz, & Swan, 2004).

When the portability of handhelds is combined with the devices' ability for learners to personalize their learning experiences, research reveals enhanced student motivation and engagement factors (Shuler, 2009; Swan et al., 2006). Additional studies highlight shifts between institutional control and personal ownership (Savill-Smith & Kent, 2003), and the measureable relationship between MLD ownership (utilization) and student engagement (Perry, 2003).

A study of the utilization of mobile technology devices in six elementary classrooms, grades three through seven, revealed some interesting data in regard to personalization (Roschelle & Pea, 2002). Data analyzed included lesson plans, data usage, student interviews, teacher interviews, and classroom observations. The study found the students largely utilized the tools for note taking in classroom laboratory situations, journal writing, and other writing assignments. Students in grades 3, 4, and 6 appropriated and utilized a drawing application that was included on the technology device, but not overtly introduced or taught.

The same study found a wide variability of weekly handheld usage time between classes of students, and between students in the same class. This suggested, along with the fact that 75percent of the students utilized the devices outside of the school setting, that a significant number of students appropriated the mobile technology devices for their

personal use/learning (Roschelle & Pea, 2002). Additional exploration is needed to understand the variability of voluntary MLD learning appropriation, and extended learning opportunities outside of the classroom.

Interviews from the study revealed teacher believed that the mobile technology devices assisted in addressing the range of student academic needs in the classroom (Roschelle & Pea, 2002). Personalization, or as described from the teachers' perspective as the ability to differentiate instruction, was particularly noted as an asset for special needs students. In terms of knowledge acquisition and work ethic, teachers reported homework rates completed at higher levels with the MLD, as well as more and better writing produced, perhaps due to an electronic peer editing feature. Although preliminary in nature, this research informed future research and demonstrates how learning may be amplified, increased, and personalized with young children utilizing mobile technology devices. (Swan et al. 2005).

Although not a specifically researched component of this study, the role of the teacher as facilitator of the use of MLD is important. Roschelle (2003) noted that although increased collaboration is frequently correlated with the use of handhelds in a classroom, many of the actual interactions of asking questions, explaining, clarifying, and summarizing are non-technology-based functions: they are teacher functions. The critical role pedagogical standards play is an important implementation consideration for mobile learning devices in educational settings. It is inadequate to solely rely on the social capital potential of small technological devices. Swan, et al. similarly echoed, "Technology in and of itself won't make the difference; it's what students do with it that does" (Swan, et al., 2005). Future MLD research must focus on the combination of the

new technology's capabilities, optimum teacher pedagogical practices, and the inherent

instructional design of content within third-party applications (Swan, et al. 2005;

Naismith, 2002).

Third-party content applications and peripheral applications utilized with MLD

can be categorized largely by their utility and the kind of pedagogy that they promote.

Patten et al. (2006) suggested application categories of: 1) administration— based upon

organization and accessing of information; 2) reference— tools for information delivery

and portability, like a calculator or translator; 3) interactive— response and feedback

technology, like memory activities or a quiz; 4) micro world— providing learner-

constructing technology within the electronic or virtual environment; 5) data collection—

tools assisting in the gathering and recording of information for scientific, reflective, and

multimedia purposes in the real world; 6) location aware— applications that feature

interactive learning activities within a given context, like a museum guide or a treasure

hunt and; 7) collaborative— to encourage information and knowledge sharing practices

(Patten et al., 2006).These technology application categories directly relate to the most

common learning theories linked to handheld devices (Motiwalla, 2005). This supports

the fundamental learning theory notion that different learning outcomes require different

approaches to instruction (Bransford et al., 1998). The next section discusses the different

MLD learning theories linked to the variety of different MLD instructional approaches.

Pedagogical Practices Associated with Mobile Technology Learning Devices

Mobile learning devices afford users unique experiences that have the potential to

be capitalized upon in a formal instructional setting (Shuler, 2009). As presented

previously, MLD characteristics include connectivity, portability, social interactivity,

context sensitivity, and personalization. Sharples et al. (2003) maintained that

pedagogical practices that utilize MLDs in classrooms must be a combination of formal

and informal learning due to the enhanced information accessibility of individual

learners, and the likelihood of the learner, to personally initiate his learning. Appropriate

practices must embrace the students' active construction of knowledge. (Sharples et al.,

2003)   At the same time, researchers caution that, like other technologies, mobile devices

do not guarantee effective learning (Bransford et al., 1999). With technology in the palms

of their hands, learners' engagement in the classroom changes. Pedagogical approaches

must plan for this and other behavioral shifts (Swan et al., 2005). The actual leaning tasks

and technology must be well suited to one another (Naismith et al., 2004; Perry, 2003).

Mobile Learning Device Implementation Challenges

The role and ability of the teacher to directly plan, design, and facilitate

technology-enhanced curriculum cannot be underestimated (Shuler, 2009). There are

many significant usability issues that require comprehensive systemic planning, not the

least of which is facilitator professional development for the teacher, and a support

system throughout early- and long-term implementation (Naismith et al., 2004). There

are multiple implementation challenges with mobile learning. To put theoretical research

into practice on a large scale with mobile learning devices, the MOBILearn project

research recommends a number of first steps (O'Malley et al., 2003). These include the

development of a cost model for the needed technology, infrastructure, training, and

services. Also needed for implementation is a clear plan of mobile technology usability

for content creators, administrators, teachers, and learners. The plan must be inclusive of

such important issues as security, privacy, digital literacy and digital citizenship (Shuler,

2009). Initial and long-terms support roles need to be identified and realized, with management procedures and professional development training planned and provided.

Future Implications, Research, and Education Policy for Mobile Learning Devices

There is consensus that more systematic research is needed to fully investigate and understand the effects of mobile technology devices on learning in classrooms (Swan et al., 2005; van t'Hooft et al., 2004; Traxler & Kukulska-Hulme, 2005; Traxler, 2007; Swan et al., 2005, Motiwalla, 2005; Roschelle, 2003). Additional studies are needed to understand mobile devices' impact on concepts such as student organization, cultural device utilization issues within a classroom context, and usage issues by gender, age, and ability (Kukulska-Hulme, 2005). More research is also needed to ensure well-designed instructional applications and protocols (Motiwalla, 2005; Trifonova & Ronchetti, 2003). Likewise, research will be important to offer guidance to teacher facilitators as to mobile learning's level of usefulness, to ensure real impacts on learning.

Although small in scale, early research with young disenfranchised young adults demonstrated some significant positive effects with handheld-supported learning (Attwell & Savill-Smith, 2003). Even though technology has been shown to support personalization of instruction, little research has been conducted to understand how mobile learning devices can be implemented to accelerate language development and utilization (Kukulska-Hulme, 2007). If it is true as Traxler, Roschelle and Sharples et al. contend that mobile learning devices mediate learning, then it is plausible to study the utilization of content applications with audio and video-enhanced mobile learning devices and the relationship to reading English for English learners (2005; 2003; 2006, respectively).

Mobile Learning Devices and Research-based Approaches for English Learners

In order for this study to research the possible impacts of the utilization of mobile learning devices and English learners' acquisition of English reading skills, it is necessary to understand effective pedagogical approaches for second language learner students. While acknowledging it is not possible to create a one-size-fits-all research-based literacy plan for English learners, August & Shanahan compiled a set of guidelines for teaching literacy to English learners. In reviewing recommendations from the National Reading Panel (2002), literacy research, and second language acquisition research, these researchers provided "generalizations that can constitute a broad-base for evidence based practice. This was reported by the National Literacy Panel for Language Minority Children" (August & Shanahan, 2006). As summarized by August & Shanahan, the eight research-based guidelines for teaching literacy to English learners include:

1. An emphasis on essential components of literacy (phonemic awareness, letters and spelling, fluency, vocabulary knowledge, and explicit instruction in meaning making-cognition) (Gunn et al., 2000, 2002, 2005; Giambo & McKinney, 2004; Kramer, Schell & Robison 1983, Stuart, 1999; Swanson, Hodson, and Schommer-Aikins 2005; Troia, 2004; Roberts & Neal 2004).

2. Similarities to effective literacy instruction for native speakers (Abu-Rabia & Siegel, 2002; Chiappe & Siegel, 1999; Mumatz & Humphreys, 2001).

3. A literacy curriculum and instruction that may be adjusted to meet individual ELL students' needs (Shanahan & Beck, 2006; Drexler, 2006; Neufeld & Fitzgerald 2001).

4. Effective literacy instruction with instructional routines, which are comprehensive and multi-dimensional, benefit ELL students' comprehension (Gunn et al., 2000, 2002, 2005; Tharp, 1982; Bean, 1982; Cohen & Rodriguez, 1980; Slavin & Madden, 1999; Fung, Wilkinson & Moore, 2003).

5. Instruction that develops students' oral proficiency (Carlo et al., 2004; Tufdor & Hafiz, 1989, Saunders 1999; Saunders & Goldenberg, 1999; Liang, Peterson & Graves 2005; Biemiller & Boote, 2006).

6. Instruction that is differentiated (Slavin & Madden, 1999; Gunn et al., 2000, 2002, 2005; Lesaux, Rupp & Siegel, 2007).

7. Well-prepared teachers (Au & Carroll, 1997; Haager & Windmueller, 2001; Kucer 1999).

8. Instruction that is respectful of the students' home languages (Francis, Lesaux, & August, 2006; Rolstad, Mahoney & Glass, 2005; Greene, 1997; Willig, 1985).

Mobile learning devices, along with particular MLD literacy content applications, may contain elements supportive of these English learner literacy instructional guidelines. The mobile learning device's ability to provide differentiated learning experiences, in terms of content, pace, aural, and oral practice suggest a strong alignment to effective ELL instructional practices (Kukulska-Hulme & Shield, 2007). With other documented MLD features of personalization, increased motivation, and time on task, the study of mobile learning device impacts on English learners' self-efficacy in reading is merited (Savill-Smith & Kent, 2003; Swan et al., 2005; Shuler, 2009; Traxler, 2005; Sharples et al., 2006).

Chapter 3

Research Design and Methodology

The purpose of this study was to add to the research on the use of mobile learning devices (MLD), particularly in elementary educational settings, through multiple research methods. Specifically, this MLD research explored how MLD may benefit or limit English language learner students' self-efficacy and achievement regarding their ability to read in English. In order to accomplish this purpose, I drew on both qualitative and quantitative approaches to compare similar classrooms of English language learners (ELL) who are using mobile learning devices, and English learners who are not using MLD.

Research Questions

Three primary research questions were explored:

1. How does the reading achievement of English language learners who utilize 1:1 mobile learning devices compare to the reading achievement of matched ELL students who do not have access to mobile learning devices?

2. In what ways do mobile learning devices impact English language learners' self-efficacy about reading when compared to a matched sample of ELL students' self-efficacy who do not utilize mobile learning devices?

3. What benefits and limitations do elementary-aged English language learners identify with the daily 1:1 use of mobile learning devices for literacy learning?

The study's two H0 were: (1) there is no difference in English reading achievement between ELL students who use one-to-one mobile learning devices and ELL students who do not use one-to-one mobile learning devices; (2) there is no difference in

English learners' levels of self-efficacy in reading between ELL students who use one-to-one mobile learning devices on a daily basis and ELL students who do not use one-to-one mobile learning devices.   The study's two H1 were: (1) ELL students who have daily access to mobile learning devices achieve at higher reading levels than comparable ELL students without mobile learning devices access; (2) ELL students with daily access to mobile learning devices demonstrate higher levels of self-efficacy in reading than EL students without access to mobile learning devices.

Context of the Study

This study focused on a sample of 426 English language learner students (ELL) in 28 classrooms at grades four and five. Of this sample, two hundred eighty six ELL students from 16 classrooms used mobile learning devices on a daily basis for literacy activities.   The ratio of students to iPod touch devices was one-to-one. These classrooms were matched with 12 similar classrooms, with 140 ELL students, who did not use mobile learning devices (MLD). The 28 total classrooms were located in ten schools, within a single suburban K-8 school district in Southern California. The district educated 18,600 Pre-K to Grade 8 students. The district's student population was composed of 70 percent Hispanic/Latino, 21 percent White, 3 percent African-American, 2 percent Asian-Pacific, 1 percent Filipino, 1 percent American Indian, 1 percent Pacific Islander, and 1 percent other ethnicities.   Seventy-four percent of the district's students qualified as socio-economically disadvantaged students, as measured by student participation in the National Free- and Reduced-Lunch Program.

Linguistically, the district had 47 percent of its students classified as English Language Learners (ELL), in that their first language was not English, and they were not

yet deemed "proficient" in their ability to listen, speak, read, and write in English. Proficiency, also known as reclassification, was determined by: 1) scores on the California English Language Development Test (CELDT); 2) achievement on the California Standards Tests; 3) achievement on a district developed on-demand writing assessment; and 4) teacher recommendation (California English Language Development Test, 2009). The study will gather study language proficiency levels as a possible relational factor to the three research questions.

Looking at student achievement from a district perspective, Pioneer School District (pseudonym) had not met all of the proficiency criteria in terms of the *No Child Left Behind Act (2001)*. It was considered by the federal and state government to be a "Program Improvement" local education agency. In each of the eight years of federal NCLB accountability (2002-2009), Pioneer District had not met the proficiency targets for English learners in English-language arts (E-LA). Although E-LA achievement for the subgroup of English learner students has increased from 10 percent proficiency in 2002, to 30 percent proficiency in 2009, achievement was still well below the 2010 federal English-language arts proficiency expectation of 46 percent proficient or above for all students. Over the same 7-year period in the district, White students scored at the 48 percent proficiency level in 2002 and at the 70 percent proficiency level in 2009. The achievement discrepancy in E-LA between the English learner and White student subgroups was 38 percent in 2002, and 40 percent in 2009. Pioneer District's student achievement had increased over time, but the learning achievement gap between English learners and White students had remained and slightly increased over the same period of time. With its significant ELL population, Pioneer School District consequently had not

meet its ELL student subgroup's English-language arts proficiency expectation, or its collective "All Student" 2009 E-LA proficiency expectation at the time this research was conducted.

It was noteworthy that Pioneer School District did in fact have a pioneering history of innovatively using technology in elementary- and middle school-level classrooms. For seven years, the Pioneer District had implemented a program known as *Project LIVE (Learning through Innovative Video Education),* whereby teachers facilitated the creation of student-made digital videos to support complex content standards. *Project LIVE* fostered visual literacy skills in both students and teachers in order to increase student achievement. Goals included building upon standards-driven instruction through the use of an engaging digital environment, increased student collaboration, problem-solving skills, and the explicit teaching of important 21st century technology skills.

In multiple year student achievement comparison data in English-language arts and mathematics, students in *Project LIVE* classrooms achieved at significantly higher levels than students in non-*Project LIVE* classrooms. The student subgroups that benefitted the most in terms of student achievement gains were students with disabilities and English language learners. A specific example of District *Project LIVE* student reading achievement gains for ELL is quantified in the Figure 1. below. From this early data, the district felt strongly that more initiatives to explore connections between literacy learning and technology were merited for all students, and especially for the ELL and special education student subgroups.

CST English Learners Fourth Grade 2005

Legend:
- All other 4th Grade Classes
- 4th Grade Project LIVE

Scaled Score (Y-axis): 300 to 350

Language Arts: All other 4th Grade Classes = 312; 4th Grade Project LIVE = 330

Math: All other 4th Grade Classes = 323; 4th Grade Project LIVE = 340

Subject (X-axis)

© Escondido Union School District, 2006
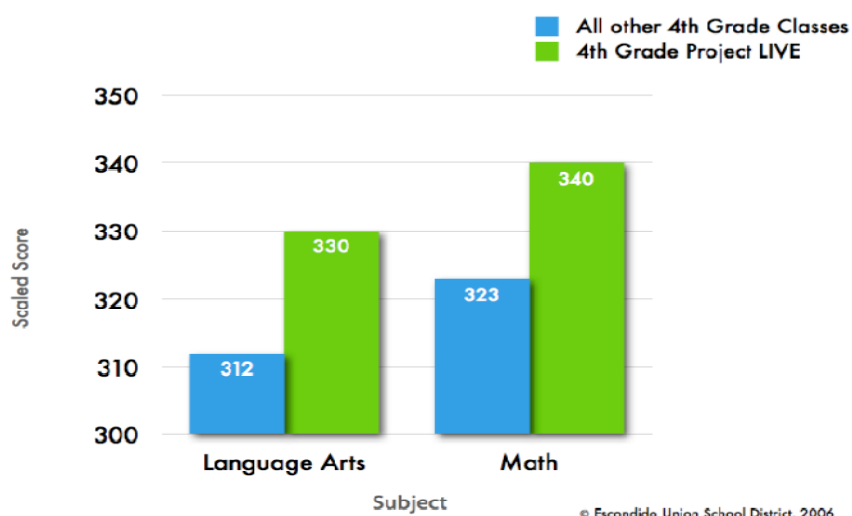
Figure 1. Pioneer School District's Fourth grade California Standards Reading Test Results of Project LIVE and Non-Project Live Students

NOTE: CST-California Standards Test in English-Language Arts; Scale score range- 0 to 700

In 2008, the district explored the utilization of 1:1 iPod touch devices in one classroom with a teacher who had successfully participated in *Project LIVE*. With just a six-month implementation period, early comparison results were significant, as measured by a pre-post-Iowa Test of Basic Skills of students in the iPod touch classroom, of students with daily utilization of the iPod touch and students in the same grade class at the same school without access to the iPod touch devices.. Students in the 1:1 iPod touch class made an average gain of 1.9 years English-language arts growth over six months while students in the non-iPod touch classroom students averaged 0.3 years growth gain over the same period of time.

The Pioneer District continued its MLD exploration in 2009-2010 with five one-to-one iPod touch classroom implementations. The district was one of the first

elementary school districts in the United States to have elementary students utilize the individual devices in classrooms on an on-going basis. The district was documented as one of the fifty early mobile learning device (MLD) adapters in the nation (Shuler, 2009). Additionally, the district had explored using small sets of iPod touch devices (8-10) with at-risk adolescent readers and English language learners at the middle school-level, with the similar intent as in the elementary schools; improving reading fluency, vocabulary, and ultimately reading comprehension. With or without MLD, young English learners, developing language proficiency for the communicative purposes of listening, speaking, reading, and writing, were first required to "develop proficiency with vocabulary, syntax (grammar), phonology (sounds and sound patterns), and morphology (how prefixes and suffixes indicate word meanings and grammatical roles)" (CDE, 2010 p.83).

The significant English learner population of the Pioneer School District was contextually critical to this study. The high ELL student concentration afforded the exploration of MLD with a variety of English learners at different developmental levels of English acquisition. The highly concentrated ELL classrooms provided a large enough sample for quantitative analyses. Data was also collected and analyzed to account for five CELDT-identified English language levels within the ELL student population - Beginning, Early Intermediate, Intermediate, Early Advanced, Advanced (California English Language Development Test, 2009).

Research Design

This study explored possible relationships between the implementation of mobile learning devices in 10 elementary schools, English learner students' levels of self-efficacy in reading, and reading achievement. The unit of analysis was the classroom. The study

was conducted in two phases. The first phase involved a quasi-experimental research design component. In this phase, data from 16 MLD classrooms and 12 comparable Non-MLD classrooms was studied, along with the study of 12 matched MLD and Non-MLD classrooms. Pre- and post-reading student achievement data and pre-post student self-efficacy reading surveys were administered, collected, and analyzed.

The second phase of this study was qualitative and focused on the technology-enhanced literacy experiences of students in the experimental group. An embedded unit case study design was utilized, involving English language learner students in two classrooms with 1:1 implementations of mobile learning devices. Eight focus group interviews were conducted with thirty-three English learner students from the two target 1:1 MLD classrooms. Each focus group included 4-6 English learner students. For the composition of each focus group, the participating MLD teacher selected an initial English learner, followed by the selectee choosing 3-5 ELL classmates to join him/her. The group selection method was purposeful to create a level of comfort and safety amongst the ELL focus group participants and with the researcher. The interview questions were available in English and Spanish, and two bilingual researchers conducted the interviews. This assured full comprehension of student responses in either language, or of answers given in a combination of both languages (see Appendices D1 and D2).

The explanatory focus for this case study sought to describe and document emerging self-efficacy and achievement benefits and limitations of ELL students' using individual mobile learning devices. The research studied the students' first mobile learning device experience in their schooling. The documentation served to inform how,

and to what extent, teachers and English learner students integrated mobile learning

devices into the language arts programs of fourth- and fifth-grade classrooms.

Phase I. Quasi-Experimental Research Component

The quasi-experimental design component of the study enabled the researcher to

determine the effect of 1:1 MLD access on ELL student achievement in reading, and the

effect of 1:1 MLD access on ELL students' self-efficacy in reading. Research question

one explored the relationship between ELL students, the use of 1:1 iPod touch devices,

and ELL students' achievement levels. Research question two studied the relationship

between the ELL students, the devices, and the ELL students' reading self-efficacy

levels. While the use of technology in classrooms may be appealing to many, careful

study was warranted as to how the MLD tool did or did not contribute to students' overall

learning, specifically to ELL students' overall learning, and their learning in reading.

Results serve to inform similar studies in the future, technology-enhanced teaching and

learning decisions for English learners, and future educational contributions of mobile

learning devices.

Quasi-Experimental Participants

The teacher and student participants were selected via purposeful sampling. This

strategy was appropriate as the researcher intentionally selected the participants in order

"to inform an understanding of the research problem and central phenomenon on the

study" (Creswell, 2007). This non-random sampling method was employed as the

participants needed to share specific characteristics including: (1) grade range level (4-5);

(2) English language proficiency (a minimum of 30 percent ELL in each class); (3)

attendance in comparable schools in the same school district, and (4) use of the same core

instructional materials and curriculum. Sixteen teachers implemented one-to-one mobile learning devices in their classrooms. Teachers interested in utilizing MLD in their classrooms applied for a limited number of 1:1 MLD classroom grants in Spring 2010. (see Appendix E). After an application process, the district selected 25 teachers from an interest pool of 130 teachers. Selected 1:1 MLD teachers voluntarily agreed to: (1) implement the new technology; (2) attend initial and on-going monthly district MLD professional development, and: (3) contribute to an electronic MLD teacher learning community with three MLD student projects (with student products), which were then posted to the learning community's website. (See Appendix J for the professional development content and participation requirements). From this cohort of 25 invited MLD teachers, 16 MLD teachers were part of this study, with fourth- or fifth-grade teaching assignment.

To identify a comparable and viable Non-MLD teacher sample, a pool of districtwide teachers was identified with teaching assignments at the fourth- or fifth-grade level. Teachers had assignments at either the same school, or a school with comparable student demographics within the school district. A two-step Non-MLD teacher participant/classroom selection occurred. First, a pool of potential Non-MLD teachers was identified for their similarity to the participating MLD teachers. Teacher quality was controlled for in a limited way by selecting teachers with the same teacher evaluation rating of "satisfactory" —having no identified areas in need of improvement, as measured by principals' ratings on the district teacher evaluation tool. The teacher evaluation document was based upon the California Professional Teaching Standards (see Appendix F).

A second criterion for selection of the Non-MLD teachers was utilized. Aggregated mean 2009-2010 CST student reading achievement scores were calculated for each possible Non-MLD teachers' previous class of students. Student scores were coded for anonymity. Mean average reading gains associated with each teacher were compared to the selected MLD teachers' average student reading achievement gains from the previous year in an effort to pair teachers with comparable 2010 average student reading achievement gains, along with comparable ELL student classroom demographics. Although, student rosters were pre-determined by the respective school administrations, the 25 invited Non-MLD classrooms for the study had a minimum ELL student composition of 30 percent. Of those 25 Non-MLD classroom teachers, 12 chose to participate in the study and fully comply with the permission and study processes.

Thus, the study included ELL student participants from 28 classrooms in 10 different schools. Within the 28 classrooms, a total of 426 English language learner students participated in the study. These English language learner student participants collectively represented 51 percent of the entire 28-classroom student sample. The remainder of the participants included English-only students and long-term reclassified ELL students. Non-ELL participants were removed from the database. For analyses of confounding variables, the language development level (CELDT level) of each ELL student was collected (see Appendix C). In terms of student levels of English proficiency, this sample included students achieving a score of 1 to 5 on the California English Language Development Test (CELDT), with a "1" designated as Beginning, a "2" as Early Intermediate, a score of "3" as Intermediate, a "4" as Early Advanced and a score of "5" as Advanced.

In addition to ELL students with a CELDT score of 1-5, the student sample included a subset of ELL students who began the study designated as "ELL" according to the CELDT criteria, and who were subsequently reclassified as "fluent English proficient" during the eight-month study period. Also included in the ELL sample were students who were reclassified as "fluent English proficient" in the preceding 2009-2010 school year. This inclusion decision followed long-standing California state assessment protocol, which purposefully includes reclassified students from a previous school year in the subsequent school year's ELL database. Thus, the total sample of 435 ELL students in this study included reclassified ELL students from 2009-2010, ELL students who remained ELL students throughout 2010-2011, and ELL students who during the 2010-2011 school year achieved "reclassification" status.

Additional ELL student participation criteria for the research sample was defined as ELL students who: 1) attended school within the same class for the complete eight-month period of time; 2) completed both the pre-and post-self-efficacy reading surveys; and 3) participating in both the pre- and post-MAP achievement assessments. Of the 28 participating classrooms, 16 classrooms (68 percent) utilized mobile learning devices on a daily basis for literacy activities and 12 classrooms (32 percent) did not utilize the devices. Parity in the study's targeted grade levels was nearly reached, with 47 percent of the participants at the fourth-grade level and 53 percent of the study's participants at the fifth-grade level.

The study design attempted to partially control for teacher variability. Via purposeful sampling, the researcher invited 20 pairs of MLD and Non-MLD teachers to voluntarily participate in the study. The matching criteria included teachers having

satisfactory teacher performance evaluations in 2009-2010, grade level teaching assignment, school assignments with similar student demographics, comparable aggregate student reading achievement scores from the 2009-2010 California Standards Test, and classroom compositions with a minimum composition of 30 percent ELL students in both the experimental and control groups. Greater actual voluntary participation was evidenced by MLD teachers than Non-MLD teachers, with 16 of the 20 invited teachers electing to participate (80%) than with the Non-MLD invited teacher cohort, wherein just 12 of the 20 teachers elected to participate (60%).

The net voluntary teacher participation in the study resulted in 12 matched teacher pairs, of which 5 pairs were at the fourth-grade level and 7 pairs were at the fifth-grade level. Unpaired teachers utilizing mobile learning devices in their classrooms were comprised of 4 fifth-grade classrooms and 2 fourth-grade classrooms. Subsequent quantitative analyses included paired teacher analyses and aggregate non-paired teacher analyses, utilizing the nonparametric method of cross tabulation.

The voluntary ELL student participation rates within the voluntary teacher classrooms were contingent upon parent permission and student assent for the pre- and post-reading self-efficacy survey and for the collection of the NWEA MAP reading achievement data. An overall 67 percent voluntary ELL student participation rate was achieved from 28 participating teacher classrooms.

Descriptive statistics regarding the initial 435 student sample included: 1) student gender, with 47 percent male and 53 percent female; 2) socio-economic status, with 94 percent of the ELL students from low socio-economic households, as defined through their qualifying participation in the National School Lunch Program (receiving

free- or reduced-price school meals; 3) ELL students' primary languages, with the sample predominantly Spanish (88 percent) and including 1 percent Vietnamese, .2 percent Korean, .5 percent Filipino, .7 percent Arabic, .2 percent Mixteco, 0.5 percent English and 8 percent "other Non-English languages." Parents of students identified these primary languages at the time of the students' school registration.

Of the sample population, 97 percent of the ELL students had a California Standards Test (CST) record from the previous 2009-2010 school year. This indicates that nearly all of the students had been attending a California school in April-May of the previous school year, the timeframe for the administration of the statewide CST assessment. While this descriptive statistic did not provide specific data as to the history of transiency of the ELL students, it minimally provided the researcher with the knowledge that the students had access to the California educational system for some portion of the 2009-2010 school year.

In terms of ELL students' proficiency levels in listening, speaking, reading and writing English, CELDT test scores revealed 5 percent of the students designated as "Beginning," 9 percent as "Early Intermediate," 36 percent as "Intermediate," 22 percent as "Early Advanced," 2 percent as "Advanced," and 27perecent as "Reclassified." Quantitative analyses were conducted by ELL student CELDT level groups, in order to determine the potential effect of literacy environments for students at different levels of acquiring English as a second language.

Quasi-Experimental Measures/Instrumentation

Reading achievement instrument. A computerized adaptive assessment from the Northwest Evaluation Association (NWEA), known as *Measures of Academic*

Progress (MAP), was utilized to assess students' reading progress. NWEA- MAP

student achievement data was collected at the beginning and at the end of the project.

The NWEA growth research database "contains the most extensive collection of student

growth data in the United States, collected over more than 12 years and encompassing

10,055,780 unique students as of 2009. In California specifically, NWEA-MAP has

measured 90,625 students' academic growth in 125 California school districts. (see

http://www.kingsburycenter.org/our-data/grd-data, 2010).

NWEA-MAP reading assessment is aligned to national and California curricula

and standards. The Rasch Unit score scale (RIT score) for the reading component, along

with the standard error was utilized. "RIT assigns a value of difficulty to each test item

with an equal interval measurement, so the difference between scores is the same

regardless of whether a student is at the top, bottom, or middle of the scale."

(http://www.nwea.org/products-services/computer-based-adaptiveassessments/map,

2010). The selection of this particular assessment was purposeful in that it was already

in place in the school district. It dynamically adapted to individual students' responses as

they took the test, in order to determine students' learning levels, and it provided

actionable data for teachers. MAP provided initial and cumulative data to document

students' level of understanding around specific reading concepts within the same

academic school year. It effectively provided intermittent data of MLD and Non-MLD

students at two comparative points within the same academic year.

For both assessment intervals, RIT reference charts displayed topics and subtopics

the students mastered . It indicated which reading goals remained as opportunities for

growth. The reading assessment was divided into five subtopics: 1) Word Recognition

and Vocabulary; 2) Reading Comprehension-Literal; 3) Reading Comprehension-Inferential/Interpretive; 4) Reading Comprehension-Evaluation; and 5) Literary Response and Analysis. RIT normative data reference charts for reading and language usage, with further component descriptions are shown in Appendices G and H.

NWEA has conducted regular linking studies to determine the correspondence between Measures of Academic Progress (MAP) and California Standards Tests (CST). The most recent linkage study, conducted between MAP and the California Standards Test in English-Language Arts (CST-ELA) was conducted in 2007 (NWEA, 2007) The study identified the specific Rasch Unit (RIT) scale scores from MAP that corresponded to the various CST proficiency levels (Far Below Basic, Below Basic, Basic, Proficient, and Advanced) for each grade level in reading. Test records for more than 73,000 students were included in the study. A two-step process was utilized by first reporting the proportion of MAP-participating students performing at each of the CST-ELA proficiency levels. Percentage proportions were then used to determine equivalent cut scores on the MAP assessment for the sample of students within California that took both assessments (second order regression methods). The process, known as the Equipercentile Method, was repeated for all grade levels (Ryan & Brockman, 2009). "Accuracy of predicting proficient performance on the CST from spring NWEA assessments was above 83 percent for all grades and 82 percent for all grades when fall NWEA scores were used" (http://www.clrn.org/elar/details.cfm?section=description&elarid=61, 2010). The two data points calling for the collection of reading assessment data in this research (pre- and post) were within the limit of four trials within one year, as recommended by NWEA.

Language development data. Achievement data analysis for both groups of ELL students, with and without MLD, was stratified and analyzed by California English Language Development Test (CELDT) levels; Level 1-Beginner; Level 2-Early Intermediate; Level 3-Intermediate; Level 4-Early Advanced; Level 5-Advanced. (see Appendix C) A second analysis of the ELL student achievement data allowed for levels of student reading growth to be explored with students' English development levels. In the Pioneer School District, English language learners are assessed or re-assessed each year between July 1 and October 31 for three purposes: 1) To identify students who are limited English proficient; 2) to determine the level of English language proficiency of students who are limited English proficient; and 3) to assess the progress of limited English proficient students in acquiring the skills of listening, reading, speaking, and writing in English.

Within the reading domain, the CELDT test components included: (1) word analysis; (2) fluency and systematic vocabulary development; (3) reading comprehension; and (4) literary response and analysis. An overall performance level and scaled score were determined for all domains of the test combined and for each domain tested and then combined. The overall performance scale score equally weighted the domain scales at 25 percent for the respective domains of listening, speaking, reading, and writing (CELDT Assistance Packet, 2009). CELDT scores were used for initial identification, program/classroom placement, measurement of English language development growth, and as one of four criteria used to determine if English learner students were ready to be reclassified as Fluent English Proficient (RFEP). This study

mainly focused on the CELDT overall performance levels and scaled scores and the

CELDT reading domain performance levels and the corresponding scaled scores.

Technical evidence for the CELDT revealed that validity was tested in terms of

construct, content, criterion, and consequential validity. The evidence received a rating of

"meeting or exceeding technical quality expectations" in 27 of the 64 evidence/method

elements. The overall evidence validity rating by the Assessment & Accountability

Center at West Ed for CELDT met or exceeded expectations. However, the evidence of

reliability and freedom from bias and sensitivity did not meet expectations in the key

areas of *test-retest* and *alternate forms.* Additional descriptors and protocol were

determined necessary. Although this is a limitation of the CELDT assessment tool, the

CELDT will still be utilized as extant data for student comparative purposes

(http://www.aacompcenter.org/pdf/AACC_EL_CELDT.pdf , 2007).

Student Self-efficacy Instrument

Teachers administered student pre- and post- self-efficacy surveys with student

participants in MLD classrooms and Non-MLD classrooms. Specifically, the self-

efficacy tool allowed for the measurement of whether the 1:1 iPod touch classroom

learning climates had a measurable influence on students' self-perceptions of their

reading abilities. Past research has demonstrated that students with positive perceptions

about reading tend to lead to higher achievement in reading (Anderson, Fielding &

Wilson, 1988; Foertsch, 1992). Since reading achievement, student motivation, and

reducing the ELL reading achievement discrepancy were under study, a student reading

self-efficacy instrument aligned well with the MLD phenomenon to be studied. The

Reader Self-Perception Scale (RSPS) aptly measured student self-efficacy in reading

(Henk & Melnick, 1995). The foundational underpinnings of the RSPS came from

Bandura's perceived self-efficacy work (Bandura, 1977, 1982). The assessment had 33

items over four specific factors of reading self-efficacy as defined below.

Table 1. Reader Self-Perception Survey Factors

1. Progress (PR) -9 Questions	A student's perception of present reading performance compared with past performance
2. Observational Comparison (OC) -6 Questions	A student's perception of his/her reading performance compared with the performance of classmates
3. Social Feedback (SF) -9 Questions	A student's perception based upon direct or indirect input about reading from teachers, classmates, and family members
4. Physiological States (PS) –9 Questions	A student's perceived internal feelings that he/she experiences during reading

Note: Reader Self-Perception Survey (Henk & Melnick, 1995)

Henk and Melnick's survey tool highlighted the natural overlap between the

factors in the scale, and point to the socially situated nature of literacy learning

(Alvermann & Guthrie, 1993).   A 5-point scale rates students' self-esteem and

motivation in reading (5 = Strongly Agree, 1 = Strongly Disagree). The tool was

specifically designed for intermediate level children, aligning well with the range of ten-

to twelve-year old participants in this study. Instructions and the student surveys were

available in English and Spanish. The survey, unlike other self-efficacy tools, included

the specific reading elements of word recognition, word analysis, fluency, and

comprehension .

The RSPS was designed to take approximately 15 to 20 minutes to administer,

with the teacher providing some oral instructions and modeling via an example question

done with the entire class. Descriptive statistics were normed for each of the four factors

by grade level, with respective comparable means and low standard deviations across all three tested grade levels. Alpha reliabilities in a test of 1,479 intermediate-level students measured .81 and .84 with all items contributing to the overall scale reliability. "A factor analysis indicated the existence of each of the expected categories and, as hoped for, moderate yet significant relationships were indicated between RSPS scores (total and individual scale) and both the Elementary Reading Attitude Survey (McKenna & Kear, 1990) and a variety of standardized reading achievement measures" (Henk & Melnick, 1992, page 8). (see Appendix J)

Quasi-Experimental Data Collection Procedures

Quantitative data gathered in Phase 1 included student demographic data, student pre- and post-efficacy data, and two sets of reading student achievement data. The student demographic data was gathered to analyze for confounding variables and other possible relationships. The data included student I.D. number, gender, school, grade level, ethnicity, ELL status, socio-economic status, parental educational level, 2009-2010 English language level, 2010-2011 English language level, and MLD/Non-MLD classroom assignment.

Pre-post- student self-efficacy reading data was gathered from a total of 435 ELL students, 295 from ELL students in classrooms with MLD implementations and 140 from ELL students without 1:1 MLD Implementations, in Months 1 and 8-9 of the 2010-2011 school year. The researcher distributed the surveys to participating teachers. Teachers assisted with the distribution of parent permission forms, student assent forms, and Reader Interest Student Surveys (renamed from RSPS). Teachers returned student surveys to the Director of Technology and Media Services, who in turn forwarded the

data to the researcher using only student ID numbers and classroom designations. Student achievement data was gathered from the district's student database via the student I.D. numbers and the confidential assistance of the district's data program specialist.

Quasi-Experimental Data Analysis

From the pre-post self-efficacy survey data, the pre-post reading achievement data, and the ELL students' CELDT data, a variety of analyses were conducted. These included calculating means and standard deviations, conducting paired sample *t*-tests, correlation and multivariate correlation analyses, within and between analysis of variances, and crosstabs. The analysis tool Statistical Package for the Social Sciences (SPSS), Version 17, was utilized.

For the pre- post-self-efficacy surveys, the mean was calculated for each of the four RSPS factors/variables: (1) Progress; (2) Observational Comparison; (3) Social Feedback; and (4) Physiological States (see Appendix I). Descriptive statistics were calculated for each question item and efficacy factor. A similar process was done regarding student achievement data. Data was screened for possible outliers, linearity, and normality. An ANOVA was used to examine possible efficacy and achievement differences by literacy environments.

Violations of Assumptions and Outliers

Once pre- and post-reading self-efficacy surveys and pre- and post- NWEA reading achievement data were gathered, data sets were entered in SPSS. The student survey data were examined for violations of assumptions of the General Linear Model (GLM) and outliers prior conducting statistical analyses. Normality in terms of the

distribution of scores on the dependent variables was assessed for the MLD/ Non-MLD

pre-test data sets and the MLD/Non-MLD crosstabs data sets to assess the mean values

using the 5 percent Trimmed Mean feature. No strong influence on the mean was

detected in any data set. With these large data samples from 426 ELL students (287

MLD and 139 Non-MLD), skewness and kurtosis did not 'make a substantive difference

in the analysis' (Tabachnik & Fidell 2007, p.80).

Table 2. Summary of Quantitative Data

Research Question/ Participants	Collected Data	Analyses
Q.1 Reading achievement of matched ELL students **Participants**: 426 English language learners from 28 fourth- and fifth-grade classes: 1) 287 ELL using 1:1 MLD 2) 139 ELL without MLD	1) Student English language development pre- and post-levels (CELDT scores) 2) Pre- and post- student reading assessment data (NWEA MAP) 3) Student demographics- gender, socio-economic level, years in district, parents' educational level, years as an ELL.	1) Descriptive statistics 2) Inferential statistics 3) *t*-tests 4) Factor Analysis 5) Correlations 6) ANOVA-within-between
Q.2 Relationship between use of mobile learning devices and ELL students' reading self-efficacy levels **Participants**: 426 English language learners from 40 fourth- and fifth-grade classes: 1) 287 ELL using 1:1 MLD 2) 139 ELL without MLD	1) Pre- and Post-student Student Reader Interest Surveys 2) Student demographics- gender, socio-economic level, years in district, parents' educational level, years as an ELL.	1) Descriptive statistics 2) Inferential statistics 3) *t*-tests 4) Factor Analysis 5) Correlations 6) ANOVA-within-between

NOTE: ELL-English Language Learners; MLD-Mobile Learning Device; CELDT-California English Language Development Test; NWEA-MAP-North West Evaluation Association; MAP-Measures of Academic Progress; ANOVA-analysis of variance.

Phase II. Qualitative Data Collection

Within qualitative research, general propositions may be derived from analyses of data (Simons, 2009). In order to gather such data, English learners students in two fifth-grade classrooms with mobile learning devices were the foci of qualitative data collection. Focus group interviews were conducted to document English learner students' experiences with mobile learning devices via their own voices. Documented student-described similarities and distinctions within the two MLD classrooms were systematically recorded, coded, and analyzed. As common student themes arose, they were compared to previously researched characteristics attributed to learning with mobile learning devices, such as personalization, increased time on task, and increased engagement (Kulkulska-Hulme, 2006; Swan et al., 2005; Pintrich & DeGroot, 1990).

This research design was justified in two important ways. The first was the documented need to reform teaching and learning to more fully engage ELL students in their own learning. Nationally, education systems must be able to afford English learners rich meaningful ways to practice and master listening, speaking, reading, and writing in English, so that they may access subject area content and ultimately experience academic success. Equally important was the need to investigate technology-based learning systems, such as mobile learning devices, to ascertain whether or not they would increase the amount of engaging and empowering learning experiences in classrooms, and potentially be pivotal to improving student learning. This second premise represented a critical learning goal of the National Educational Technology Plan. (U.S. Department of Education, 2010). This plan called for a study such as this one "with the mission of

serving the public good through research and development at the intersection of learning sciences, technology, and education" (Pea & Lazowska, 2003, p. xiv).

Qualitative Study Participants

Two MLD classrooms were randomly selected out of the 18 participating MLD classrooms. English Language Learner students (ELL) from these two fifth-grade classrooms were purposefully invited to participate in small focus group interviews about their use of iPod touches. Thirty-three ELL students elected to participate and were divided into eight focus group interviews. Participants' parents granted permission, while students did so through a written student assent and a final verbal student assent at the time each interview was held.

The interviews were conducted at the end of Month 8and at the beginning of Month 9, over a three-week period of time. Fifteen ELL participants were from Classroom A, and 18 ELL participants were from Classroom B. ELL focus groups ranged in size from 3 to 6 students. Classroom A participant ethnicities were 77 percent Hispanic, 11 percent Asian, and 11 percent Egyptian (n = 14, 2, and 2 respectively). All ELL students in Classroom B were of Hispanic origin. Interestingly, a large majority of the ELL students had been in the Pioneer school system for at least three years, and more than half of the students had been in the system since kindergarten. However, of the 33 participants, however, just 12 percent (4) had been in the same school from kindergarten through fifth grade, and just 18 percent (6) had attended preschool.

Interview Protocol

The interview process began with a single ELL student selecting 2-5 ELL classmates from a provided list to join him/her and the researcher for the group interview.

Interviews were held in an unused classroom within each school. Interviews were of approximately 1-hour duration. In a round-table discussion, a protocol of nineteen questions were used to guide the conversation (see Appendix K).

By design, and as pre-tested with pilot interviews, the interview questions explored reading achievement, self-efficacy in reading, and the benefits and limitations of mobile learning device utilization. The reading achievement topic was accessed via questions 1 through 8 (excluding 5b), along with 10, 11a, 11b and 20. Self-efficacy was measured via questions 1-3, 5-8, and 10-20. Benefits of MLD utilization were elicited via questions 1, 4, 5b, 6-8, 10, 11b, 12-20, while limitations of MLD utilization were elicited in questions 1, 4, 5b-8, 10, and 11b. The eight focus group interviews provided data for triangulation with the achievement data and the reading self-efficacy survey responses, and enabled more complete answers to the research questions. Each interview was audio-recorded, transcribed, and uploaded as .txt files into the qualitative software program HyperRESEARCH.

Initial coding produced 63 codes with 2,829 individual citations. The 63 codes were analyzed and synthesized, eventually leading to 5 major themes. Themes included: (1) the blended MLD learning environment; (2) reading achievement; (3) learning English; (3) self-efficacy constructs; (4) benefits of iPod touches; and (5) limitations of iPod touch utilization. Major themes under mobile learning device benefits included personalization, engagement, self-regulation, two-way communication, and overcoming limitations.

Due to the researcher's position as a central office administrator in the school district, access to students' English language development levels for this purpose was

possible. The two separate classroom cases provided qualitative data for comparison purposes that could be of value to future technology studies, in order to more fully understand how a technology-enhanced classroom might/might not the unique needs of English learners.

Instrumentation/Data Collection Procedures

English language learner student interviews served to ascertain student interpretations as to the benefits and limitations of using MLD with their daily literacy learning. The structured interview protocol was previously piloted in the spring of 2010 with ELL students who utilized mobile learning devices in a fifth grade classroom for eight months (Appendices K1, K2). The interview protocol's design largely mirrored the appreciative inquiry model in order to elicit affirmative information from the English language learner students about their English literacy experiences (Cooperrider & Barrett, 2001). In a Bosch article (1998), Exit Interviews With An "Appreciative Eye," the author identified how qualitative factors about an organization, such as being "the best," unique organization characteristics, shared commitment, people and teamwork can be elicited with an appreciative inquiry protocol. This method also served to protect ELL students from possible negative or deficit feelings about themselves as an English language learner by focusing on their strengths and accomplishments.

Table 3. Summary of Qualitative Data

Research Question/ Participants	Collected Data	Analyses
Q.3 ELL student identified reading benefits and limitations with 1:1 Mobile Learning Devices **Participants**: Focus groups of 40 ELL students from two MLD classrooms	1) Taped interviews from 8-10 ELL student group interviews (16-question Appreciative Interview Protocol 2) Researcher's notes from 8-10 group interviews	1) Interview transcription, coding, theme identification 2) Triangulation with themes from MLD and ELL literature reviews 3) Triangulation with Quantitative data

NOTE: ELL-English Language Learner; MLD-Mobile Learning Device

The quality level of research was largely dependent upon the quality of evidence collected - strengths and accomplishments. (See Table 3 above). The 19 question interview protocol specifically was keyed to the three research questions and included open-ended questions to allow for additional unanticipated student response information related to the research questions. A collection of multiple student perspectives created a database of evidence and allowed for an investigation of how the data was interrelated (Yin, 2003). The ultimate triangulation of data allowed for verification of sources, themes, and coding. HyperRESEARCH software was used to help ensure the validity of the data.

Significant ethical protections were taken for this study, particularly due to the ages of the participant student population (10-12 years of age). Along with a UCSD Institutional Review Board approval, approvals were obtained from the district's school board of education, participating teachers, parents of participating students, and for the two embedded case studies, student assent were solicited. Informed consents explained the purpose of the study, the procedures of the study, the voluntary nature of the study, its

complete anonymity, and the risks and benefits associated with the project. (Appendices M, N, P). UCSD's required additional   approval for student interview audiotaping was collected from parents of all student interviewees (Appendix O).

This study further protected all stakeholders' privacy by using pseudonyms and/or numeric codes for the school district, schools, teachers, and students during data gathering and analysis. For the entirety of the study, audio-recorded interviews, researcher notes, electronic student data, and the SPSS and HyperRESEARCH software was stored on the researcher's password-protected laptop and office computer, kept in a locked office. A back-up flash drive of coded data was stored in a locked file cabinet and will be stored for a minimum of five years.

As a qualitative researcher, it was important that I recognize my personal biases and limit them to the extent possible. In order to minimize the influence of my positionality on research outcomes, student self-efficacy surveys were voluntarily distributed by teachers and voluntarily completed by students. To further separate a teacher's participation decision from my positional power, surveys packets were returned (completed or not) to the district technology department.

The semi-structured ELL group interviews occurred in student-selected groups of four to six, from the same classroom. With this design, students were likely to be comfortable speaking amidst their peers and with the researchers as relative outsiders. The structured focus group interviews were held in available empty classrooms, providing an alternate known and comfortable setting. All data collection protocols and instructions reinforced confidentiality for the participants at each data collection point, This was communicated verbally and in writing in English and Spanish. In the two 1:1

MLD classrooms, the teachers followed an additional protocol to explain the on-going nature of the study, collected written permission from students' parents, and student's written assent to participate**.**

I personally conducted seven of the eight semi-structured student focus group interviews using the previously piloted interview protocol based on appreciative inquiry (see Appendix K, L). One interview was led by a fellow bilingual researcher for comparison purposes and to assess early on in the research process whether or not my positionality would overtly influence student responses. Upon directly comparing two interviews done at the beginning of the process, the data collected from an interview conducted by a bilingual researcher outside of the district did not prove to be qualitatively different than the focus group data collected by myself, the primary investigator, who was internal to the district and from the central office. Interview factors such as the length of the interview, and student-generated responses for MLD benefits and limitations were found to be very similar during the comparative process.   I did not believe my positionality as a central office administrator was a factor with students. Few students actually understood my role within the district. Outside of several walk-through classroom visitations per year, students did not have a pre-existing relationship with me prior to the research study.

Qualitative Data Analysis

The student interview data was triangulated in order to examine multiple sources of qualitative data and to tell allow students to their own story about their literacy development with the use of mobile learning devices. (Yin, 2003). Some a priori codes, established from both MLD and ELL research literature served as starting points for data

categorization. These include personalization, self-reflection, meaning making, reading progress monitoring, and awareness of ELL learning issues, and perceived MLD benefits and limitations.   Data was transcribed, translated into English if needed, independently read, re-read, sorted and coded. The process of analyzing the MLD teaching and learning elements was generative and drew on the researcher's theory of action: through a social cognitive framework, mobile learning devices may impact ELL students' motivation to learn literacy skills and improve reading in English. Common and uncommon emerging themes were identified between and among the student data sources. Meaning was constructed using a constant comparative analysis approach (Glaser, 1978; Swan et al., 2005).

Data checking was used between the quantitative and qualitative resources in order to strengthen internal validity. The student focus group interviews, near the end of the study, assisted the researcher with the clarification of interpretations/inferences. Additional probing questions were utilized in particular when student-gathered information was inconsistent with gathered quantitative data. All interviews were transcribed in the exact language of the ELL students. The resultant transcript data was examined for emergent patterns where trends were identified, coded, and linked to representative quotes.

Researcher Positionality

As the primary researcher of this MLD research study, my position as a central office administrator in the elementary school system in which data was gathered also has some broader considerations. It is true that I am a proponent of the integration of technology tools into elementary classrooms. I believe all students learning and

eventually working the 21st century need a vital set of global citizenry skills that include how to optimally utilize technology to access information, apply and analyze information, and effectively communicate information. As a top administrator of the school system, it is also true that I have a vested interest in quality teaching and the creation of rich learning environments in order to maximize student learning opportunities and achievement. As the primary researcher I sought to understand the relationship between these two vested interests and explore how individual mobile learning devices in elementary classrooms impacted learning environments, student achievement, and students' ability to apply technology.

It was salient to my dual role of researcher/educational leader that the student subgroup of English language learners be included in this study as a special focus. The astoundingly low national rate of Hispanic students graduating from high school at 53 percent compared to all American students graduating at an 81 percent, made further stratification and study around this subgroup a moral imperative. As an educational leader, my bias here was to explore a teaching and learning tool, with a multimedia platform which could potentially accelerate learning for ELL students.

Advantages to my researcher position included access to a great deal of the educational system in which the study was conducted: student data, teacher data, professional development data, and classroom data. This study accessed a combination of relevant data, collected in order to address both quantitative and qualitative questions of how a 1:1 implementation of mobile learning devices may impact student engagement and learning. In terms of the use of technology within the district, my positionality included a historical perspective, a financial perspective, a political perspective, and a

pre-research study educational perspective. Advantages to my researcher/practitioner role included long-standing relationships with teachers, support staff, internal technology professional developers, and school site leaders as a factor of my tenure in the district.

While my leadership role within the district provided research access, it also had some important disadvantages. As a central office administrator, my power, authority, and ability to influence others had to be acknowledged and mitigated. The specific data collection design for this study controlled for these factors, in that student surveys were distributed and collected by the classroom teachers and student reflections were gathered within focus groups. My only direct involvement in data gathering was with the student focus group interviews. The open-ended structural features of the taped student interviews precluded me from unduly influencing student responses. These students were also the least knowledgeable of my position, or of how my position might correlate to their experience with mobile learning devices.

Limitations of the Study

This study had several limiting factors that require consideration when making conclusions about the results:

1. This study was limited to a singular K-8 school district in Southern California, with a singular technology device implementation program at third, fourth and fifth grade levels.

2. This study explored and described the impacts of 1:1 MLDs on a limited sample of elementary-aged ELL students (n=426 for the quantitative, n=33 for the qualitative) in the elementary grades. Although the limited sample of 33 students

posed a threat to the study's validity, the triangulation of the data sources of

surveys, achievement data and focused group interviews strengthened validity.

3. This study did not control for the impact that individual teachers had on the

teaching and learning process and ultimately upon student achievement.

4. This study did account for differences that may exist in school level leadership

or in teacher leadership at the different sites in terms of the use of 1:1 technology

for learning.

5. Although the study had a degree of control in terms of teachers using required

district core instructional materials and systemic supports, the study did not

account for a variety of available supplemental resources for both the 1:1 MLD

classrooms and the Non-MLD classrooms.

6. The study's mobile learning device was the Apple iPod touch. Any

correlations, quantitative data, or qualitative data gathered were specifically

related to this device and its features and capabilities. Results are able to be

generalized to other MLDs, to the implementation of iPod touches in a different

environmental setting, or with a different set of variables.

Chapter 4

Analysis of the Quantitative Data

A variety of statistical analyses were conducted to analyze the quantitative data in order to answer research questions one and two. The statistical analyses included: descriptive statistics, factor analysis, paired t-tests, mixed between-within ANOVA, correlations, and cross tabulation. The analytical procedures were conducted using the Statistical Package for the Social Sciences (SPSS) software, version 17.0 for Windows. This range of statistical models allowed the researcher to analyze the data in depth and to control for variations of variables.

Findings from Quantitative Data Analysis

A factor analysis procedure was conducted on the pre- and post- reading self-efficacy data sets to explore possible interrelationships among the 33-items in the Reading Self-Perception Survey (RSPS) and the four self-efficacy categories as identified by the originators of the survey; Progress, Observational Comparison, Social Feedback, and Physiological States (Henk & Melnick, 1992). The data revealed 8 coefficients of .3 and above. The Kaiser-Meyer-Olkin value was .91, which supported the recommended value of .6 or above. Regarding the Bartlett's Test of Sphericity, it was statistically significant at .000 demonstrating $p<.05$. Principal component analysis showed the presence of 6components with eigenvalues greater than 1, explaining 8% of the variance. Examination of both the pre-test and post-test screeplots showed a clear break after the fourth component. This factor analysis indicated the existence of each of the 4 expected self-efficacy categories, as defined by the originators of the survey.

Histograms and box plots were generated to review each variable's distribution of scores. The continuous variables examined included: fall and spring NWEA reading subtest achievement scores, fall and spring NWEA language usage subtest achievement scores, pre- and post-total reading self-efficacy survey scores, and pre- and post-reading self-efficacy scores by each reading self-efficacy construct; Progress, Observational Comparison, Social Feedback, and Physiological States. Outliers from the individual variables were examined. If a case was identified as an outlier in two or more of the data sets, the case was eliminated from the study. Nine cases from the original 435 student case sample were eliminated from further analyses.

The parametric techniques of: (a) the within- and between- analysis of variance formula, (b) the correlation method, and (c) effect size were used to analyze the data. The ANOVA method was used to examine differences between groups on key outcome variables of interest based on the research questions. Lastly, the non-parametric chi-square test for independence (Crosstabs) was applied to the teacher-quality paired sets of data. This afforded analysis for possible associations between the independent variables of reading achievement and self-efficacy in reading to the categorical variables of teacher quality and literacy environment.

Achievement Findings from Reading Subtest

Do mobile learning devices have a significant effect on the reading achievement of the experimental group of fourth- and fifth-grade ELL students utilizing MLD compared to the control group of fourth- and fifth-grade ELL students who did not access MLD for literacy activities? A mixed between-within subjects analysis of variance was conducted to determine if any significant achievement difference existed between the two

literacy environments (MLD/Non-MLD) by the NWEA Measures of Academic Progress' reading subtest. This procedure was conducted by using the pre-test scores of the reading subtest as a covariate.

Assumptions of homogeneity of variances were met with Levene's Test of Equality of Error variances being > .05 (.46, .14) and the Box's Test of Covariance Matrices >.001 (.22). There was no significant interaction between MLD and Non-MLD literacy environments and reading sub-test achievement over time, Wilks Lambda = .99, F (1,412), p = .55, partial eta squared = .00. There was a small-moderate main effect for reading sub-test achievement over time, Wilks Lambda = .69, F (1,412), p < .0005, partial eta squared = .31, with both groups showing a small-moderate increase in achievement on the reading subtest as seen in Table 4 below.

Table 4. Between-Within Analysis of Variance (ANOVA) of ELL Students' NWEA-MAP Reading Sub-test Scores Across Two Time Periods and Two Literacy Environments

	MLD Literacy Environment			**Non-MLD Literacy Environment**		
Time Period	Number of Participants	Mean	Standard Deviation	Number of Participants	Mean	Standard Deviation
Reading Pre-test	279	193.80	13.93	135	193.99	13.63
Reading Posttest	279	200.67	14.17	135	200.27	13.33

Note: MLD-Mobile Learning Device; Non-MLD-Non-mobile learning Device

The main effect comparison between the two types of literacy environments was not significant, F (1,412), p = .94, partial eta squared =.000, suggesting no difference in the effectiveness of the two literacy environments in reading sub-test student achievement.

Achievement Findings from Language Usage Subtest

Do mobile learning devices have a significant effect on the second reading achievement sub-test component, known as language usage, for the experimental group of fourth- and fifth-grade ELL students compared to the control group of fourth- and fifth-grade ELL students who did not access mobile learning devices for literacy activities? A mixed between-within subjects analysis of variance was conducted to assess the impact of two different literacy environments (MLD/Non-MLD) on ELL participants' language usage achievement on the NWEA Measure of Academic Progress, across the two time periods (Month 1, Month 8).

Assumptions of homogeneity of variances were met with Levene's Test of Equality of Error variances being > .05 (.76, .38) and the Box's Test of Covariance Matrices >.001 (.39). There was no significant interaction between MLD and Non-MLD literacy environments and language usage sub-test achievement over time, Wilks Lambda = 1.00, F (1,408), p = .80, partial eta squared = .000. There was a small-moderate main effect among the time periods, Wilks Lambda = .69, $F(1,408)$, $p < .0005$, partial eta squared = .31, with both groups showing a small-moderate increase in achievement on the language usage subtest in Table 5.

Table 5. Between-Within Analysis of Variance (ANOVA) of NWEA-MAP Language Usage Sub-test Scores over Two Time Periods and Two Literacy Environments

	MLD Literacy Environment			Non-MLD Literacy Environment		
Time Period	Number of Participants	Mean	Standard Deviation	Number of Participants	Mean	Standard Deviation
Language Pre-test	275	196.41	14.07	135	195.33	15.05
Language Posttest	275	202.70	13.16	135	201.39	12.64

Note: MLD-Mobile Learning Device; Non-MLD-Non-Mobile Learning Device

The main between effect comparing the MLD/Non-MLD types of literacy environments was not significant, F (1,408), $p = .38$, partial eta squared $=.002$, suggesting no difference in the effectiveness of the MLD and Non-MLD literacy environments in student language usage sub-test achievement.

Findings from Reading Self-Efficacy Surveys

The second research question asked: Do mobile learning devices have a significant effect on an English language learner's self-perception of reading ability for the experimental group of fourth- and fifth-grade ELL students with MLD as compared to the control group of fourth- and fifth-grade ELL students who did not access mobile learning devices for literacy activities? A student's self-perception of his reading ability, also termed as self-efficacy, was measured by the Reader Self-Perception Scale (RSPS). The conducted analyses between MLD/Non-MLD groups included: (1) an analysis of variance conducted with total survey response rates; and (2) four further analyses of variance conducted with the raw score responses for each self-efficacy factor (Progress, Observational Comparison, Social Feedback and Physiological States).

Findings for total reader self-perception scale. A mixed between-within subjects analysis of variance was conducted to assess the impact of the two literacy environments (MLD/Non-MLD) on ELL participants' scores on the Reading Self Perception Scale (RSPS), across two time periods (Months 1, 8).

Assumptions of homogeneity of variances were met with Levene's Test of Equality of Error variances being $> .05$ (.54, .59) and the Box's Test of Covariance Matrices $>.001$ (.03). There was a significant interaction effect between literacy environment type and time, Wilks Lambda $= .99$, F (1, 424) $= 5.58$, $p = .02$ (p was $< .05$),

partial eta squared = .01. Thus, although English learners in the non-mobile learning device environment had higher self-efficacy levels than their counterparts in the mobile learning device group at baseline (pre-test), this changed with the mobile learning device students gaining greater self-efficacy over time (posttest), beyond what would normally have been expected. Table 6 below demonstrates these results.

Table 6. Between-Within Analysis of Variance (ANOVA) of ELL Students' Reading Self-Perception Scale Scores Across Two Time Periods and Two Literacy Environments

	MLD Literacy Environment			**Non-MLD Literacy Environment**		
Time Period	Participants	RSPS Mean	Std. Dev.	Participants	RSPS Mean	Std. Dev.
Month 1 Pre-test	287	120.28	17.67	139	120.46	16.68
Month 8 Posttest	287	125.29	17.19	139	121.87	16.75

Note: MLD-Mobile Learning Device; Non-MLD-Non-mobile Learning Device; RSPS-Reader Self-Perception Survey

Because of the noted significant interaction effect, caution was taken in interpreting a main effect. The profile plots of the experimental and control groups supported a significant interaction effect. It suggested that, indeed, the literacy environment variable did impact total reading self-perception scores.

Additional analysis was needed to further investigate the affective influences on English language learners' reading achievement in literacy environments with and without mobile learning devices. As previously noted, the Reader's Self-Perception Survey (RSPS) was designed to mirror the four basic factors of a self-efficacy model: Performance, Observational Comparison, Social Feedback, and Physiological States (Bandura, 1977, 1982; Schunk, 1984). The RSPS creators adapted Bandura's performance factor to a more narrow scope, which they termed "progress." Henk and

Melnick defined progress as, "how one's perception of present reading performance

compares with past reading performance" (Henk & Melnick, 1995, p 472). Given that the

self-efficacy factors were interconnected and socially situated, it was important to

analyze how the factors collectively and individually were affected by the daily

utilization or non-utilization of mobile learning devices. The total collective RSPS survey

results above indicated a significant interaction effect on student overall self-efficacy

levels and the use of MLD. An analysis of the individual dimensions of self-efficacy

follows.

What are the impacts of the literacy environments on the four self-efficacy factors

of Progress, Observational Comparison, Social Feedback, and Physiological States?

Table 7 indicates the mean scores and standard deviations for each self-efficacy factor

across experimental and control group environments.

Table 7. Descriptive Statistics of Self-efficacy Factor Scales and Two Literacy Environments

Self-Efficacy Factors		Progress		Observational Comparison		Social Feedback		Physiological States	
	n	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Pre MLD	287	36.4	6.0	19.1	5.1	28.4	4.7	32.5	5.8
Post MLD	287	38.1	5.5	20.1	4.9	32.2	5.3	31.0	7.0
Pre NMLD	139	37.2	5.6	19.1	4.3	28.4	5.0	32.0	6.0
Post NMLD	139	37.1	5.6	19.1	4.6	32.2	5.5	29.7	7.1

Note: Pre-Pre-test; Post-Posttest; MLD-Mobile Learning Device; Non-MLD-Non-mobile Learning Device; n-Number of participants; SD-Standard Deviation

English language learner students reported the highest relative reader perceptions

on the Progress factor in both literacy environments, at Month 1 and Month 8. The

Social Feedback factor was next highest rated, followed by Physiological States, and

finally Observational Comparison, with the lowest response rate. It is noteworthy that for

ELL learning in Non-MLD literacy environments demonstrated an actual reduction over time for three of the four self-efficacy factors; Progress, Observational Comparison and Physiological States. Contrastingly, for participants using MLD, self-efficacy factor rates increased over time for Progress, Observational Comparison, and Social Feedback. The Physiological States factor of self-efficacy declined for both the experimental and control groups over time (-1.5, -1.3 respectively). The data also showed the neutral and unchanging role Social Feedback played, as a self-efficacy factor, for both MLD and Non-MLD participant groups at Month 1 (28.4) and also at Month 8 (32.2).

Findings for progress factor of self-efficacy survey. A mixed between-within subjects analysis of variance was conducted to assess the impact of the two literacy environments (MLD/Non-MLD) on ELL participants' scores on the Progress factor of the Reading Self Perception Scale (RSPS), across two time periods (Month 1, Month 8). Assumptions of homogeneity of variances were met with Levene's Test of Equality of Error variances being insignificant and $p > .05$ (.27, .36), and the Box's Test of Covariance Matrices assumptions were met with $p > .001$ (.514).

A statistically significant interaction effect existed in English learners' Progress Factor scores over time for the two different literacy environments (MLD/Non-MLD), Wilks Lambda = .98, $F (1,424) = 7.36$, $p = .007$, partial eta squared = .017 (p was $< .05$). English language learners who had access to an MLD showed higher Progress factor self-efficacy gains than their Non-MLD counterparts, and the MLD environment demonstrated a significant 'boost' to student's efficacy regarding their reading progress beyond what would have been normally expected (+1.7). Contrastingly, the control Non-

MLD group's Progress factor remained relatively the same, with a pre-post differential of -0.1.

Findings for observational comparison factor of self-efficacy survey. A mixed between-within subjects analysis of variance was attempted to assess the impact of the two literacy environments (MLD/Non-MLD) on ELL participants' scores on the Observational Comparison factor of the Reading Self Perception Scale (RSPS), across two time periods (Month 1, Month 8). Assumptions of homogeneity of variances were not met with Levene's Test of Equality of Error variances (.04, .38). Since the homogeneity of variance was violated at .04 for the Month 1 Observational Comparison data, the between-within ANOVA analyses were not completed.

Findings for social feedback factor of self-efficacy survey. A mixed between-within subjects analysis of variance was conducted to assess the impact of the two literacy environments (MLD/Non-MLD) on ELL participants' scores on the social feedback factor of the Reading Self Perception Scale (RSPS), across two time periods (Month 1, Month 8). Assumptions of homogeneity of variances were met with Levene's Test of Equality of Error variances being insignificant (.29, .36), the Box's Test of Covariance Matrices >.001, and did not violated assumptions (.654).

There was no significant interaction effect between literacy environments and the pre- and posttest self-efficacy factor of Social Feedback, Wilks Lambda = 1.00, F (1, 424) = .09, p =.77, partial eta squared = .000 ($p > .05$). There was a substantial main effect for the Social Feedback factor over time, Wilks Lambda = .09, F (1,424) = 4297.30, p = .000 ($p < .0005$), partial eta squared = .91 with a very large effect size. The

between effect analyses comparing the MLD/Non-MLD literacy environment types did not reach statistical significance, F (1,424) = .01, p =.94, partial eta squared = .000.

Findings for physiological states factor of self-efficacy survey. A mixed between-within subjects analysis of variance was conducted to assess the impact of the two literacy environments (MLD/Non-MLD) on ELL participants' scores on the physiological states factor of the Reading Self Perception Scale (RSPS), across two time periods (Month 1, Month 8). Assumptions of homogeneity of variances were met with Levene's Test of Equality of Error variances being > .05 and not significant (.63, .50), and the Box's Test of Covariance Matrices >.001, not violating assumptions (.137).

There was no significant interaction effect between literacy environments and pre- and posttest self-efficacy factor of physiological states, Wilks Lambda = 1.00, F (1,424) = 1.42, p =.23, partial eta squared = .003. There was a statistically significant effect in the pre- and post- physiological states of self-efficacy over time, Wilks Lambda = .935, F (1,424) = 29.33, p =.000, partial eta squared = .07. This was a moderate effect size. The main between effect comparing the MLD/Non-MLD literacy environment types did not reach significance, F (1,424) = 2.120, p =.15, Partial Eta Squared = .005.

Table 8 below provides a summary of results related to research question two and participant self-efficacy variances between a literacy environment with the daily use of mobile learning devices and a comparable environment without the individual technology. (See Table 8.)

Table 8. Analysis of Variance Results (ANOVA) between Two Literacy Environments within Two Time Periods

Self-Efficacy Factors	Interaction Effect	Main Effect	Main Effect Size	Between Effect
Progress	Significant $p = .01$*	N/A	N/A	Not Significant $p = .82$
Observational Comparison	Not Significant $p = .06$	Not Significant $p = .06$	N/A	Not Significant $p = .24$
Social Feedback	Not Significant $p = .77$	Significant $p = .000$*	Very Large partial eta^2 =.91	Not Significant $p = .94$
Physiological States	Not Significant $p =.23$	Significant $p =.000$*	Moderate partial eta^2 =.07	Not Significant $p = .15$

NOTE: * indicates significant effect level is < .05.

Findings for Correlations Analysis

Three correlation studies were conducted between the dependent variables, achievement on the reading subtest, the language usage subtest, and scores on the reading self-efficacy survey. The first additional research question asked: What is the relationship between the reading sub-test measure of reading achievement and ELL participants' self-efficacy in reading with the experimental MLD group as compared to Non-MLD control group? This question investigated the pre- and posttest scores in the reading sub-test achievement and in reader self-perception, separated by group, to determine any correlation between gains in reading and reader perception.

The relationship between reading achievement (as measured by the NWEA-MAP Reading sub-test) and perceived self-efficacy (as measured by the Reader Self-Perception Scale) was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no assumptions of normality, linearity, and homoscedasticity. There was a small to medium correlation between the reading achievement variable and the self-efficacy variables. Results yielded from the Pearson correlations conducted on pre- and posttest reading sub-test data are displayed in Table 9.

Table 9. Pearson Inter-correlations amongst Pre-Posttest Scores on NWEA-MAP Reading Sub-test, Total Self-Efficacy Survey, Progress, Observational Comparison, Social Feedback and Physiological States by Group

Variable: Reading Sub-test	MLD Pretest $n = 282$	MLD Posttest $n = 282$	Correlation Differential *(r)*	NMLD Pretest $n = 136$	NMLD Posttest $n = 138$	Correlation Differential *(r)*
Total RSPS Survey	.26*	.34**	+.08	.24**	.24**	.00
Progress	.29**	.41**	+.12	.37**	.41**	+.04
Observational Comparison	.21**	.34**	+.13	.24**	.24*	.00
Social Feedback	.19**	.07	-.12	.10	.20*	+.10
Physiological States	.12*	.18	+.06	.05	.11	+.06

Note: * indicates correlation is significant at the .05 level; ** indicates significance at the .01 level; MLD-Mobile Learning Device; NMLD-Non-mobile Learning Device

For all self-efficacy variables (Total Survey, Progress, Observational Comparison, Social Feedback, and Physiological States), analyses showed positive correlations with the reading sub-test for both the experimental and the control groups, at both time periods. The largest measureable shift in correlation strength between the two groups was with the Social Feedback factor. Here the MLD group's correlation weakened by .12, while the Non-MLD group's correlation factor strengthened by .10.

For the experimental group (MLD), a small-strength correlation existed and increased to medium strength for three of the five correlation variables from the pre- to the post-survey (Total Survey, Progress, and Observational Comparison). Although there was a .06 increase in correlational strength for Observational Comparison over time, the posttest correlation strength of .18 remained small. The experimental group's exception to the increasing correlational trends over time was the Social Feedback factor, which

weakened to a statistically small degree (-.12) resulting in a near non-existent correlation of .07.

In contrast, the strength range of the control group's self-efficacy to reading sub-test correlations were small for Physiological States, Social Feedback, Observational Comparison, and Total Survey over both time periods, and of medium strength correlation for the Progress factor (r = .33, r = .41). The control group's variable correlations to reading achievement over time demonstrated no change for the Total Survey and Observational Comparison factors, and insignificantly small positive change for the Progress, Social Feedback and Physiological States factors.

A second further research question asked: Is there a correlation between the sub-test measure of language usage achievement and reader self-efficacy of the ELL participants in the MLD/Non-MLD literacy environments over the two time periods, Month 1 and Month 8? This question investigated the pre- and posttest scores in the language usage achievement sub-test and in reader self-perception, separated by group, to determine any correlation between gains in language usage and reader self-perception.

The relationship between language usage achievement (as measured by the NWEA-MAP language usage sub-test) and perceived self-efficacy (as measured by the Reader Self-Perception Scale) was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no assumptions of normality, linearity, and homoscedasticity.

There was a small to medium correlation between the language usage variable and the self-efficacy variables for both groups. From a Total Survey analysis, a medium strength correlation was evidenced for students using MLDs on language usage

achievement and an equal size impact for students not using MLDs (.33). As with the

reading sub-test correlation analyses, the self-efficacy Progress factor had the strongest

correlation coefficient for language usage (MLD $r = .38$, Non-MLD $r = .41$). Results

yielded from the Pearson correlations conducted on pre- and posttest language usage sub-

test data are exhibited below in Table 10.

Table 10. Pearson Inter-Correlations amongst Pre-Posttest Scores on NWEA-MAP Language Usage Sub-test, Total Self-Efficacy Survey, Progress, Observational Comparison, Social Feedback and Physiological States by Group

Variable: Language Usage Test	MLD Pretest $n = 282$	MLD Posttest $n = 282$	Correlation Differential *(r)*	NMLD Pretest $n = 136$	NMLD Posttest $n = 138$	Correlation Differential *(r)*
Total RSPS Survey	.21**	.33**	+.12	.29**	.33**	+.04
Progress	.26**	.38**	+.12	.37**	.41**	+.04
Observational Comparison	.17**	.31**	+.14	.27**	.24**	-.03
Social Feedback	.16**	.13*	-.03	.14	.20*	+.06
Physiological States	.07	.15*	+.08	.12	.11	-.01

Note: * indicates correlation is significant at the .05 level; ** indicates significance at the .01 level; MLD-Mobile Learning Device; NMLD-Non-mobile Learning Device

For the MLD experimental group, the weakest strength correlations were

associated with the Social Feedback and Physiological States factors. This was true for

both time periods, with insignificant correlational change (-.03, +.08). Medium size

correlations, with small size correlation growth over time, were in evidence for 3 of the

self-efficacy factors. These included $r = .38$ for Progress, with a correlation growth of

+.12, $r = .33$ for Total Survey, with growth of +.12, and $r = .31$ for Observational

Comparison, with growth of +.14.

In contrast, the Non-MLD control group's correlation changes over time were quite small, with the highest correlational growth evidenced with Social Feedback at +.06 and the smallest evidenced by Observational Comparison at -.03. The weakest correlations the control group between language usage and the self-efficacy variables were for Physiological States, Social Feedback, and Observational Comparison (r = .11, r = .20, r = .24).

The third correlational research question asked: What is the correlation between the two measures of reading achievement within the experimental MLD group as compared to the ELL participants in the Non-MLD control group? This question investigated the pre- and posttest scores in achievement on the reading sub-test and in achievement on the language usage sub-test, separated by group, to determine any relationship between the two variables over time.

The relationship between reading achievement (as measured by the NWEA-MAP Reading sub-test) and perceived self-efficacy (as measured by the NWEA-MAP Language Usage) was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no assumptions of normality, linearity, and homoscedasticity. The correlation coefficients were very strong and positive between reading achievement variables for both groups over the two time periods. There was a strong, positive correlation between the two variable with each group, which strengthened very slightly over time (r = +.01) for students using mobile learning devices and weakened slightly over time (r = -.03) for students without the devices. For both participant groups there was a strong correlational relationship between the two sub-tests of the NWEA-MAP achievement test, which increased very

slightly over time. Results yielded from the Pearson correlations conducted on pre- and

posttest reading and language usage sub-test data are seen in Table 11.

Table 11. Inter-Correlations amongst Pre-Posttest Scores on NWEA-MAP Reading Sub-test and Language Usage Sub-test Responses by Group

ELL Student Groups

Reading Sub-test & Language Usage Sub-test	MLD Pretest (*n* = 282)	MLD Posttest (*n* = 282)	NMLD Pretest (*n* = 136)	NMLD Posttest (*n* = 138)
	.83**	.84**	.84**	.86**

Note: ** indicates significance at the .01 level

Additional Investigations with Non-parametric Analyses

Findings of student self-efficacy by teacher quality pairs. To further

investigate research question two, "In what ways do MLD impact ELL's reading self-

efficacy when compared to ELL's reading self- efficacy not utilizing MLD?,"

experimental and control group teachers were paired by similar average aggregate

California Standards Test-English language arts student test results (2010). These non-

parametric analyses were conducted to control for teacher quality impact on the

experimental and control literacy environments. Teachers with comparable histories of

producing similar aggregate student achievement results, in demographically similar

schools were paired with one another.

Once classrooms were paired, ELL student self-efficacy level data were

disaggregated by categorical variables of literacy environment (MLD/Non-MLD) and

levels of pre- and post- self-efficacy scores. Student self-efficacy scores were interpreted

and categorized as "low" with a RSPS raw score of 32-102, "average" with a raw score

of 103-141, and "high" with raw scores of 142-160 (Henk and Melnick). Table 12

provides comparative pre-treatment survey and post-treatment survey results by teacher

quality pairs.

Table 12. Cross Tabulation Analysis of Student Self-Efficacy Levels and Teacher Quality Pairs

Teacher Quality Pairs

Variable:	MLD	Teachers		NMLD	Teachers	
Self-Efficacy Levels	Pre-Survey	Post-Survey	**Diff.**	Pre-Survey	Post-Survey	**Diff.**
Pair 1 (*n* =27)						
Low	8.3%	0.0%	**-8.3%**	6.7%	6.7%	**0.0%**
Average	83.3%	66.7%	**-16.6%**	80.0%	80.0%	**0.0%**
High	8.3%	33.3%	**+25.0%**	13.3%	13.3%	**0.0%**
Pair 2 (*n*=39)						
Low	20.0%	10.0%	**-10.0%**	26.3%	21.1%	**-5.2%**
Average	80.0%	85.0%	**+5.0%**	68.4%	68.4%	**0.0%**
High	0.0%	5.0%	**+5.0%**	5.3%	10.5%	**+5.2%**
Pair 3 (*n* =36)						
Low	0.0%	0.0%	**0.0%**	16.7%	11.1%	**-5.6%**
Average	94.4%	94.4%	**0.0%**	77.8%	83.3%	**+5.5%**
High	5.6%	5.6%	**0.0%**	5.6%	5.6%	**0.0%**
Pair 4 (*n* =38)						
Low	13.3%	4.3%	**-9.0%**	6.7%	6.7%	**0.0%**
Average	82.6%	95.7%	**+13.1%**	80.0%	80.0%	**0.0%**
High	4.3%	0.0%	**-4.3%**	13.3%	13.3%	**0.0%**
Pair 5 (*n* =40)						
Low	57.7%	26.9%	**-30.8%**	35.7%	21.4%	**-14.3%**
Average	42.3%	73.1%	**+30.8%**	64.3%	78.6%	**+14.3%**
High	0.0%	0.0%	**0.0%**	0.0%	0.0%	**0.0%**
Pair 6 (*n* =36)						
Low	20.0%	5.0%	**-15.0%**	12.5%	18.8%	**+6.3%**
Average	70.0%	75.0%	**+5.0%**	81.3%	68.8%	**-12.5%**
High	10.0%	20.0%	**+10.0%**	6.3%	12.5%	**+6.2%**
Pair 7 (*n* =22)						
Low	8.3%	0.0%	**-8.3%**	0.0%	0.0%	**0.0%**
Average	75.0%	83.3%	**+8.3%**	80.0%	90.0%	**+10.0%**
High	16.7%	16.7%	**0.0%**	20.0%	10.0%	**-10.0%**
Pair 8 (*n* =15)						
Low	30.0%	20.0%	**-10.0%**	20.0%	0.0%	**-20.0%**
Average	50.0%	50.0%	**0.0%**	53.3%	46.7%	**-6.6%**
High	20.0%	30.0%	**+10.0%**	26.7%	40.0%	**+13.3%**
Pair 9 (*n*=35)						
Low	15.0%	0.0%	**-15.0%**	0.0%	6.7%	**+6.7%**
Average	75.0%	85.0%	**+10.0%**	100.0%	80.0%	**-20.0%**
High	10.0%	15.0%	**+5.0%**	0.0%	13.3%	**+13.3%**

Table 12. Cross Tabulation Analysis of Student Self-Efficacy Levels and Teacher Quality Pairs (continued)

Teacher Quality Pairs						
Variable:	**MLD**	**Teachers**		**NMLD**	**Teachers**	
Self-Efficacy Levels	Pre-Survey	Post-Survey	**Diff.**	Pre-Survey	Post-Survey	**Diff.**
Pair 10 (*n* =32)						
Low	19.0%	0.0%	**-19.0%**	9.1%	18.2%	**+9.1%**
Average	66.7%	23.8%	**-42.9%**	81.8%	72.7%	**-9.1%**
High	14.3%	66.7%	**+52.4%**	9.1%	9.1%	**0.0%**
Pair 11 (*n* =20)						
Low	14.3%	21.4%	**+7.1%**	0%	0%	**0.0%**
Average	71.4%	71.4%	**0.0%**	83.3%	66.7%	**-16.6%**
High	14.3%	7.1%	**-7.2%**	16.7%	33.3%	**+16.6%**
Pair 12 (*n* =33)						
Low	3.7%	11.1%	**+7.4%**	11.1%%	0.0%	**-11.1%**
Average	66.7%	66.7%	**0.0%**	77.8%	88.9%	**+11.1%**
High	29.6%	18.5%	**+8.1%**	11.1%	11.1%	**0.0%**

NOTE: Diff-Differential between pre- and post- self-efficacy levels.

Although caution must be taken in over interpreting the small ELL student data from teacher quality pairs, some observations can be made. In 7 of the teacher pair samples, ELL students' self-efficacy gains, as defined by movement from the low range and the average range to a higher range of average or high, were greater in the technology-enhanced literacy environments. Total positive gains ranged from 8.3 percent to 52.4 percent (MLD teachers in Pairs 7 and 10, respectively). For four of the teacher pairs, ELL students in classrooms without mobile learning devices made greater gains in self-efficacy levels than students in classrooms utilizing mobile learning devices (Pairs 3, 8, 11, and 12). NMLD gains for these NMLD ELL students ranged from 5.5 percent to 11.1 percent, which was considerably smaller and more narrow range of gains than those experienced by the students with MLDs.

Findings of Student Reading Self-efficacy by English Proficiency Levels

A final cross tabular analysis was conducted regarding research question two to consider an important contributing factor of the English language learner students-their proficiency levels in English at the time of this investigation. The extent to which mobile learning devices may be advantageous in acquiring or mastering English is not known. Thus, it was relevant to investigate how the technology-enhanced and the traditional literacy environments may impact ELL's reading self-efficacy, when disaggregated by the students' English proficiency levels. The pre- and post- treatment self-efficacy survey results are listed in Table by students' proficiency levels, as defined by the CELDT test levels of "Beginning, Early Intermediate, Intermediate, Early Advanced, and Advanced."

Table 13. Cross Tabulation Analysis of Student Self-efficacy Pre-test and Posttest Scores by English Proficiency Levels

<div align="center">ELL Student Self-Efficacy Levels</div>

English Prof. Levels	Pre Low	Post Low	Diff. Low	Pre Avg.	Post Avg.	Diff. Avg.	Pre High	Post High	Diff. High
MLD-Beg	20% (*n* =3)	0.0% (*n* =0)	**-20%**	66.7% (*n* =10)	86.7% (*n* =13)	**+20%**	13.3% (*n* =2)	13.3% (*n* =2)	**0.0%**
NMLD-Beg	25.0% (*n* =2)	12.5% (*n* =1)	**-12.5%**	62.5% (*n* =5)	62.5% (*n* =5)	**0.0%**	12.5% (*n* =1)	25.0% (*n* =2)	**+12.5%**
MLD-Early Int.	36.4% (*n* =8)	27.3% (*n* =6)	**-9.1%**	59.1% (*n* = 13)	68.2% (*n* =15)	**+9.1%**	4.5% (*n* =1)	4.5% (*n* =1)	**0.0%**
NLMD-Early Int.	33.3% (*n* =9)	29.6% (*n* =8)	**-3.7%**	59.3% (*n* =16)	51.9% (*n* =14)	**-7.4%**	7.4% (*n* =2)	18.5% (*n* =5)	**+11.1%**
MLD-Intermed.	22.8% (*n* = 23)	12.9% (*n* =13)	**-9.9%**	67.3% (*n* =68)	75.2% (*n* =76)	**+7.9%**	9.9% (*n* =10)	11.9% (*n* =12)	**+2%**
NMLD-Intermed.	21.9% (*n* =20)	12.5% (*n* =12)	**-9.4%**	72.9% (*n* =70)	83.3% (*n* =80)	**+10.4%**	5.2% (*n* =5)	4.2% (*n* =4)	**-1.0%**
MLD-Early Adv	16.1% (*n* =10)	6.5% (*n* =4)	**-9.6%**	77.4% (*n* =48)	72.6% (*n* =45)	**-4.8%**	6.5% (*n* =4)	19.4% (*n* =12)	**+12.9%**
NMLD-Early Adv	22.2% (*n* =14)	14.3% (*n* =9)	**-7.9%**	74.6% (*n* =47)	81.0% (*n* =51)	**+6.4%**	3.2% (*n* =2)	4.8% (*n* =3)	**+1.6%**
MLD-Advanced	50% (*n* =3)	0.0% (*n* =0)	**-50%**	50% (*n* =3)	100% (*n* =6)	**+50%**	0.0% (*n* =0)	0.0% (*n* =0)	**0.0%**
NMLD-Adv	40% (*n* =2)	0.0% (*n* =0)	**-40%**	60% (*n* =3)	100% (*n* =5)	**+40%**	0.0% (*n* =0)	0.0% (*n* =0)	**0.0%**
MLD-Reclass.	2.4% (*n* =2)	3.7% (*n* =3)	**+1.3%**	78% (*n* =64)	63.4% (*n* =52)	**-4.6%**	19.5% (*n* =16)	30.5% (*n* =25)	**+11.0%**
NMLD-Reclass.	0.0% (*n* =0)	3.9% (*n* =3)	**+3.9%**	90.8% (*n* =69)	78.9% (*n* =60)	**-11.9%**	9.2% (*n* =7)	17.1% (*n* =13)	**+7.9%**

NOTE: Int. & Intermed.-Intermediate; Adv-Advanced ; Beg-Beginning

Self-efficacy gains, when analyzed by English proficiency levels, were noted for both the ELL experimental and control groups. Students of all English proficiency levels, with the exception of students in the Non-MLD and MLD "Reclassified" proficiency

groups demonstrated an increase in perceived efficacy about reading. The percentages of self-efficacy growth in which $n > 10$ ranged from 11.0% to 12.9%. These gains were made by students with a fair amount of English at the "Early Intermediate," "Early Advanced" and "Reclassified" levels. The ELL self-efficacy gains were specific to the MLD literacy environments. At each level, the students' gains were substantially higher than their like English proficiency level counterparts in Non-MLD environment, with respective differences of 11.1%, 11.3%, and 3.1%.

The quantitative research findings of this study do not support the hypothesis of research question one regarding the use of iPod touches and increased reading achievement. Thus, the hypothesis is rejected. Research findings do however support research question two in terms of a significant positive relationship between the use of iPod touches and the perceived reading self-efficacy of English language learner students. This hypothesis is not rejected. The implications of these findings will be discussed in chapter five. The next section presents the qualitative data collected through focus group interviews of English learner students who utilized iPod touches on a daily basis throughout the investigation. The remaining research question will be investigated.

Findings from Qualitative Data Analysis

In order to consider research questions one and two from a qualitative standpoint and to answer research question three, it was necessary to ascertain the students' perspective as to the benefits and limitations regarding mobile learning device utilization for daily literacy activities. This design directly accessed the learners' description of their enhanced technology learning experience and the central iPod touch-literacy phenomenon.

In the following sections, I describe the findings of the qualitative data analysis by research question and along several dimensions. The first section provides descriptions of the students' particular MLD-enhanced classroom. This is important in order to understand the central phenomenon of mobile learning device-enhanced learning. It is also necessary to fully understand the socio-cultural context in which the research questions have been studied. The second section addresses the focus on reading achievement as presented in research question one, presenting interview data related to literacy activities, the students' sense of their reading achievement, and of learning English as a second language. The third section focuses on research question two, student self-efficacy, with interview data that adds to the self-efficacy survey data already discussed. The final section presents data related to research question three regarding student-perceived benefits and limitations of mobile learning device utilization during literacy activities.

As the analysis of data will reveal, the majority of students believed the iPod touch devices positively impacted their reading achievement and their ability to do literacy activities in a more efficient manner. According to the students, a direct correlation did exist between MLD use, their achievement, and their self-efficacy in reading. Student comments also revealed additional ways that mobile devices allowed them to seek and gain feedback about speaking, reading, and writing in English.

Section 1: Mobile learning device-enhanced classroom. In each of the eight focus group interviews students described their MLD integrated classroom. Question one, regarding a comparison of the students' present MLD classroom and their Non-MLD classroom from the previous school year, along with questions seven and nine

focusing on the MLD teachers' activities, were most productive in eliciting MLD

environmental descriptions. The described blended learning classroom included face-to-

face student-teacher interaction and virtual interactions via the iPod touches.

Students described a variety of MLD activities. These included; (1) receiving

daily assignments from their teacher; (2) uploading their completed assignments to the

teacher; (3) working on teacher-assigned content-based applications; (4) utilizing MLD-

embedded resources; (5) researching information and doing projects; (6) communicating

with their teacher and peers; and (7) student MLD discretionary use. A specific teacher

learning management system and social network called Schoology was evident in

Classroom A, and one named Edmodo was used in Classroom B.

iPod touch management. In Classroom A, students discussed the use of

Schoology as an organizational tool for the mobile devices. Along with Schoology, they

referred to their teacher's blog and students' personal blogs as a part of their class MLD

system.

> Mrs. (Teacher's name) has a blog that she talks to us on it and we have a
> blog too. Every story we have, we post it on there…*Read, Share and
> Create Edublogs.* She gets like websites and she puts it on there, or an
> app, and she puts a password for it, for that… so we can go there… Last
> year when the teacher… when he wanted us to do something, he would
> put it on the whiteboard. This year (Teacher's name) puts assignments on
> Schoology and we have to look it up on Schoology (A-16, personal
> communication, May 2011).

In describing how the teacher organizes work for three different student literature groups,

a student explained, "We have assignments to do. It's a book, but we do all our

assignments on the iPod. The three groups are reading different books. The teacher

posts assignments on Schoology, and then we read, and then she makes us do

assignments…and we answer them and submit them" (A-17, personal communication, May 2011). Another student spoke of personal organizational support experienced with the MLD when asked to compare his current school year experience with his last year's school experience:

> Well, it's more faster. You can just move on to the next assignment…just like that. You don't have to look around in your desk for what you need…and you don't have to just keep on going and going and waste time. And it goes faster on the iPod, cause you can move around and organize your apps. Last year, we had a to-do list, all the way at the front of the classroom…and we had to step up to see, and this year we have a to-do list right on our iPod, in Schoology. We just have to double click and go to Schoology (A-31, personal communication, May 2011).

In Classroom B, Student B-2 described the Edmodo learning management tool as follows: "Edmodo is kind of like a Facebook, but for a school. It looks a lot like Facebook, but like if your teacher puts a post asking a question, you can answer it or they can post about something…like a reminder" (B-2, personal communication, May 2011). The student further explained, "On Edmodo, when we are reading a story and we don't know what's going on, we can ask the questions and then we get the answer" (B-2, personal communication, May 2011). Further researcher probing revealed that MLD-communicated answers are provided by both the teacher and fellow students. Another student mentioned how Edmodo is utilized during and after teacher read-aloud time: "…Edmodo for the part that our teacher reads in the book, and we get to share our thoughts and feelings about it…and maybe even ask a question" (B-14, personal communication, June 2011).

Students highlighted "different learning" with the MLD and the teacher learning management systems. "The teacher teaches differently. He like makes everything more

funner…like with the iPods, it like gets more faster and he can teach us new things like

more faster" (B-3, personal communication, May 2011). In regards to the text and audio

capabilities of the MLD with Edmodo one student said, "Instead of everyone answering

the question out loud when it is really noisy, you can just go on Edmodo and answer it

there" (B-1, personal communication, May 2011).

　Another student described his teacher's behaviors, "…he posts grammar

questions, writing questions, all those kinds of questions, math questions, and he like…he

makes them a challenge for us and like we answer them. He starts reviewing them and he

tells us the answers and then asks more questions…just to make sure. He keeps the

conversation going" (B-12, personal communication, June 2011).

Students also acknowledged virtual organizational aspects of using iPod touches

with Edmodo:

> Edmodo has helped me the most. Because Edmodo helps me
> communicate with my teacher and with my peers, with the people around
> me. And we can ask any type of question…but as long as its educational
> and appropriate. If we forget like (student's name), she forgot about when
> our essay was turned in, and it was on Tuesday because we had the
> Memorial Day weekend…and she asked the class on Edmodo what day is
> our essay turned in…and people could respond to her and she checked it
> again (Edmodo), and she actually turned it in on the right day" (B-9,
> personal communication, June 2011).

One student contrasted turning in an assignment to a basket in the classroom

versus uploading an assignment to Edmodo:

> Plus if the teacher says, 'Well where's that assignment?' and you say,
> 'Well I put it in the basket'…and they don't find it. It can get lost. In
> Edmodo, we can just pass it to him (electronically)…and also like on
> Edmodo there's like a little box that says 'Spotlight' and like it says
> 'Assignments' and it like tells us…like…what we can do…like the
> number of assignments and what assignments we have to do. Like to read

a book and post your favorite part on Edmodo or something like that" (B-11, personal communication, June 2011).

Finally, another student discussed the tool's organizational aspect from a self-regulation standpoint:

> Well, if you misspell something or put something in the wrong place, she corrects it for you. If some of the kids want to see their grades and how they're doing…A, C, B, or F… they go to 'End Grade,' and then they get to see each and every grade they have. If they have an 'F' on social studies or language arts or math, they will work harder just to make that an 'A' or a 'B' (B-18, personal communication, May 2011).

Content-based software applications. In a majority of interview responses, students mentioned MLD content applications (apps) in their explanations of how they utilize their mobile learning devices for learning. Students mentioned learning apps 248 times, with 53 unique apps. Twenty-two of the 53 unique apps specifically addressed language arts skills. Additionally, students shared that other interdisciplinary apps were used for literacy activities. A table of the apps by name and content is listed below in Table. The apps list not only demonstrates the breadth of content to which the MLD students had been exposed to in eight months, it also demonstrates the degree to which the MLD teachers directed the students' activities with the devices. As Student B-4 explained it, "We do the ones (apps) he tells us to do" (B-4, personal communication, May 2011). At different times during the research period, teachers loaded content apps onto the MLD and deleted others, in order to align certain content with specific instructional units.

Table 14. Mobile Learning Device Content Applications Referenced by MLD ELL Students

Literacy/Reading	Math	Science	History/Social Studies	Interdisciplinary
Grammar Dragon	Ninja Frogs	Bill Nye	GEO Master U.S.	Puppet Pals
Story Robe	Long Division	Dragon Physics	PS Express	Simple Draw
Story Line	Lattice Multiplication	Dr. Nano		Quick Draw
Smart Vocabulary	Rocket Math	Phyzios		Deep Typer
Young Reader	Math	Brain Pop		Comic Book
AC Flashcards	Beat the Computer	Happy Planet		Comic Touch Lite
Spelling Bee	Divisibility Dash	Meteor		Islands
Alpha Catcher				Nature Space
Quick reader				Sonic Pics
Storymaker				Chalkboard
Root Words				D-Tack
Vocabulary 4-6				Hot Brain
K-12				Brain Pop
Word Quiz				Sir Pro-1
Story Board				Oregon Trail
Screen Write				
Misspell				
Same Meaning				
Fables				
Opposite Oceans				
Antonyms				
Oh Crumbs				

Mobile learning device-embedded resources. Students delineated two additional

sets of resources as being critical to their use of their mobile learning devices. The iPod

touch itself has certain built-in features which students purported as being important

supports to their literacy routines. These device-embedded features included Voice

Memo, Dictionary, iTalk, Notes, iNotes, Notecards, Thesaurus, and iSpeak. Student B-1

explained, "One time in Edmodo, he posted something and it was on a paper so he posted

those words to the iPod, and then we answered, then we got the iPod and put it in our

own Notes and answered from there, which is very helpful to me" (B-1, personal

communication, May 2010).

The dictionary feature was mentioned multiple times by the ELL students in each

of the eight group interviews, followed in frequency by the Voice Memo feature.

Students shared multiple ways they solicited vocabulary assistance on their own:

> Like on our Apple iBooks, when we're reading a story and we like don't
> understand a word or a phrase, we just highlight it, and then we go on
> dictionary. When you highlight it, it has a little arrow pointing towards
> dictionary, and then it tells you what it means or something. And it helps
> you put it into syllables and pronounce it even…like…right…and you
> don't have to make it wrong. Now it's more easier (A-30, personal
> communication, May, 2011)**.**

The dictionary-word access feature came up strongly in response to the question,

"Do iPod touches help you learn English?" Three students in an interview had the

following group response:

> It helps me when I come across a word that I don't understand. I go on
> dictionary.com and look up the word and I read through the definitions so
> I can understand the word (A-22).
>
> Sometimes you can just click on the word and it will get highlighted, and
> it is better for you that you don't have to go through a book looking at it.
> And it is faster, so you have more time to do your other work than spend
> 10 minutes looking up a word (A-23).
>
> (So, when you click on a word, what happens?)
>
> When you click on a word, it says, iNotes, iResearch, Dictionary or
> Highlight (A-23).
>
> Like Student A-22 said, I also look in the dictionary, but I also look at
> how to pronounce it. Because if I don't pronounce it right, I might not
> understand the whole story at all. (A20-24, personal communication, May
> 2011).

Students in Interview Group B(1-4) spoke how the dictionary feature assists with writing,

with word analysis, and of their frequent use of the function.

> The words like if you look in the dictionary, they are all English. If you read it and you don't get the word…it just…you try to…If you read on it, click on it, it says the word out loud, if you don't know how to say it (B-4, personal communication, May, 2011).

> Um, like the dictionary, it has like the word…if you push the word it says it for you so you can pronounce it better (B-3, personal communication, May 2011).

> If you don't know how to spell the word, then you do a search right beside it. It has this microphone. Then you click it, and then it says the word…and it shows you. I use this sometimes when I don't know how to spell a word or if I'm writing something. I just say it and then it just comes out (B-1, personal communication, May 2011).

> (How about for you B-2?)

> On the dictionary, if you look for a word and like…if you see a root word, it will tell you if it is Greek or in Latin…and then it would sound familiar to you (B-2, personal communication, May 2011).

> (How often do you use that dictionary app?)

> Like mostly every day (B-1, personal communication, May 2011).

> Yeah…(B1-4 in unison).

Students shared several uses of Voice Memo, the feature that allows students to record

sound, to verbally practice reading fluency, or to produce audio content.

> You can use the Voice Memo to record your fluency piece…so, like you can do it perfectly.

> (Tell me a little more about fluency reading.)

> Fluency reading is like a summary of the stories we are reading in our HM book (Houghton Mifflin), and our teacher makes us read them and then we practice them. At the end of the week we can record them so we get the meaning of it. We listen to it and see if we can improve (B-16, personal communication, May 2011).

Virtual resources for student research and learning projects. Students described a number of electronic resources that they accessed from their mobile learning devices. These included everything from search engines, such as Google, Bing, and Yahoo, to specifically assigned blogs by their teacher such as a physical education blog, *Enchanted Learning*, *Fact Monster*, *Read Naturally*, *Read, Share and Create Edublogs*, and *Meteor*. Other management resources such as iBooks, e-Books, and *Accelerated Reader* tests were also described in the interviews. From both sets of classroom group interviews, it was apparent that the teacher controlled student content access and that specific behavior expectations for the students were well established. This point was exemplified when a student was talking about using the iPod for "free time." "Sometimes (Teacher's name) just lets us play games. She doesn't get just any games. She gets educational games, and we play any game we want from there" (A-25, personal communication, May 2011).

Virtual communication. Some interviewed students were aware of the wider audience available to them via the use of mobile learning devices: "There is this place called Meteor and you write your story right there, and then you post it on Mrs. (Teacher's name) blog…our blog and people go over there and read it. So, it helps not just us, but it helps other people when we post our stories on our blog" (A-24, personal communication, May, 2011). Another student talking about what helped him most responded, "Schoology, because what helped me most was the blogs, because I love like telling other people stories and all those things. And now I can talk to the whole world since a lot of kids do it" (A-26, personal communication, May, 2011). Student B-2 talked about student-to-student communication:

Sometimes the students can look…look at your post and see if it's the wrong meaning or not and they can tell you…

(What does your teacher do with everything that you post?)

He can present it at meetings, so he can show off how smart we are!

(Other students agreed.)

(Tell me how that makes you feel.)

Good, because we know then that we did good on something that we did (B-2, personal communication, May 2011).

And you feel appreciated (B-1 personal communication, May 2011).

Student iPod touch discretionary use. This final MLD environment portion of the

student interviews explored students' discretionary use of the devices during their

instructional day. The discussion was openly structured to include student activities done

with and without the teacher's permission. Interview question 8 asked, "Tell me about a

time when you used the iPod touch on your own and it turned out great."

Classroom A student responses were largely similar to A-32's: "We have a bunch

of books that we can read (electronically), like in our free time because the teacher won't

let us play games…so we have all of these books to read. Another student in the same

class shared, "Sometimes for other reasons, like during math, if we're done with math for

a while (paper-pencil tasks), she only lets us play math games since we are already in

math" (A-27, personal communication, May 2011). Contrastingly, Classroom B students

had access to educational apps during their "free time" as evidenced by, "So, instead of

reading…you know how it's sort of boring sometimes?...like after you've done all of the

stuff…and we just play fun math games and stuff like that" (B-11, personal

communication, June 2011).

In terms of using the devices without the teacher's permission, four students spoke about experiences with leveled content apps. The game-like environment with built-in competitive levels resulted in students continued play well after other students were no longer using the devices. Student A-30 explained, "I play *Deep Typer* when the teacher is not looking. I always go to level 10, all of the time." Another student described his without-teacher permission use:

> One time, there was that one thing I was telling you about…*Rocket Math*…I knew that I was going to beat it. Well, we just did the first stages and stuff…and then you were actually in control of the rocket at the very end…and we had to turn the whole rocket ship and go out and then fly away. And I did that so far 7 times" (A-32, personal communication, May 2011).

Another forthright student shared:

> I remember once when we were only allowed to use math drills in the morning, and I remember one time I wanted to get passed it because I wanted to move on to like division, instead of multiplication…and I remember once I was using my iPod under like here (demonstrated below her desk)…and I finally like got good. I passed the thing. (A-29, personal communication, May 2011).

This example illustrates the importance of the content the teacher selected to have on the technology device, as well as the high engagement factor of the content and its design. In this case, it is relevant to note that the student's supposed off-task MLD behavior improves the students' motivation to master the content.

In follow-up probing about unauthorized Internet access, students cited just four examples. A student shared another classmate's foray on to the Internet:

> One time, she was showing us her history and she looked up something because people were talking about this lady called "Big Mama," and she wanted to find out what is was and she looked it up and she found the picture of it and then she tried to take it off, but (Teacher's name) said if

we erase the history we're going to get in more trouble. So she just admitted to what she did (B-10, personal communication, May 2011).

Additional teacher MLD expectations regarding unauthorized use were evidenced. "When I used to sit next to my two best friends, (Student's name & Student's name), they told me to look up Justin Bieber and I looked him up and they told me to take a snapshot of his picture for my wallpaper; that was before when (Teacher's name) said that we could put our wallpaper, whatever we wanted" (B-9, personal communication, May 2011). Students explained that over time, the teacher centralized MLD features like the wall paper to simply be a number assigned to a student. A student from Classroom A said, "Well, there was this kid in our class who played on the iPod so much that he was banned from using it…um…so he has to do a lot of work on paper and on the laptops" (B-5, personal communication, May 2011).

The new MLD environment appeared to have changed many aspects of the classroom, as with this final example of "authorized" unauthorized use. "Yeah, we had a sub yesterday and after we finished, we just got on the iPods and we looked up stuff we got for free. It would be the first time we look up something on the Internet, and we just get facts from it and information" (A-25, personal communication, May 2011). In this case, although the regular teacher downloaded Internet information and websites to the learning management system or her blog for controlled student use, this protocol was not followed by a substitute teacher. The student's choice to point out the aberrant MLD behavior/procedure, along with the above-described daily MLD procedures, led the researcher to believe that student behavior expectations regarding the MLD are normally in place.

Section 2: Mobile Learning Device Literacy Activities, Reading Achievement and Learning English. A preponderance of student interview responses related the students' belief that iPod touches helped them with the process of reading, their achievement in reading, and learning English. The statement, "I have improved a lot in reading because of the iPod" was echoed verbally or non-verbally by nearly all students in both classrooms (B-8, personal communication, June 2011). "The iPod is like a teacher. You get to download apps and like it teaches you step-by-step math, grammar, reading, and writing" (B-11, personal communication, June 2011). The linear design of content applications was frequently mentioned as helping the students learn, understand more, and comprehend:

> During the language arts time we do more group work than we did last year, because everybody is on the iPod looking things up…and we could post on Edmodo our answer because usually (Teacher's name) asks questions about our story. So we answer them. And last year, we really didn't understand it that much. When we didn't understand something, we just had to go with it…not understanding it. (B-9, personal communication, June 2011).

In addition to generic comments such as, "The iPod started making me read faster and better" (A-21, personal communication, May 2011), some students described their experience with more detail. "It helped me in language arts because I can't…like I don't understand teachers…and I'm getting better at it." The participant added that the most help had come, "Mm…on grammar and spelling" (B-3, personal communication, May 2011). Students stated, "I'm learning more English than before," and "There's different apps like *Same Meaning* and *Opposite Ocean* (that) will teach you more English, and more vocabulary and also new big words…yeah, new big words (B-7, personal communication, May 2011).

Students depicted the actual MLD reading process as both an audio process and an independent metacognitive process. "It has like stories in there. It has apps for stories and then we have like on our music (audio playlist)…we have like stories so we can read along and listen to it" (B-3, personal communication, May 2011). With the independent reading process, a student described how the readability level of a book does not impede a student's MLD access to the content:

> And there is two other apps-*Aesop's Fables* and then there is *Oh Crumbs*, where there is all these different kinds of books…of lists where you can highlight each word…and then you have to read with the highlight…keep up with the word…and you can go…you can read any book that you want (A-32, personal communication, May 2011).

A student explained about the iPod's ability to differentiate student reading materials: "There's an app that has books in it and you can download books in it (Like iBooks?) yeah…iBooks. You could download books and you can read them…you could download chapter books or (another student interjects "or baby books") easy books, it depends what level you're on" (B-12, personal communication, June 2011).

Research question 1: Reading achievement. The students' awareness of their reading achievement included self-monitoring, through the features of the mobile learning device, teacher monitoring via teacher-posted questions on the device, assignments, videos, projects, and external monitoring with the NWEA-MAP assessment. "When we have to read a story, and when it's in the iPod, you could hear it by the iPod and like if you don't know a word, it will tell you" (B-9, personal communication, June 2011). This happened frequently when students solicited the device's dictionary features. Another student explained, "…if you read just on the book you might mispronounce and

the iPod says it correctly. So you know how to say it the next time you read it. If you

want to retry to read it again, you can retry" (B-7, personal communication, May 2011).

Teacher-monitored reading achievement. The teacher played a definitive role

establishing expectations for reading comprehension and monitoring reading

comprehension.

> (Teacher's name) posted a question on Edmodo and we have to respond to
> it, answer the question (A-18).
>
> It doesn't only ask us questions…We have to write what we thought the
> book was about, what we thought about, like the whole chapter. Like you
> can't write what happened in it, but you can write like, "I think it was
> surprising that she did this" (A-19).
>
> We have to use certain words… (A-18).
>
> (What kind of words?)
>
> Like "I wonder, I predict, I think…"(A-19)
>
> Like I wonder how the bird understands the girl…words that start with
> questions-well, not questions…It doesn't always start with questions, it
> starts with like…what 'we' think (A-16).

Additionally, the teacher "gives us tasks to do around the story" and, "sometimes we read

by ourselves or with groups (B-5, B-2, personal communication, May 2011). Students

also shared that they created their own comprehension questions for one another. "Yeah,

but it has to be from the story. You have to put the page number and you have to put the

paragraph" (B-7, personal communication, May 2011).

Students depicted mobile learning device comprehension "activities" or "projects"

from different curricular areas as well. "We have…there's like…we have an app for

Brain Pop…and it has basic activities to do on it. It has like different stories, and we can

post questions on Edmodo about that (B-4, personal communication, May 2011). Another

example was in science:

> She downloaded videos like *Bill Nye the Science Guy* on the iPods. We
> get to see them when we have free time. We get to see a lot of stuff (A-
> 25).

> We use the videos for when we take a test…because the answers are on
> the videos, but you have to pay close attention…and if you're absent that
> day, you can just look at it in your iPod (A-27, personal communication,
> May 2011).

Classroom B students also described MLD projects.

> And then we do CMOs (Clear Measurable Objectives). Like we can go on
> *Storyrobe* or *Voice Memos* and do a project about the book…about the
> books (B-5).

> The best project I did was with (Student's name) because we hardly
> messed up. We said almost every word correctly and like we got good
> pictures that goes with the story. What was it, (Student's name)? "Mariah
> Keeps Cool." It was an activity after a story" (B-8, personal
> communication, May 2011).

> ***Mobile learning devices, reading achievement and NWEA-MAP.*** Even though a

significant reading achievement difference did not exist between students using iPods and

those not using iPods in this study, a group discussion about reading progress illustrated a

nexus MLD students believed existed between the use of the iPods and their reading

progress/achievement.

> Well, I've…I don't know…I've improved in reading a lot. There's a test
> we take every year called the MAPs test. We take it 3 times a year…and
> it sees how much we've improved over the year…and in the beginning of
> the year and stuff like that. I improved 10 points, and that's like a lot. In
> the beginning of the year I was at 206, and now I'm up to 213, and now I
> have 217. So I've improved over the year (B-12, personal
> communication, June 2011).

> Well, from according to last year, my MAP scores in reading was really
> low, like 202 or something…and like now, the first time I got 212 and the

second time I got 224, but the third time I dropped because I really didn't read like that much (B- 11 , personal communication, June 2011)

(So, what does that tell you? Anything?)

That the iPod is really helpful if you keep working on it…it will make you better at something you really want to do (B-11, personal communication, June 2011).

On occasion, students credited their progress in reading to specific content applications: "What's helped me most is probably…*Grammar Dragon*…because it teaches me about grammar. I was like low on language usage, and it taught me about grammar because I was only at 206 at the beginning of the year. Now I'm at 214" (B-8, personal communication, May 2011).

Learning English. English language learner participants expounded upon the iPod touch as an assistive tool to learn English. Questions 11(a) and (b) specifically addressed English acquisition, and the topic also came up of the students' own volition in other interview questions. Although English learner literacy themes included reading, grammar, spelling, and writing, the themes of vocabulary enrichment and reading fluency were most prevalent.

Vocabulary enrichment. In talking about the iPod, students said, "Sometimes it's helped me learn like new English words that I've never known before…like I was in one of the kindergarten apps…just to like explore it. It showed me a word but I forgot it. It was like something…like it was a word that meant 'big tower' in English" (B-11, personal communication, June 2011). Another student related his iPod use to everyday conversations: "Sometimes when you're talking with your friend and it comes up and he tells you a word and you don't know it…like…you can go in the dictionary. You can

search it" (B-10, personal communication, June 2011). When asked if they thought they

practice English more because of the iPod, all students believed they did. B-12 explained

how he practices English more:

> Because you learn more English, you learn more words that are in
> English…in the English language. Like the books in the apps in the iPods,
> we read new words that we never knew. You practice by the apps and you
> practice by everything else…by doing them.
>
> (B-10 added)
> There was an app. I think we still have it. It will show you a picture…and
> you had to put the words. There were a lot of people playing it. But
> there's things like that… (B-12, B-10, personal communication, June
> 2011).

Students discussed an array of ways that the mobile learning device assisted them

with English. One student shared how their teacher made content available via the iPod

for a "Beginning" level ELL student.

> …there are kindergarten apps that show you pictures and give you the
> voice and you can respond back. We had a kid named (Student's name) in
> our class. He didn't know English at all and we had to communicate with
> him…and now he talks…like English…like all the time now…perfect
> English because (Teacher's name) found out that some of us have trouble
> with English…that's why we're in ESL…(Teacher's name), he just kept
> on for his free-choice Friday…every time learning how to speak English
> with the kindergarten app…even though they were really low, they were
> really helpful (B-9, personal communication, 2011).

A higher level English learner explained how ELL students' vocabulary had been

enhanced in content areas, such as science, via the mobile learning device's multimedia

features.

> I like it when we go to *Brain Pop* because sometime if we get into it…a
> lot…then we get to make a video about it and how it works and stuff like
> that…and…Right now in ELD we're making a video with the iPods
> About to persuade someone to not put carbon dioxide in the air…so to use
> a high risk. So, we are persuading some people, and then we are making a
> video about it (B-3, personal communication, June 2011).

Students described how the MLD assisted them with their differentiated vocabulary and

reading instructional needs.

> Well…there's an app that if I memorize a word like "mango" and find it in
> the dictionary, then the *Read Naturally* has helped a lot because if I don't
> know the word, it pronounces it right….then what's that word called (side
> conversation)…*Opposite Ocean*, it helps you figure out the opposite of the
> other thing. You could put 1st grade level, 2nd grade level for…3, 4, 5 and
> up to 6th grade (B-8, personal communication, May 2011).

> It helps you be a good reader because when you read and know that the
> words are too hard for you, you have to pick a lower book that doesn't
> have that much hard of words…like it does on the other books. You find a
> book that is good for you, if you can read all those words then that could
> probably be your reading level (A-16, personal communication, May
> 2011).

Students also explained how the device assisted them or had the potential to assist them

outside of school. "It's helped me when I'm reading a book at home…and then when I

go to school and I memorize that word I didn't know, I look it up in one of the two

dictionary apps…and I figure out the word and what it means" (B-6, personal

communication, May 2011). Another student in talking about how he might make a

commercial for his parents to persuade them to purchase an iPod touch said this.

> I think the iPod's really great because my sisters…they're not good at
> Spanish or English either…so I would tell all the parents in my
> commercial that they should get iPods for their kids who really want to
> learn English if they speak a different language. I would tell my parents to
> get my sisters an iPod touch and have them download *Quick Reader* or
> any book, any other apps that help you with…read English…because their
> English is worse than their Spanish, but because they mostly like Spanish
> more than English (B-7, personal communication, May 2011).

Reading Fluency.   Both sets of classroom interviews revealed the daily practice

of fluency reading as an important required activity with the mobile learning devices.

Daily fluency practice involved the three components of fluency: (1) accuracy; (2)

automaticity; and (3) prosody-the appropriate use of phrasing and expression to convey meaning, as described below by the students (Rasinski, 2003). "It has helped improve me on reading out loud, because the teacher, she makes us read these paragraphs and record them on our iPods…and that's helped us learn how that you can make mistakes and then you can work on that" (A-28, personal communication, May 2011). With probing, "When you record a story, how do you think that helps you?" Student B-11 said, "By practicing, like practicing how to read better…pronunciation, speed, accuracy…all that" (B-11, personal communication, June 2011).

Students referred to specific apps that assisted them with fluency practice. "There's an app called the *K-12* that helps me in reading….tells me how many words a minute I read" (A-18, personal communication, May 11). Students could control the rate at which print was presented through an application on the mobile learning device. "There's an app called the *Young Reader* where it tells you how to read it, and you can decide the pace that you like. It tells you what time you did it, and it helps you read it" (A-16, personal communication, May 2011). A description of a third fluency app gave students a perspective of their pacing with a comparison of time needed to complete reading a book: "…when we read in the morning, it (the app) would put a timer and we would put in how much we had read, and then it would say that… like… you read this much pages a day, then this is by the day that you will be finishing reading the book (A-29, personal communication, May 2011). This kind of personal reading feedback loop was greatly valued by the English language learners.

Some students spoke highly of the MLD's self-regulation feature. Asked how they felt about it, one student replied, "It's better. We can just hear it by ourselves" (B-

15, personal communication, June 2011). Several participants spoke about the ability to

practice their reading while maintaining their dignity:

> It is different than if you had to read in front of the class compared to just reading into your iPod…because with an iPod you get to hear it over yourself and not a lot of people get to hear you when you make a mistake… and it's embarrassing when you don't know how to pronounce a hard word (B-9, personal communication, May 2011).

> (B-10, smiling) If you have to read in front of the whole class and you come up to a word that you couldn't read…like… people make fun of you and if you record it, only yourself will hear it (B-10, personal communication, May 2011).

The student issues of dignity and personalization included the ability to control for errors,

practice more, and submit their best product to the teacher. One student described the

self-reflective reading feature of the iPod in this way.

> If like…we didn't have the iPod to help us like…read, it would be like… much harder, because…like people in our class that don't know, you know, how to read really good maybe would get really confused a lot of the time, and be asking them for a lot of help and people wouldn't… like if they didn't even know, how can they even help the other person? (B-12, personal communication, June 2011).

Other students valued a social context for practicing fluency, "And um…sometimes we

record with friends, we have partners of 4 and we read them together or apart, like a

paragraph and then a paragraph" (B-9, personal communication, May 2011). Additional

literacy activities, beyond vocabulary development and fluency practice, are included

under the future section of student-perceived benefits and limitations of utilizing the

mobile learning device.

Research Question 2: Student Self-efficacy Qualitative Data

Focus group interview data was also analyzed to explore how MLD use may

impact student self-efficacy in reading. Student responses were coded using the four self-

efficacy factors of: (1) Progress— "a student's perception of present reading

performance compared to past performance"; (2) Observational Comparison— "a

student's perception of his/her reading performance compared with the performance of

classmates"; (3) Social Feedback — "a student's perception based upon direct or indirect

input about reading from teachers, classmates, and family members"; and (4)

Physiological States – "a student's perceived internal feelings that he/she experiences

during reading" (Henk & Melnick, 1995). The frequencies of these codes are shown in

Table 15.

Table 15. Summary of Student Focus Group Interview Frequency Data Coded by Self-Efficacy Factors

Self-Efficacy Factors	Total Codes	Mean	Standard Deviation
Progress	220	27.5	7.27
Physiological States	54	6.75	2.96
Social Feedback	50	6.25	2.05
Observational Comparison	18	2.25	1.39

Progress self-efficacy factor. Since the performance or mastery of a task is the

most important contributing factor to one's level of self-efficacy, it was not a surprise

that the Progress self-efficacy factor was most frequently coded. Students spoke about

this in traditional ways. "The numbers on the score of the tests are bigger that I get now"

(B-4, personal communication, May 2011). Another participant said, "When we would

correct it, like…I can see I'm getting better at it (B-3, Personal communication, May

2011). Students also referred to external measurements from which they knew the

mobile learning devices were assisting them in making progress.

> My reading progress…like if you read on the iPod and get a book…and
> then you take an AR test…you get more points and you get a lanyard. I've
> done better in my reading this year than last. I wasn't really good at

reading, but now I am…like way more. We took MAP and it was pretty alright (B-14, personal communication, June 2011).

Because last year, I didn't really understand that many things….and like this year, I understand it a little more. I got higher MAP scores than last year (B-13, personal communication, June 2011).

Regarding his progress in spelling one student explained,

Last year like it took us…like a long time to… like learn each word and like…to try to spell it and when we use to take tests on spelling and like… I usually like got some wrong… and then now I "get" them…like when we have fun on Edmodo…we have words and when I don't know how to spell it, I go back and check how…like to spell it (B-3, personal communication, May 2011).

Additional analysis of Progress responses demonstrated that in many cases students defined Progress (performance) differently than the traditionally extrinsic ways of a grade, a test score, or a reward. Students spoke far more often about the direct feedback they received from the device itself, regarding their performance on the mobile learning device's applications. In fact, the theme of self-regulation was coded 117 times. Students understood when they progressed through instructional levels of apps. As the student above explained, he understood when he "gets" the learning.

In describing their increased performance over time, students spoke about two main themes: (1) incremental feedback and support they received; and (2) the efficient manner-pace with which they could learn. As learners, the students shared how they controlled both aspects of their performance. With the feedback and support, they realized their own progress as it occurred. Students described the ubiquitous feedback and support as follows:

Like on the iPod, **the steps are clearer** and like on the books we may get confused, and like on the iPod, you read over the instructions, **and the**

steps, and then you **can do better on the things** (B-11, personal communication, June 2011).

Well, last year it was a little more difficult because we had good teachers. and he would show us how to do it. Now, since we have these apps, they **help us understand it more like step by step**. **Better and more clearly** (A-29, personal communication, May 2011).

Yeah, it is a little but different because of one thing. The teacher back in fourth grade used to show us…because like…we would understand. But like now with these, we could **understand it more clearly**. So if we don't get it, **we go to an app and we review**…and **we keep on going until we get the hang of it** (A-33, personal communication, May 2011).

For writing…like when we do the literature response, if I write a word wrong, **it will underline it**, and I will go back to it and erase it and write the right stuff. So that's **how it helps you** with spelling…yeah… (A-18, personal communication, May 2011).

Last year we would use everything…like on math books and…like this year we could go on apps and **it would explain** what it would do. **It shows you** like how to divide and multiply. Like every time you get one wrong **it lets you try again and again**. Last year, the textbook didn't explain that good (B-13, personal communication, June 2011).

(In answering how she knows she has improved in reading) Yes, because you can record yourself and then **you can hear yourself** and if you think…if…read the book when you record it and said a word wrong, you can record it again. If you think it is clear and the same. Help you learn more. It **helps you** pronounce the word and also to read (A-16, personal communication, May 2011).

In terms of efficiency of learning as a Progress indicator, students spoke of their performance being faster, less boring, and wasting less of their time. One student said, "Having the iPod is easier because if we don't have the iPod it takes too long to do little stuff (B-3, personal communication, May 2011). Another student shared, "Well, it's faster for us. If we finish one assignment, we can already go on to the next (B-15, personal communication, June 2011). Further evidence of a direct link between efficient MLD use and Progress was described as, "It's better with iPods than without, cause you

can get a lot of assignments done. Because our class…we're already going on sixth grade stuff…and we're ahead of schedule" (A-31, personal communication, May 2011).

   Physiological states self-efficacy factor. Students shared their perceived internal feelings about doing literacy activities with the iPod touch devices. Common attributes included enjoyment-happiness, not being bored-engagement, and feeling a sense of learning and fun at the same time. One student described positive feelings with MLD use: "It feels great because when you have a substitute you get your work done really fast, not just slowly like with pencil and paper, you get assignments done, it doesn't take up time, then it could be early for us to get out to lunch to eat… instead of just like writing on paper and taking forever…" (A-19, personal communication, 2011). In recommending a previous MLD project to a recently arrived student, one young man said,

> I would say all those other projects that we did was on Sonic Pics…and I think that (Student's name) would really enjoy it. Because first we would start on Comic Lite and then after that, we would go to Sonic Pics. Then we would send it to (Teacher's name), and I think (Student's name) would have really enjoyed that (A-24, personal communication, May 2011).

   The majority of students expressed their feelings about MLD use with ease. "I feel good…because like if the question repeats again, then I know the answer, I'm sure of myself" (B-6, personal communication, May 2011). A few students discussed the difference between writing with MLD vs. paper and pencil. "It's better to be using your finger to tap…it's more fun to type than write it. Writing hurts, and when you type, you just type. You just press one letter and that's it" (A-16, personal communication, May 2011). Another student added, "I think it's more fun because I get to write and I kind of like to write" (A-17, personal communication, May 2011).

Some students related their emotions to the use of particular MLD applications. "I feel good inside because I can improve my test with the knowledge that *Grammar Dragon* has given me" (B-8, personal communication, May 2011). Other students related personal enjoyment with MLD exploration. "Yesterday, we were on apps. (Teacher's name) gave us new apps so we started like using them, and then we went on Edmodo to tell him about them. I was on *Phyzios* and different apps. I actually had a lot of fun in those apps. We have to convince (Teacher's name) to let us keep the apps" (B-7, personal communication, May 2011).

Students also expressed complex feelings related to self-awareness and creativity. "Yes, it (the MLD) has helped me because I've been focusing on the iPod instead of like on paper…because on paper where I don't focus much" (B-12, personal communication, June 2011). "It (the MLD) was really cool. You could put your own frame and different colors. You got to be really creative" (B-5, personal communication, June 2011). At times, words were not as easily accessible for students as they attempted to compare reading with and without mobile learning devices. "I think we work more on our iPod 'cause it's more like…I don't know…it just makes it a little more fun…like learning is fun on the iPod. The reading time last year was really not cool. It was really kind of weird" (B-14, personal communication, June 2011).

Lastly, students expressed feelings of engagement/stimulation. This theme was coded 117 times in the eight focus group interviews. As with the examples below, being bored or dozing off while in class was contrasted with feelings of simultaneously learning and having fun.

Probably a class without iPods might take longer to do one lesson…and make like a really boring lesson where kids might doze off. On the iPod, they can play a game and have fun while learning. Also it makes the school days go by quickly…and without iPods it makes the school day really slow…and it keeps going slower and slower. So it seems like you are just stuck there (A-22, personal communication, May 2011).

It's better for us because most of the kids like technology and they want to use technology mostly all the time. Yeah, it's fun and you can learn every time" (A-18, personal communication, May 2011).

It makes learning more fun than last year because…last year it wasn't that fun. But on the iPods you get to learn while you play (B-7, personal communication, 2011)

Social feedback self-efficacy factor. Some of the richest qualitative data revealed itself as students described the element of social feedback with their use of the MLD. This included social feedback in traditional classroom-anticipated ways: between students, between students and the teacher, and between students and their parents. The data also highlighted new virtual social feedback, a virtual internal feedback forum for individual students, and a flexible social-internal feedback loop, made possible by the teacher-facilitated MLD use and the learning management tool.

Regarding the iPod use one student said, "Yeah, like we try harder so we can get the cube jar full up" (B-2, personal communication, May 2011). This teacher-driven social feedback practice to collectively motivate students was not directly attributable to the device. Certain kinds of teacher feedback, as reported by MLD students, could be accomplished with or without MLD use. For instance, the MLD feedback described below could also be accomplished by a teacher writing individual comments on students' submitted written assignments. A student talking about an app explained, "That one is pretty cool. If you put something that you want to write, the teacher is the only one who

can see it. If he tells you a question, and you put an answer, and someone puts a different

answer he can see it" (B-14, personal communication, June 2011). Another social

feedback comment that was neutral in terms of the device was, "With the iPod this year

my grades went up on math because of the apps. I felt happy because my mom started

letting me go out to my friend's house more" (B-9, personal communication, June 2011).

A final comment blended traditional social feedback and virtual social feedback. The

researcher asked one group, "Has anyone ever shown their parents the class blog? "

> Yes...at Open House. (group in unison)
> I showed my big brother and I showed my dad. I wrote something about
> my big brother and he really liked the blog… and my dad he asked me
> why I use the blog, and I told him that you get to type and post things so
> that other people could get experience with it, and then learn about other
> things (B-9, personal communication, June 2011).

The concept of virtual social feedback, as described by the student above as 'other

people could get experience with it,' typifies additional social interaction achieved

through MLD electronic means. This extension of a social context is well beyond the

typical show-and-tell process for parents done at school Open House functions.

Additional data demonstrated students' understanding of virtual social feedback

possibilities. "Sometimes the students can look…look at your post and they can see if it's

the wrong meaning or not and they can tell you" (B-2, personal communication, May

2011). "On the blogs we write all the stories we've done, like the essays and all that. So

then the people like from our class can comment on it. They give us feedback whether

it's good or bad" (A-27, personal communication, May 2011). Student B-6 explained

how a student can choose to solicit virtual social feedback. "And if you don't 'get' a

word in the book…and you can write it on Edmodo and say what does this word mean…

and they'll tell you" (B-6, personal communication, May 2011).

Two students addressed the MLD virtual social feedback capacity as being a

replacement for, and preferable to, the traditional social feedback practice of reading

aloud in class. "When you write a paper in Edmodo…then they read it in front of the

class from Edmodo…then everyone can see it and that is better than saying it out loud

because I am kind of shy" (A-30, personal communication, May 2011). Another student

from Classroom B shared, "Because Edmodo can like speak for you…It doesn't like

'speak,' but like you can read what we post on the Edmodo" (B-4, personal

communication, May 2011).

It was clear that students valued the MLD facilitated social feedback from the

teacher and other students.

> …Edmodo helps me communicate with my teacher and with my peers,
> with the people around me…and we can ask any type of question…
> and mostly *Meteor*, because we get to practice of what we learned, and the
> teacher can see how we improve.
>
> (So what would be an example of what you show her you have learned or
> improved?)
>
> We send it to her Gmail, and sometimes we post in our blogs and
> sometimes she posts comments, telling us what else we needed to do.
> And that's all helpful to becoming a better English speaker and reader. (A-
> 28, personal communication, May 2011).

Students spoke of social feedback opportunities via partner and group MLD activities.

> Oh, *AC Flashcards*, it helps you practice your vocabulary. You just flip it
> and it shows your word and you have to learn it and if you want to
> challenge word, you pass it to your friend, then she shakes it, and she tells
> the word, and you have to say what it means and if it says the things you
> said then you have it correct and you were studying" (A-17, personal
> communication, May 2011).

And sometimes we record with friends, we have partners of 4 and we read them together or apart, like paragraph and then paragraph…taking turns (B-10, personal communication, June 2011).

Student comments regarding social feedback also demonstrated the possible range of social feedback, from a convergent MLD activity designed by the teacher to check for understanding of some precise content, to a student independently choosing to express himself and invite random responses from others.

Before we move on to a new thing, he posts on Edmodo…'Are you guys completely sure you understand this?'

YEAH…(group response in unison).

If we understand the math, you know the objectives book and if you get the CMO (clear measurable objective)…and if we need more help and he explains it as a new post, he tries to do it again (B-9, personal communication, June 2011).

(When you have free time with the iPod, what kinds of things (apps) do you do?)

I go on, I blog and I post things on my blog (A-25, personal communication, May 2011).

Many students mentioned beyond-the-classroom examples of mobile learning devices that explained social feedback opportunities. Broader audiences for social feedback included the public at large, other students, their parents, and other teachers.

…Right now in ELD we're making a video…so we are persuading some people and then we are making the video about it (B-3, personal communication, May 2011).

They could make their own blogs, so then they could share their feelings and other stories about their life to a bunch of people around the world (A-26, personal communication, May 2011).

The parents could also have fun while they are learning. You can show them your work, like in this year we're using the iPods and how our grades improved. (B-5, personal communication, May 2011).FeGp2 –B

He (the teacher) can present it at meetings, so he can show off how smart we are.
(Does he tell you he does that?)
YEAH! (group in unison)

Another thing is that it just hasn't helped us. It's also helped (Teacher's name) because instead of teaching like one lesson to each separate group, she just puts it right here and we can like do the lesson on our own…so it's not just helped us. It's also helped her (A-29, personal communication, May 2011).

It makes other teachers understand that maybe technology could be actually helpful (A-33, personal communication, May 2011).

Students spoke extensively regarding a virtual and individual feedback loop that MLD use provided. This virtual feedback feature was achieved: (1) with the device alone, (2) between the teacher and student via the device, and (3) between the student and other students. The latter kind of social feedback resulted in safe observational comparison opportunities, the final self-efficacy factor. Students believed that individual device feedback appropriated learning without need of other social contact. "Sometimes when you are talking with your friend and it comes up and she tells you a word and you don't know it, like… you can go in the dictionary, you can search it" (B-10, June 2011). Examples were particularly prevalent when students spoke about listening to their own reading recordings in order to improve their reading fluency, as evidenced by this participant group discussion.

…you can record or hear something on the iPod and then we press it, and we could see how long it is and we talk, and then when we press it again, then and you can like pause it, and then you can hear it. If it sounds good

you can just keep on going and keep…then you can keep on talking and stuff. And if you don't like it you can just delete it.

(Tell me about deleting, is that a bad thing?)

No.

(How do you feel about that?)

It's just like... on writing a thing, if you don't like the word or you don't like your sentence- just erase it… that is the thing. But deleting it is like if it's boring, it's not helpful, nothing about it…there's no use.

Yes, and what it would feel like if you started telling someone…and you try to see where you have to improve it. When you start all over, you can see if you want that one too.

(It's not the end of the world if you start over?)

No (A-25-28, May 2011).

Virtual individual student-teacher feedback was described and valued. "Last year …like when we had to do something and they had to grade us, they had to take a paper, had to show it to the whole class. And now on Edmodo, he just shows it to you." (How do you feel about that?) "It's kind of better because no one else could know what grade that you got" (B-10 personal communication, June 2011). Individual evaluative feedback was also cited by students. Regarding a reading fluency app students said, "It tells you what time you did it, and it helps you read it." (So, what do you do with the time?) "Nothing, it tells us if we are doing better in the reading. So, the teacher can tell us if we are doing better" (A-16, personal communication, May 2011). She decides if you go higher or lower. If you go higher, you just start reading higher books" (A-18, personal communication, May 2011). The last example demonstrates a student-generated use of

the individual virtual feedback capability of a mobile learning device app, which then resulted in teacher social feedback.

> So one time the teacher was teaching and she told us we were going to have a spelling test, so then I went on *Spelling Bee* and started practicing and stuff and then I got a great score on it. And the teacher said, "Wow, I never knew you had a great score." I didn't want to tell her because I was afraid it was going to get me in trouble-that I went on *Spelling Bee* (A-16, personal communication, May 2011).

    Observational comparison self-efficacy factor. Some MLD-facilitated student work created virtual social feedback opportunities that were combined with observational comparison opportunities. The keenest example of this was whole class student responses posted collectively, for all students to see and review. "(<u>Teacher's name</u>) gives us challenging math problems on the Edmodo and he puts us to vote and he tells us how many people got it right, and how many people got it wrong" B-3, personal communication May, 2011). One student quite limited in English explained the following about her being able to read other students' responses to the same literature-based questions, "It's okay if I read my friend's answer. I can say, I agree with (Student's name)..but like…I have to say why…and say what page in the book…"(A-30, personal communication, May 2011).

    The open MLD structure for social feedback not only allowed students to see each other's work, and give feedback to one another, it also facilitated students posing their own questions and learning from other students' responses within the MLD social context. "When we read a story, like on the Anthology, sometimes the teacher posts some questions and sometimes we post the questions and we have the students answer to them and see who got them right" (B-7, personal communication, May 2011). This MLD

strategy provided numerous other opportunities for student observational comparisons, as both a self-efficacy factor and an improvement tool.

> (In talking about reading progress) The reading…everything else I have good scores…but reading I'm struggling with. She put apps on there that can help me. Some apps are like for people who are not good readers. They are different than apps for good readers. I would play them and I got more better…stronger.
> (And that's ok with you?)
> Yeah…(B-5, personal communication, May 2011).

Through the MLD-added virtual observation, virtual communication, and virtual learning opportunities, students demonstrated and described enhanced self-efficacy factors. One student summarized this kind of virtual learning enhancement best. "Yeah…the iPod in our class and everywhere else…like where kids have it, I bet it's changed everything about them. It's changed how they learn and how they use it" (B-12, personal communication, May 2011).

Research Question 3: Student Perceived Mobile Learning Device Benefits and Limitations

In addition to student-perceived benefits and limitations presented previously in the iPod touch literacy learning environment section, the reading achievement and learning English section, and the self-efficacy section, this final qualitative data highlights some additional student-perceived benefits and limitations. Benefits already discussed included: (1) learning more (Progress/performance); (2) engagement; (3) learning at a faster and personalized pace (personalization/self-regulation); (4) enhanced communication (two-way, collective social feedback); (5) enhanced incremental feedback and support (virtual and asynchronous); (6) a greater self-awareness; and (7) greater creativity.

Data depicting MLD benefits was coded to researcher-identified descriptors related to MLD benefits. Of the 244 iPod touch benefit citations, the most notable themes included personalization, student engagement, self-regulation, two-way communication, student appropriation, and overcoming limitations. Table demonstrates the codes with the greatest frequency.

Table 16. Summary of Student Focus Group Interview Frequency Data Coded by Organically-Derived Themes Related to Self-Efficacy

Organic Themes	Total Codes	Mean	Standard Deviation
Personalization	117	14.32	5.80
Engagement	117	14.62	6.89
Self-regulation	97	12.13	5.69
Two-way Communication	63	7.87	5.57
Student Appropriation	61	7.62	3.62
Overcoming Limitations	54	6.75	4.46

Perceived mobile learning device benefits. The two themes of overcoming limitations and student appropriated learning were closely connected and merited examination.   The concept of increased MLD accessibility to information surfaced on multiple occasions as the manner in which students overcame limitations and/or appropriated new knowledge. This was most frequently evidenced by the reading fluency activities, the assistive dictionary applications, and the content apps for specialized support/learning. However, students also discussed informational resources in broader ways. "Last year in 4th grade, it was much harder because we didn't have iPods, but we had laptops (2-3 laptops/ room). But she wouldn't let us use the laptops a lot. So, we mostly had to learn it by paying attention" (A-21, personal communication, May 2011). Students shared a sense of empowerment related to how they could appropriate information.

> In Edmodo… that you can ask educational questions to people that you want to find out.
>
> (And how's that different than last year?)
>
> It would be a little bit harder because we would have to write it down, and then we would have to do more work, and on Edmodo the work is easier.
>
> (Easier?)
>
> Cause, we could send it to any teacher, so if you have questions of the teacher, you could send it to them (B-7, personal communication, May 2011).

The customized teacher management tools of Edmodo or Schoology were clearly important resources. "Another helpful thing is that like…on Edmodo there's everything that can help us" (B-10, personal communication, May 2011).   Access to the Internet was perceived as a benefit, but was mentioned less often than the resources housed within the teacher learning management systems. "What has helped me the most was *Brain Pop* because it teaches me things I never knew about the Internet, the economy, and social studies (B-5, personal communication, May 2011).

Students cited other MLD benefits. One student suggested the MLD as an intervention or alternate learning tool to traditional school. "Well, like the parents can buy their kids the iPod…like if they are having trouble or if they are home schooled, they can get the iPod and they can…like read and they can…like get help through the iPod" B-11, personal communication, June 2011). Retention of information also surfaced as a benefit.

> When you're on an airplane or something like traveling to… in your app and you get bored and you want… like you think that you're going to forget all your math problems, you could use the iPod and start playing games and if you want to be a better learner you can go on iBooks or another app you have for books…so then you could read and not get bored

and you can have interesting…you can imagine lots of good things and then you could be… like when you come back to school like…if it were summer vacation and you go back to school, you'll be a better learner (A-16, personal communication, May 2011).

Long-term increased learning was a perceived MLD benefit as well. "I think it will be even better at school. You might get straight 'A's. They might even go to a really good school, maybe middle, or a really good college. It could be the difference from getting into an OK school or a great school, or a scholarship" (A-28, personal communication, May 2011).

Other benefits mentioned multiple times were the technology itself, using less paper, and the device's cost-effectiveness. When asked about how MLD learning is different, the following group discussion ensued.

It's fun (A-28).

(What else?)

It's like…a one-of-a-kind experience (A-27).

(If you had your choice for sixth grade, what kind of classroom would you want?)

Technology…one with the technology (A-27).

When you grow up you'll get better at technology. People need help with computers and you can help them (A-26).

Now everything is used with technology instead of like all the old stuff (A-27, personal communication, May 2011).

The following comment represented several ecologically-minded student responses. "I would say that…I think that you should know that it's really educational and more classes should use…cause it's really helpful, and we don't waste so much paper, and we would have more trees and stuff" (A-31, personal communication, May 2011). Students

were aware that MLD were less expensive than stand-alone computers and they

articulated additional MLD cost-effective measures. Discussing benefits, A-26 said,

> It's educational and instead of buying some books like from a store, you can just go get a sample or buy the book like…I don't know for how much…but instead of going to a store and coming back…it's more convenient. I also think that an e-book or an iBook would be a lot cheaper…like on the iBooks it costs like 7 dollars, but when you go to the store they cost… like 15 dollars (A-26, personal communication, May 2011).

Another student said, "One more thing about the iPods. Right now since the economy is

not really good, instead of spending money on paper, pencils, highlighters and stuff, they

could just use these…because these have everything on it" (A-29, personal

communication, May 2011). One student who was very quiet throughout his group

interview summarized MLD benefits by saying, "They help. They help a lot" (A-25,

personal communication, May 2011).

Perceived mobile learning device limitations. In ascertaining student-perceived

limitations to using mobile learning devices for literacy activities, many students said that

there weren't any limitations. In responding to the question, "Are there some reading or

language arts activities that are not easier with the iPod," Class A, Group 3 commented:

> No, because everything seems easier than last year, because the other things seemed harder. But the iPod shows the instructions and how to do it (A-25)

> Nothing seems harder because when we are reading on iBooks you can highlight the word that you don't understand and then you go to the dictionary and it says what it means (A-27).

> Nope. Nothing is harder, everything is easier (A-26, personal communication, May 2011).

However, as students explained their different MLD experiences, 44 limitations were

recorded and coded, such as this one regarding the pacing of a content app.

> There was the first time when we got *Quick Reader*. I was so frustrated because I never used an iPod but…we got it a week after or something like that,…but it was still hard because it was my first time on *Quick Reader* and it was going too fast, and I didn't know how to use *Quick Reader*. So I had to pay lots of attention to the teacher on how to use it. That helped me learn a lot about the iPod.
>
> (So, when apps are new it might be tough?)
>
> Yeah (A-24, personal communication, May 2011).

As with the above example, some limitations were specific to content applications. Two dictionary app limitations were described. "Sometimes on the dictionary it…like gets you the wrong word then you have to keep trying and trying to get the word to work" (B-3, personal communication, May 2011). The voice word search feature also proved problematic. "On the dictionary, when you do the voice thing for spelling, sometimes it says 'possible ways,' but the possible ways are way off" (B-1, personal communication, May 2001).

Other MLD limitations may have been from a lack of teacher instruction or inadvertent misuse of the device. "Well, in the books in the apps there's a thing called shelf books or something, and then you read a book and try to stop it and it won't stop and you keep doing that. You try to stop it to find out a word, and it won't stop and it will just go to the other page" (B-9, personal communication, June 2011). Three students mentioned the size of the MLD as a limitation.

> I'd say typing. It's harder typing on an i touch than a computer. A computer is easier because it can go more faster, and it will highlight it too… like the iPods. But it won't change the word and what it means, cuz like on the iPod it always changes the word. I try to put this word and I misspelled it and it took me to another word and that was frustrating. If you're typing, it won't (do that) on a computer (A-16, personal communication, May 2011).

> The iPod has like a little screen and like the laptop has a bigger screen so I can fit mostly everything, the iPod I can only fit the paragraph I did… like this (demonstrates with hands) (A-17, personal communication, May 2011).

> I have an opinion about the apps *Simpledraw* and *iBlackboard.* It doesn't have enough space for us. So what we do sometimes is use our own markers and the teacher has whiteboards for us-some people when they don't have any space they go get a whiteboard.

> (So, if it's a longer response, you get a white board?)

> …and if it's a small response we use the iPods (A-18, personal communication, May 2011).

An additional limitation of the iPod touch was described as "freezing." One student said, "When we are reading, we have an app like iBooks and sometimes it freezes, and we are following (*Teacher's name)* when she's reading and it freezes, then you have to turn off the iPod, and then restart it and open it again (A-18, personal communication, May 2011). Another student found reading independently to be a challenge. " iBooks frustrated me because it took a long time to load up the words, or to change the page and I got bored because it took a long time. I need a better app because it takes too long A-20, personal communication, May 2011).

The automatic feature for correcting spelling feature proved to be a challenge to the ELL students for two apparent reasons. Their writing included names or words unfamiliar to the database, and secondly the ELL students' concept of how the word was spelled was unintelligible to the database. As one student explained, "I kind of agree because when you type, it starts erasing every time you do it wrong. And when you're trying to type a name and like they don't know what it is, cause the name is just a

different thing, they think it's not a real word, and then they make it into a different thing, cause it's hard to spell. It's the Auto Spell" (A-30, personal communication, May 2011).

Additionally, students were aware of MLD limitations in terms of its interface with the Internet. An overabundance of information and a need to evaluate the information from the world-wide web was clearly described by Student B-11: "Sometimes when you want to find something out, there's like too much of that stuff that you don't want…like too much information and you only want like one thing. Too much…it gets confusing, and you get really frustrated" (B-11, personal communication, June 2011). One student reasoned why a parent might not be supportive of purchasing an iPod touch for their child, "They wouldn't want it because you might start showing the Internet" (B-13, personal communication, June 2011). A fellow student in the same group added, "Like inappropriate stuff…So they could put parent control and you tell them they can get apps for that and some of them are free apps for safety" (B-14, personal communication, June 2011).

Combining the Mixed Methods Data

The qualitative data regarding student self-efficacy supported the quantitative effect of increased self-efficacy in students that used mobile learning devices for literacy activities. However, for reading achievement, there was a clear contrast between the students' reading achievement data and MLD students' beliefs regarding their improvement in reading. Although the experimental reading achievement data showed a commensurate growth effect with the control group's reading achievement, the increased MLD student self-efficacy over Non-MLD students did not result in greater achievement.

What might this indicate in terms of the relationship between reading self-efficacy and reading achievement?

What was it about the MLD-enhanced socio-cultural learning context that produced these results? Qualitative data clearly revealed that the iPod-enhanced classroom added a virtual communication network for student learners, greater student motivation-engagement, and more opportunities to practice skills, the ability to read with assistance, and explore different expanded content. One important factor within the study, however, did not change between the two groups of ELL students. The amount of learning time available within the school day was not altered. Students did not take the devices home or have extended technology-enhanced learning opportunities after school. Necessarily one must ask then, what literacy practices did the experimental MLD students no longer do, or do less of, and what effect might these foregone activities have had on reading achievement? MLD-student qualitative data revealed some experimental group teacher practices that shed some light on this question. After a brief overview of the study, Chapter 5 will analyze the findings of the research questions, present available conclusions, consider implications for learning with MLD, and suggestions for future MLD research.

Chapter 5

Summary, Discussion, and Implications

      Summary of Findings. This mixed methods study researched a one-to-one implementation of iPod touch devices in fourth- and fifth-grade elementary classrooms. The focus was to explore the mobile learning device's relationship to English language learners' reading achievement, to English language learners' self-efficacy in reading, and to explore the benefits and limitations of the device's daily use as perceived by the students. The hypothesis was that the practice of reading and related literacy activities with mobile learning devices would augment English learners' personal and vicarious learning experiences, and thereby effect student cognitive engagement, reading self-efficacy, and reading academic achievement.

      Of the 426 English language learner students who participated in this eight-month study, 287 of the students, from 16 classrooms, utilized the one-to-one iPod touch devices on a daily basis to assist with literacy activities, while 139 ELL students, from 12 classrooms, did not have access to the devices. The students' progress in reading was benchmarked using two subtests of the NWEA-Measures of Academic Progress; reading and language usage-in Month 1 and Month 8 of the study. Student levels of self-efficacy in reading were benchmarked over the same period of time with the Reader Self-Perception Scale (Henk & Melnick, 1995). Lastly, in Months 8 and 9 of the study, 33 ELL students from two classrooms utilizing the handheld technology participated in one of eight small focus group interviews. Foci of the interviews included the students' MLD literacy experiences and perceived benefits and limitations of the iPod touch. In the

paragraphs that follow, I summarize the findings regarding the three major research questions for this study.

The first question guiding this study asked, *how does the reading achievement of English language learners who utilize 1:1 mobile learning devices compare to the reading achievement of matched ELL students who do not have access to mobile learning devices?* Two separate between-within analyses of variance (ANOVA) were conducted to answer this question— one for the reading subtest data, and one for the language usage subtest data. In each case, the subtests scores were analyzed across the two time periods and the two literacy environments. The small to moderate main effect comparison between the two literacy environments was not significant, suggesting little to no difference in the two literacy environments on student reading sub-test achievement. Regarding the language usage subtest, there was a small-moderate main effect among the time periods, with both the experimental and the control group showing a small-moderate increase in language usage achievement. The main effect between the two groups was not significant, suggesting no difference in the effectiveness of the MLD and Non-MLD environments in language usage achievement over time.

The second research question asked, *in what ways do mobile learning devices impact English Language Learners' self-efficacy about reading when compared to a matched sample of ELL students who do not utilize mobile learning devices?* Five between-within subjects analyses of variance (ANOVA) were conducted to assess the impact of the literacy environments on ELL participant scores on the Reader Self-Perception Scale. Total aggregate self-efficacy survey rates were examined as well as individual rates of the four self-efficacy factors: Progress, Observational Comparison,

Social Feedback and Physiological States. The total self-efficacy survey analysis showed slightly higher mean scores over time for the experimental group than the control group. However, the assumption of homogeneity of variances was violated, making further effect analyses invalid.

In terms of the self-efficacy factors, Progress had the highest relative student perceptions for both student groups, followed by Social Feedback, Physiological States, and Observational Comparison. It was noteworthy that control group participants experienced an actual reduction in self-efficacy for three of the four factors over time (Progress, Observational Comparison, and Physiological States). In contrast, for the experimental group, three of the four factors increased over time (Progress, Observational Comparison, and Physiological States). Social Feedback factor levels increased for both groups over time.

The qualitative interview data for ELL student self-efficacy from the experimental group students mirrored the quantitative survey trend. The Progress factor was the most frequently coded self-efficacy construct, followed by Physiological States to a much lesser degree, along with Social Feedback and Observational Comparison. Extensive discussion regarding the two significant self-efficacy effects for the Progress, Physiological States, and Social Feedback factors follows in the discussion section.

Controlling for teacher quality, what self-efficacy impacts were noted between groups? Several observations were made after conducting a non-parametric ELL analyses with the 12 MLD/Non-MLD teacher pairs. Students of the experimental MLD teachers in 7 of the teacher pairs demonstrated greater self-efficacy gains, while control students in 4 classrooms of the teacher pairs demonstrated greater gains, and one teacher

pair's students made similar self-efficacy gains. Interpretation is limited with this data, beyond noting the extensive range of student self-efficacy gains between the 7 experimental teachers' classrooms, and the much smaller range of gains made by the 4 control teachers' classrooms. Additionally, the analysis indicated a wide discrepancy in student self-efficacy between experimental teachers' classrooms. In fact, MLD students' self-efficacy gains ranged from a change of -7.2% to a +52.4%. Although this MLD study did not specifically look at teacher facilitation, this statistic demonstrates a need to research the teacher's role in the implementation of 1:1 mobile learning devices.

The research also examined *what self-efficacy impacts were noted between the groups when controlling for student English proficiency levels.* This final crosstabs analysis was conducted in order to consider the possible relationship of student English proficiency levels to their self-efficacy levels. Early Advanced and Reclassified students of the experimental group exhibited the largest self-efficacy gains. The highest self-efficacy gains for the control group students were for the Beginning (with just 3 students) and Reclassified students. The experimental gains for the Early Advanced students, those nearly approaching English proficiency, may be important and merit additional study.

Finally, *what, if any, is the relationship between the study's dependent variables?* Three additional analyses were conducted between the dependent variables: (1) reading subtest achievement, (2) language usage subtest achievement, and (3) self-efficacy perception levels. This was done in order to evaluate the correlational strength and direction of the possible relationships.

Reading subtest and self-efficacy factors. The strength of these correlations for both groups in the reading subtest and Social Feedback and Physiological States were

small. Medium correlation sizes for the Progress factor and the reading subtest were noted for both groups. Noteworthy correlational changes in strength from small to medium resulted in the experimental MLD group for the reading subtests and: (1) the total survey; (2) Progress; and (3) Observational Comparison factors.

Language usage subtest and self-efficacy factors. Looking at possible correlations between the language usage subtest and the self-efficacy factors, a similar correlation size shift from small to medium continued for the experimental group between language usage and the three self-efficacy factors of Total Survey, Progress, and Observational Comparison. Over the same time period, the control group saw no significant correlation strength shift, and very incremental change overall.

Reading subtest and language usage sub-test. As might be anticipated between two subtests of a singular assessment, in this case the NWEA-Measures of Academic Progress, there were very large positive correlational relationships between the two subtests, which strengthened slightly overtime for both the control and the experimental group.

The quantitative findings rejected the hypothesis for research question one: the use of iPod touches did not produce significantly different reading achievement gains than the control group of students who did not use the 1:1 technology. Research findings for research question two supported the hypothesis: a significant positive relationship existed between the use of iPod touches and student self-efficacy in reading.

The qualitative findings supported research question one's hypothesis: Students articulated beliefs of improved reading achievement due, in part, to the daily use of the handheld technology. While it was true that the experimental group's reading

achievement increased, it did not occur at a higher rate than the control group's reading achievement. The qualitative findings did, however, significantly support the quantitative findings regarding research question two student self-efficacy in reading.

In the interviews, students using MLD for literacy activities on a daily basis expressed feeling more engaged and motivated doing their literacy work. This was previously corroborated by the student self-efficacy survey data.

Discussion of Findings

The above findings pose several questions and merit further discussion.

If an assistive technology such as the iPod touch produces at least as positive of an achievement effect as traditional instruction, and it significantly increases student motivation and engagement, is it worth pursuing? I believe the answer to this question lies within the enhanced socio-cultural context that the 1:1 mobile learning devices enabled. The students strongly believed that the use of handheld multimedia technology, with its access to audio, video, camera, World Wide Web access, and third-party content brought increased value to their daily learning activities. Increased value was represented by the students as a more efficient use of their time, the ability to read whenever they wanted, the dignity to improve their grades on their own, a sense of empowerment to discover new knowledge of their own volition, and an enhanced communication power.

The iPod touches supported student learning by: (1) presenting information and literacy activities to students via multimedia; (2) assessing and providing feedback to students via MLD activities/practice; (3) providing important device-embedded language scaffolds, such as word pronunciation and meaning; and (4) introducing a much broader world of language and academic content. Particularly for English language learners, the

data bore out a connection between the iPod touch features and enhanced student ability to experience success on individual levels, even when learning targets were at significantly different levels than other ELL or English proficient classmates. Students described how the device lends itself to the increased ability for a teacher to differentiate, manage, and monitor instruction for multiple learner levels.

Although data revealed the extent to which this was successfully done varied between experimental classrooms and teachers, students from all interview focus groups related the teacher-facilitated content to enjoyable learning experiences, efficiency and fun. Evidenced as significant gains in self-efficacy, this increased student engagement played a mediating role in student cognitive engagement. Perhaps the best example of the MLD's mediating role in cognitive engagement was a focus group's discussion in which the students compared the heightened rate of MLD engagement to the painfully slow pace of language arts instruction from their previous year's traditional classroom. Reading researchers such as Guthrie (2001) had similar findings from previous research, maintaining that motivation is an essential determinant whether or not students choose to read.

On a number of occasions, students spoke about their preference to learn new or unknown content on their own, individually, or in a private fashion before having to demonstrate or post their knowledge to others. Roschelle described this phenomenon as anonymous learning (2003). I believe that for English language learners, who by definition are not at commensurate English language or achievement levels as their peers, the MLD's ability to provide this kind of emotionally secure asynchronous learning environment has significant potential.

The individual/internal feedback factor described above is one example of a socio-cultural change derived from mobile learning device use. Additional socio-cultural changes included Social Feedback opportunities, multiple non-threatening Observational Comparison opportunities, and amplified access to content/on-demand learning. I theorize that the daily use of iPod touches results in a significantly expanded socio-cultural environment; a virtually-enhanced socio-cultural environment. A new theoretical model is needed to accurately depict this environment. This model is a blend of traditional and 1:1 MLD learning. It necessarily builds upon a traditional classroom model, and includes new MLD-assisted virtual social augmentations to the cultural context. Traditional pedagogical socio-cultural dynamics are illustrated below in Figure 2 by lines and arrows representing typical communication patterns between the teacher and a student, between a student and other students, and of collective whole class interactions involving all students and the teacher. These traditional dynamics occur within a classroom (represented by the circle).
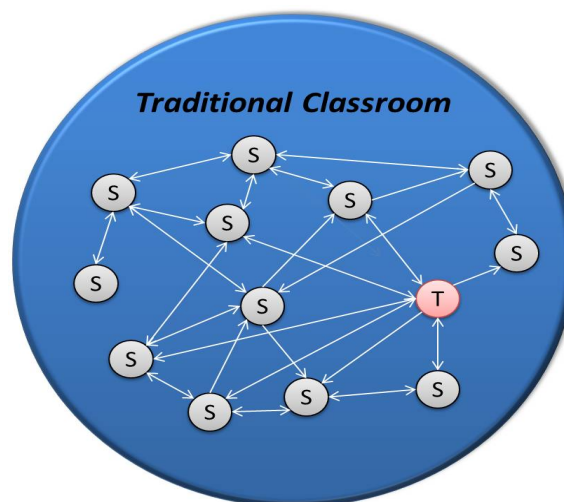
Figure 2. Traditional Classroom Social Dynamics

NOTE: T-Teacher; S-Student.

With the mobile learning devices and Internet connectivity, the classroom virtually expanded with new digitized voices, new multimedia representations for learning, new interaction possibilities, and an exponentially increased access to content and information (Figure 3). Zhao et al. (2003) used the metaphor of an ecosystem and an invading species to understand the complex factors involved with technology use in schools (2003). In this study, the virtually-enhanced classroom context is represented by the expanded circle, limited only by the finite time students had available to use the MLD (see Figure 3 below). In an ideal MLD learning context in which the students would be able to take the devices home, the model would be expanded by a third circle, indicating learning time occurring beyond the formal school day.
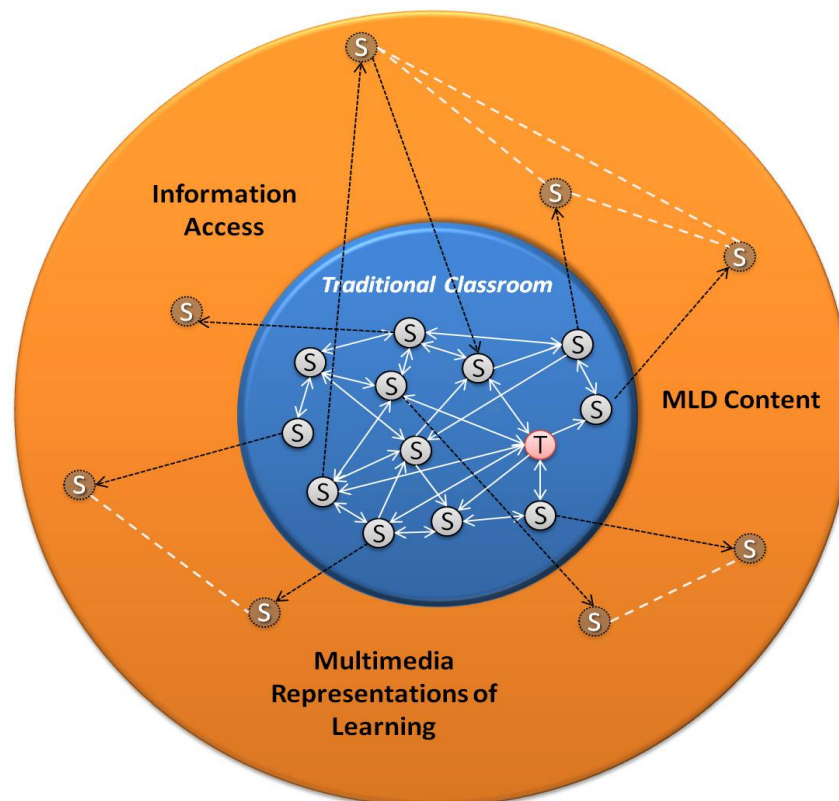
Figure 3. Enhanced Virtual Classroom Context with 1:1 Multimedia Device Access

NOTE: T-Teacher; S-Student

Student descriptions of MLD socio-cultural interactions, activities, processes, and practices contributed to a virtually-enhanced learning context. One student's set of sample social interactions is depicted in Figure 4 below. With the 32 students in each of the classrooms, the model can be extrapolated to imagine the overall richness of communication and language afforded within the classroom by the mobile learning devices.
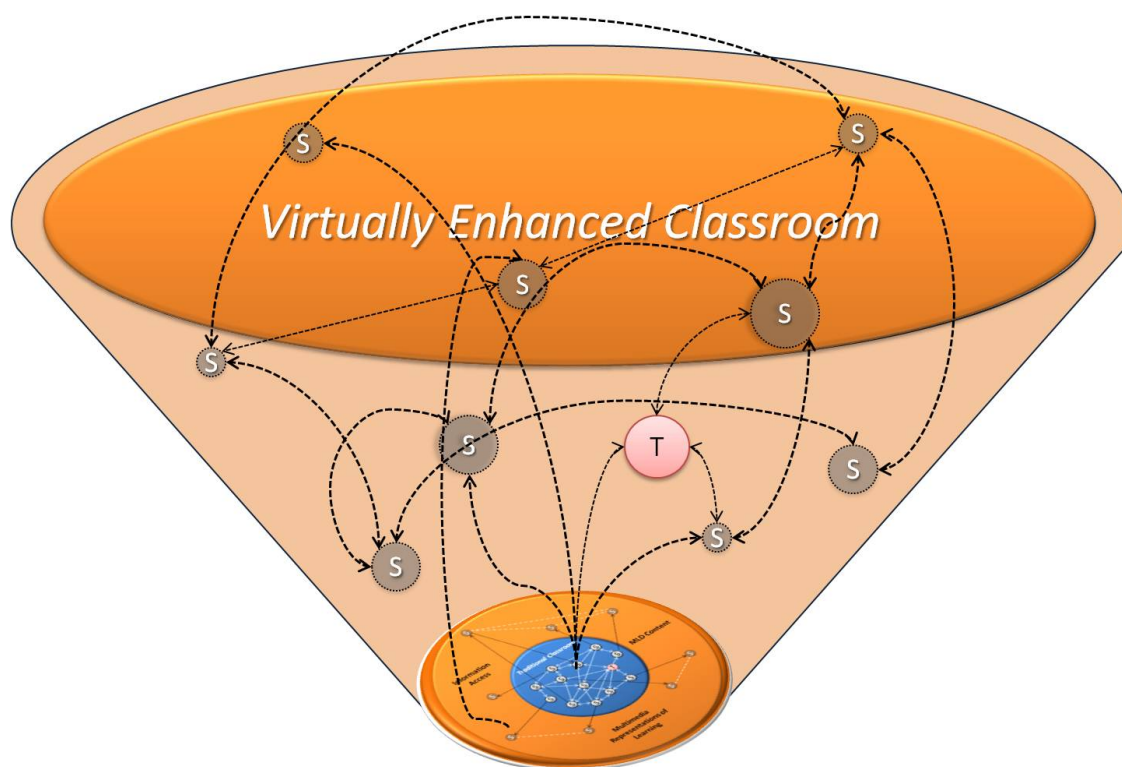
Figure 4. Virtually-Enhanced Socio-Cultural Classroom Context with 1:1 Mobile Learning Devices

NOTE: T- Teacher; S- Student

MLD-mediated interactions occurred in a virtual space that was within and yet far beyond the classroom. In terms of Social Feedback, for example, students were no longer limited to real-time feedback methods from the past, such as a brief teacher-led

conversation or a 15-minute cooperative group activity. The range of virtual

communication was wide, from a shy ELL student expressing the device's ability to

speak for her, to a singular virtual audience such as the teacher, to an open-ended virtual

world beyond the student's classroom. In the above virtually-enhanced socio-cultural

MLD classroom model, the additional virtual communication means are represented in

the lightly shaded 3-dimentional space, above and beyond the circular classroom space.

The expanded MLD communication led to a qualitatively different socio-cultural

context, which produced increased student self-efficacy in reading. Indeed, this new

context is worth pursuing and exploring in order to understand how best to maximize the

communication potential, to study additional MLD factors at play, and their combined

relationships to student achievement. Many unanswered questions remain.

To what extent might the factor of time be significant in terms of increased

English acquisition and reading achievement? With a significant correlation between

ELL student self-efficacy increases and MLD use, it could be theorized that more time

utilizing the mobile devices may relate to stronger reading achievement outcomes.

Torgesen (2006) determined key factors for effective reading interventions for at-risk

students. He said that effective protocol needed to. "…significantly increase the intensity

of instruction and practice, which is accomplished primarily by increasing instructional

time, reducing the size of the instructional group, or doing both" (p. 2).

Even though students felt strongly that they made better use of their classroom

time with MLD, the factor of time was fixed. It may be the case that more time was

needed for the students to master the content, even with appropriately leveled content to

student learning needs. If, for example, students were able to take the devices home and

practice MLD activity or do research, time would no longer be fixed. The MLD emphasis might then be able to shift more to mastery and/or different quality learning experiences. Not enough research has yet been done with this kind of technology to know if a certain amount or certain quality of virtual interaction time is necessary to significantly augment reading achievement.

In some past technology research, this has proven to be true. In studies of software programs providing reading tutorials, Kulik and Becker both found that the technological interventions did not result in significant improvements in reading achievement (Kulik, 2003, Becker, 1994). Kulik pointed out, however that the software program effects may have been stronger had the content been implemented as designed by the developers. His study results revealed that students spent approximately half of the developer-recommended amount of time on the computer assisted instruction. It is unknown in this MLD study, with an open-architecture instructional management system and a plethora of available content apps, whether or not a "tipping point" level of input, after a certain amount of time, would produce a significantly higher level of achievement than achievement gains made by students in the control traditional classroom (Gladwell, 2000).

In fact, MLD students did not have more time for literacy activities than the control group. Given the neutral factor of time, the facilitative role of the teacher for the MLD use became even more important. MLD teachers were tasked to determine appropriate MLD content and how best to instructionally utilize the devices. Perhaps equally important teacher decisions centered around which traditional literacy practices

would remain, and which ones would not. Creating a balanced literacy program within the new virtual socio-cultural context requires thoughtful implementation.

   To what extent might the quality and selection of MLD literacy tasks have impacted the produced reading achievement levels? The data revealed examples in which the five components of effective reading instruction— phonemic awareness, phonics, fluency, vocabulary, and comprehension — were enhanced with MLD utilization. The MLD was used extensively as a fluency tool to provide a bridge between word recognition and the more fluency-dependent skill of reading comprehension. According to a 2002 National Reading Panel, fluency or "repeated reading with attention to text comprehension has been shown to be effective in experimental studies," as determined by a conducted meta-analysis (Worthy & Broadus, 2001, p.336). In this case, however, the extent to which the teachers were able to match up the other reading program components with the students' MLD literacy activities in order to meet students' critical literacy needs appropriately leveled instruction was not clear (Vygotsky, 1978). Previous research regarding engaging literacy instruction emphasized educators needing to provide students with choice, as well as a responsive classroom with instruction centering on learners as opposed to solely centering on texts (Guthrie, Wigfield, & Von Secker, 2000).

   Interestingly, successful MLD technology matches to student needs were more easily articulated by students in the area of mathematics than in the area of reading. In addition to technology being able to address critical literacy goals and student needs, the technology also needs to be a good fit with the existing reading curriculum, and with supporting and extending activities (Technology and Teaching Children to Read, 2004).

Examining the MLD fit with the reading program was not within the scope of this study. In the study's blended learning environment, the mobile learning devices were but one component of the overall reading program.

Two additional student issues emerged from the data: (1) student self-selection of independent reading material; and (2) the extent to which students solicited the assistance of MLD-mediated digitized speech to read stories for them. Both issues seemed related to accelerating student achievement and were not programmed to be adjusted by the MLD or software. In the selection of reading materials, Classroom A students were directly guided by their teacher. Classroom B students were less directly guided and selected books from a teacher-recommended list or the Accelerated Reader program. It is imperative for successful text comprehension that students read from texts and supplemental materials aligned to their zone of proximal development (Vygotsky, 1978). Students' reading ability and whether or not MLD reading material was aligned to the students' ability was not included data in this study.

The mobile learning device feature of digitally-recorded stories from the reading textbook was frequently mentioned. While having the text read aloud can enable students to engage in reading with comprehension, it was unknown to the researcher which ELL students needed this electronic scaffolding and which students might have benefitted from a reduction in scaffolding, to afford more able students the responsibility for their own reading. In MLD classrooms with a wide range of ELL student reading levels, the presence of a talking reading selection may be important. As more well-designed reading software is developed with built-in meaning making strategies, such as graphic organizers and hypertexts with comprehension questions, a teacher will be able to better control the

read aloud feature (a present capability), and be able to challenge higher level ELL students to read and more actively interact with the text. (Technology and Teaching Children to Read, 2004). As Slavin et al. (2008) have pointed out, students' reading comprehension depends a great deal on the teacher to facilitate and provide structures for the necessary student metacognition to develop over time. It has been further maintained that direct and explicit instruction must be included in reading intervention processes. Slavin's best evidence synthesis clearly indicated that programs designed to change teaching practices show greater reading comprehension gains than programs focused solely on a curriculum or on a technology. The quality of MLD teachers' reading comprehension instruction and support was not measured in this study. Also important and unknown was the level of interface/alignment between the teachers' explicitly taught comprehension practices and student MLD comprehension practices.

Lastly, an overall comparison of MLD and Non-MLD student literacy tasks was not conducted. Since the achievement gain levels of both groups were commensurate with one another, it may be that the MLD-mediated literacy activities did not challenge students' cognitive, affective, or psychomotor domains in a significantly different way. The mobile learning device has the ability to facilitate learning which demands student thought beyond remembering and understanding to activities demanding students apply, analyze, evaluate and create content. After being exposed to MLD for eight months, students discussed some activities requiring higher thinking skills. In comparison however, more drill and practice MLD activities for grammar and vocabulary acquisition purposes were cited than open-ended interdisciplinary projects or extended activities. One might speculate that future MLD achievement potential may be more likely

actualized after early MLD practitioners fully understand and explore higher level learning opportunities such as these.

Connections to Prior Research

It is imperative that educators continue to explore how individual mobile learning devices can be utilized for learning, both within classrooms and beyond the classroom doors. When a fourth-grade English language learner speaks about a one-of-a-kind MLD experience, it is incumbent upon educators to pursue understanding of that reaction, and to research how to best capitalize on such an innovation for learning. English language learner students' in 16 classrooms who utilized iPod touches on a daily basis made the same reading achievement as students not using the devices, and yet made significant increases in their reading self-efficacy levels over students without technology. Although other reading achievement studies involving technology have shown significant reading gains over the control groups, this study did not (Greenlee-Moore & Smith, 1996; Northeast and the Islands Regional Technology in Education Consortium, 2004). A majority of the currently existing technology-enhanced reading research is related to computer-assisted technology and specific reading software or management systems. More specific research is called for on the utilization of one-to-one mobile devices for learning.

This research is also notable in that it studied the implementation of 1:1 mobile learning devices and the corresponding evolution of a new virtually-enhanced learning environment in depth in two classrooms, from the ELL students' perspectives. Unlike other MLD research, which has largely focused upon and measured a prescribed software or process, this 1:1 study documented a school district's exploration of possible

educational uses through the eyes of its recipients-the students (Soloway et al., 2001). Within this study, the teachers explored and determined the best MLD designs for their students, with on-going central office professional development and support. Instructional MLD activities were independently controlled by MLD teachers and were changed during the year depending on how students responded to particular applications or activities.

This study clearly delineated virtual communication supports associated with the use of 1:1 mobile learning devices. The students' ability to asynchronously communicate— to express themselves, to get support, and learn new things through the device— was of great value to the students. Zhao and others have previously discussed Internet-altered conditions of interpersonal contact, and have called for a new social reality that includes a "there and now" communication zone (Zhao, 2006, Kulkulska-Hulme, 2007). Within this study's classroom setting, the virtually enhanced socio-cultural context allowed for many communications that might not have occurred, or have occurred in a less timely way, in a traditional classroom setting. Virtual classroom communications were not limited, like past research, to the MLD's Internet feature or the device technical capacity (sources). Enhanced virtual communications included: (1) learning management systems that afforded the students and teacher the ability to organize their MLD work; (2) the ability for students to privately ask and receive instructional help from the device, their teacher, or other students; (3) a safe way to report interpersonal issues, such as a bully, to the teacher; (4) whole class virtual forums to exhibit student products and receive virtual written or verbal peer feedback; (5) the ability for English-emergent students to privately share their oral reading and other verbal

productions; (6) the ability to interact and share work with parents and students in other locations via classroom and personal student blogs; and (7) the exposure to new multimedia academic content, including meaning-making communication activities.

The daily use of the iPod touches positively impacted the self-efficacy of learners of English as a second language. Increased enjoyment, greater efficiency and confidence may be important predictors of future academic success for the students. The iPods' capacity, along with a teacher's ability to differentiate appropriately leveled practice activities via the MLD cannot be underestimated. This is a true prospect for greater utilization of mobile learning devices and future research. No other study has documented such MLD benefits for ELLs.

Students freely documented past learning frustrations and how 1:1 practice with the mobile learning device helped them to overcome areas of weakness. Even with teacher-controlled content on the devices, students felt empowered to regulate their own learning and realize their progress. As students remarked, the device's assistive features allowed students to solicit help, and thereby have more control over their own academic success. In this way, the study's results support Kulkulska-Hulme's and Swan's previous MLD student personalization research, the continued use of individual mobile devices for learning, and the need for continued research on how best to leverage high order thinking and creativity (2007, 2005, respectively). Further research will afford a more comprehensive understanding of one student's assertion that mobile learning devices changed everything about how he learned.

Areas for Future Research

　　As this research is at the front of a much larger mobile learning device adoption cycle with children in educational settings, there are many areas for further research. Some of these ideas have been presented earlier. Perhaps the most crucial area for future MLD research would be an examination of MLD-related student tasks. It would be valuable to know to what extent MLD tasks are replacing existing educational practices and to what extent the MLD is being leveraged to further challenge students with more enriching higher thinking order learning opportunities.

　　Secondly, it would be useful to conduct a comparative study between participating MLD teachers. It was apparent by the significant differences in pre-post student self-efficacy in this study that all MLD teachers did not utilize the devices in the same way. A qualitative study of the teachers in the classrooms in which students were the most productive, in terms of reading achievement and self-efficacy gains would be valuable. Learning about the successful teachers' instructional planning, facilitation methods, and monitoring processes could be crucial to more effective MLD implementation.

　　Further reading research is necessary for English language learners and technology. Deeper analysis of their reading achievement data, by specific reading skills, could reveal some important information about MLD use. A long-term ELL/MLD study might also be warranted, especially since the majority of the students from this study will continue using 1:1 mobile learning devices in their next school year. The self-efficacy increases realized could be analyzed for sustainability over time, as well as a re-examination of reading achievement for a possible long-term correlational effect.

Given the significant number of Intermediate Level 3 ELL students in the nation, further research to identify specific apps and MLD activities that target their English acquisition learning needs would also be of practical value.

More narrow studies are also called for from this research. For example, students discussed the concept of "free time" with their iPod touch use. This might be an area for research to explore how students make utilization decisions, and to what extent might this time be leveraged for even more higher- level active learning than what students described in this study. Further research could also study MLD-enhanced impacts for just one reading program component, such as fluency, or comprehension, or oral language development, or writing.

Research will need to be further conducted in order to more completely understand the benefits and limitations of the mobile learning devices being used as an extended learning tool outside of class. Many factors would need to be addressed and researched in order for educators to understand critical contributing factors to increase MLD-enhanced achievement.

The further research areas above could all be done with other MLD devices, with students at different grade levels, and in different socio-economic settings as well. Empirical research about MLD reading supports and interventions, specifically tailored to English language learners needs to be conducted for inclusion in the What Works Clearinghouse, a national online site that publishes intervention reports that evaluate literacy and instructional strategies for students in grades 4-12 (Institute of Educational Science, http://ies.ed.gov/ncee/wwc/).

Implications for Practice, Policy, and Social Justice

   Practice Implications for 1:1 Mobile Learning Devices. The increase in student engagement in the experimental MLD classes over the control group and commensurate reading achievement gains with the control group call for additional action research in order to explore the optimal value of 1:1 technology implementation and applications for reading instruction, reading practice, and mastery. As Naismith et al. (2004) pointed out early on in handheld research there are many factors that must be considered to implement technology effectively. With evolving MLD technology and multimedia content, one national report recommends blending "the practitioner wisdom of elementary teachers, reading specialists, special educators, and instructional technology specialists to reach the best possible decisions" (Technology and Teaching Children to Read, 2004, p. 19). The learners' opinions and reactions must also be central to the discussion as handheld learning is evaluated and its utilization evolves.

   In the not too distant past, the financial cost of mobile learning devices precluded any practical implementation in elementary classrooms. This is no longer the case. Notwithstanding the technology infrastructure that is needed for any electronically connected classroom whether it utilizes computers or individual mobile learning devices, the current MLD cost of approximately $236 per device is quite affordable. If one begins to account for classroom supplies that will no longer be necessary, such as dictionaries, thesauruses, encyclopedias, maps, supplemental reading materials, etc. the individual learning device becomes even more economical. The MLD has other educational benefits that are more challenging to quantify in a cost-benefit analysis. As evidenced from the study, these benefits include a virtually-enhanced socio-cultural learning

context, an immediate anonymous access to assistive information, and immediate access to connect learning to other people, places and real-world events via the Internet and third-party applications. The relevancy and alignment of an MLD-enhanced classroom to how students co-exist and learn with technology outside the classroom is also an added value.

Such ascribed value will only be attained with a thoughtful implementation plan that includes all stakeholders and centers upon teachers' skills to cognitively plan for optimal learning in the virtually-enhanced socio-cultural learning context. Voluntary and ongoing MLD professional development of current educators, along with purposeful selection of new educators that will embrace blended learning are essential to an educational system's technological evolution. Professional development activities themselves can take on virtual communication and sharing aspects when designed for daily support for the MLD teacher trailblazers. Other success factors needed include a stable funding source, administrative support, reliable and open-ended technology infrastructure to accommodate new technology, and broad community support.

1:1 Mobile Learning Device Policy Implications. From a policy perspective, there is a need for leaders to juxtapose the argument to invest in one-to-one educational technology with the need for the nation to be globally competitive. In terms of clear policy, there are two documents that provide impetus toward this needed nexus; the Common Core State Standards and the National Education Technology Plan (National Governors Association for Best Practices and the Council of Chief State School Officers, 2010; United States Department of Education, 2010).

Mobile learning devices, whether they are smart phones, tablets, or laptop computers, must be an available tool for attaining the new Common Core Standards. The complexity of the standards, which include rigorous content and application of knowledge through high-order skills call for students to conduct research on demand, to think, and to synthesize multiple sources of information. The assessments are evidence-based and require access to technology as seen in the seventh-grade example below (Figure 5). The 2014 national assessments will be given electronically, and it is noteworthy that the only listed resources for students to access are entirely accessed via technology using the Internet.

Part III: An Extended Performance Task

Gas Bills, Heating Degree Days, and Energy Efficiency

Here is a typical story about an Ohio family concerned with saving money and energy by better insulating their house.

Kevin and Shana Johnson's mother was surprised by some very high gas heating bills during the winter months of 2007. To improve the energy efficiency of her house, Ms. Johnson found a contractor who installed new insulation and sealed some of her windows. He charged her $600 for this work and told her he was pretty sure that her gas bills would go down by "at least 10 percent each year." Since she had spent nearly $1,500 to keep her house warm the previous winter, she expected her investment would conserve enough energy to save at least $150 each winter (10% of $1,500) on her gas bills.

Ms. Johnson's gas bill in January 2007 was $240. When she got the bill for January 2008, she was stunned that the new bill was $235. If the new insulation was going to save only $5 each month, it was going to take a very long time to earn back the $600 she had spent. So she called the insulation contractor to see if he had an explanation for what might have gone wrong. The contractor pointed out that the month of January had been very cold this year *and* that the rates had gone up from last year. He said her bill was probably at least 10% less than it would have been without the new insulation and window sealing.

	Customer	Bill Date
Argon Energy Co.	Ms. Arlene Johnson 42 Bluebonnet Avenue Columbus OH 43205	Jan 31, 2008 **Account #** 56-73342B Residential

Current Itemised Bill

December 30 reading actual		8300
January 31 reading actual		8488
Total units used January 2008		188
January 2008:	1108 heating degree days 0 cooling degree days	
Price per unit @ $1.25		$235

Energy Use History

Total units used January 2007		200
January 2007:	1000 heating degree days 0 cooling degree days	

TOTAL CURRENT CHARGES   **$235**

Ms. Johnson compared her January bill from 2008 to her January bill from 2007. She found out that she had used 200 units of heat in January of 2007 and was charged $1.20 per unit (total = $240). In 2008, she had used 188 units of heat but was charged $1.25 per unit (total = $235) because gas prices were higher in 2008. She found out the average temperature in Ohio in January 2007 had been 32.9 degrees, and in January of 2008, the average temperature was more than 4 degrees colder, 28.7 degrees. Ms. Johnson realized she was doing well to have used less energy (188 units versus 200 units), especially in a month when it had been colder than the previous year.

Since she used gas for heating only, Ms. Johnson wanted a better estimate of the savings due to the additional insulation and window sealing. She asked Kevin and Shana to look into whether the "heating degree days" listed on the bill might provide some insight.

Figure 5. Common Core Extended Performance Task-Grade 7

Winter Temperatures and "Heating Degree Days"

Kevin and Shana quickly found a description of "degree days" on Wikipedia at http://en.wikipedia.org/wiki/Heating_degree_day. Here is some of what they learned:

> Degree Days are a method for determining cumulative temperatures over the course of a season. They were originally designed to evaluate energy demand and consumption, and are based on how far the average temperature departs from a human comfort level of 65°F. Each degree of temperature above 65°F is counted as one cooling degree day, and each degree of temperature below 65°F is counted as one heating degree day. For example, a day with an average temperature of 45°F is counted as having 20 heating degree days. The number of degree days accumulated in a day is proportional to the amount of heating/cooling you would have to do to a building to reach the human comfort level of 65°F. The degree days are accumulated each day over the course of a heating/cooling season, and can be compared to a long term (multi-year) average, or norm, to see if that season was warmer or cooler than usual.

Task Description

Assess the cost-effectiveness of Ms. Johnson's new insulation and window sealing. In your assessment, you must do the following:

- Compare Ms. Johnson's gas bills from January 2007 and January 2008, estimate her savings due to the new insulation and sealing, and explain your reasoning.

- Decide whether the insulation and sealing work on Ms Johnson's house was cost-effective, and provide evidence for your decision.

Internet Resources

Heating and Cooling Degree Days - Definitions and Data Sources

> Definition and discussion - http://en.wikipedia.org/wiki/Heating_degree_day

> Standard for HDDs and CDDs - http://www.weather2000.com/dd_glossary.html

> National Climatic Data Center -
> http://www.ncdc.noaa.gov/oa/documentlibrary/hcs/hcs.html

> City-specific data - http://www.degreedays.net (use weather station KOSU for Columbus)

Natural Gas Usage and Natural Gas Prices

> U.S. Dept. of Energy - http://www.eia.doe.gov/neic/brochure/oil_gas/rngp/index.html

> Ohio Consumers' Council - http://www.pickocc.org/publications/handbook/gas.shtml

> Ohio Public Utilities Commission - price comparison chart for Columbia Gas of Ohio -
> http://www.puco.ohio.gov/Puco/ApplesToApples/NaturalGas.cfm?id=4594

Figure 5. Common Core Extended Performance Task-Grade 7, continued

The National Technology Plan echoes reform in a similarly embedded way, calling on school systems to "leverage the power of technology to measure what matters and use assessment data for continuous improvement" (http://www.ed.gov/technology/netp-2010/assessment) . The Common Core high quality, technology-intensive assessments will influence and change many future educational decisions related to technology. Ultimate student success will depend upon national, state and local policy makers to ready their community, their system, their teachers, and their learners for new virtually-enhanced ways to teach, learn, and demonstrate acquired knowledge.

Within the National Technology Plan a fifth goal entitled "Productivity: Redesign and Transform" discusses the need for technology to not just be utilized to automate existing educational practices. Instead, the outlined policy challenge is for educators to make "fundamental structural changes that technology enables if we are to see dramatic improvement in productivity." Indeed as this study has revealed, some roles and processes of teaching and learning shift with one-to-one mobile technology. Learning across contexts shifts (Sharples, 2006). In a 1:1 MLD classroom a new virtually-enhanced context was evidenced. Further exploration is needed to understand how best to improve the achievement productivity in 1:1 learning environments. School leaders must continue to push forward conversations to rethink "not just learning, assessment and teaching process in the classroom, but also the infrastructure and operational and financial sides of running schools and school systems" (http://www.ed.gov/technology/netp-2010/assessment).

1:1 Mobile Learning Devices and Social Justice Implications. Substantial social justice implications come into play as the need for technological and instructional school reform abounds. For instance, how will students housed in older urban schools or in rural areas, with limited technology infrastructure, gain equal access to the Internet as suburban student counterparts in newer wireless school communities with individual mobile devices for each student? It can be argued that mobile technology has the capability to bridge the technology access divide inside classrooms, as it has done to a large degree in the broader community. The issue of school connectivity still remains a significant barrier to equal student access in terms of connectivity and access to quality electronic content .

Connectivity outside of school is also an equity issue for students of poverty. Students performing below grade level, along with students who are acquiring English as a second language and may also be performing below grade level because they are not yet proficient in English skills need additional learning time, beyond the time afforded to learn current grade level content standards. It is entirely possible that if students had access to mobile learning devices for appropriate and targeted practice/ learning activities beyond the school day, the learning opportunity gap could be substantially narrowed. One barrier to this targeted intervention is the fact that one third of Americans do not have Internet connectivity in their homes. Several national efforts are underway to address this connectivity discrepancy of the poorest Americans without broadband access in their homes. A private and non-profit sector partnership, known as Connect to Compete, is promoting broadband adoption and digital literacy training for disadvantaged communities in order to improve learning outcomes. The concept is to offer broadband

access (Internet service) at the significantly reduced rate of approximately $10.00 per month, along with the availability for purchase of computers for $150 and $250 (Connect to Compete, http://connect2compete.org).

In November 2011, the Federal Communications Commission (FCC) announced a public-private plan to meet the national goal of connecting all Americans to the Internet (Vaughn, 2011). This plan mirrors the Connect to Compete plan. For families whose students qualify for the federal school-lunch program, Internet providers will be able to offer monthly broadband service for $9.99 beginning in the spring of 2012. It is estimated that an additional 25 million Americans will gain home broadband access over the two-year initiative.

As connectivity expands in students' homes, connectivity amongst and between schools is uneven at best. The federal E-rate program provides schools and libraries with certain discounts for broadband access and electronic services. The level of discounted rates depends on eligibility criteria such as the level of students living in poverty. While this program has made a strong difference in schools with high levels of students eligible for the National School Lunch Program, schools without such discounts struggling to electronically transform their schools. It is a moral imperative to provide electronic connectivity to all schools in the nation.

School leaders must be willing to leverage their leadership within their school communities in order to manage the system change needed to produce highly capable graduates ready to adapt and compete in the global knowledge economy. To the extent that technology plays and will continue to play a pivotal information access and learning role, education leaders must strategically forge forward to do the following:

1. Raise community-by community awareness for investment in educational technology

2. Lead multi-year local policy initiatives that ensure all educational systems have technology enhanced learning environments

3. Targeted classroom action research in which digital content and platforms can be fully explored in terms of their potential to motivate students to think more critically, read in more reflective ways, and write in more reflective ways.

4. Invest and design professional development keying upon the strengths of the creators of the socio-cultural context, the teachers, but which also relies upon input and feedback from the digital partners-the students.

Conclusion

In this study, English language learner students accessed additional language models, practiced English, and received accelerated feedback as they learned with the aid of 1:1 mobile learning devices and the device's multimedia-enhanced academic content. The increased reading self-efficacy levels of the ELL students support further exploration of handheld technology's potential. Mobile learning devices, facilitated by the classroom teacher, produced a virtually-enhanced socio-cultural context for learning. Many factors related to this new learning context, such as time, the mediating role of the teacher, the quality of alignment of MLD learning tasks, and the alignment of MLD tasks to student needs merit further research. With additional information, and both technological refinement and MLD curricula refinement, it may be possible for ELL students to extend literacy activity practice, thereby accelerating English acquisition and reading achievement, beyond what was evidenced within the scope of this study. Increased

student engagement with the 1:1 multimedia technology is undeniable, as is the critical

need for more definitive empirical research.

APPENDICIES

Appendix A.
Technology Use Policy

Escondido Union School District
ACCEPTABLE USE POLICY
For Using the Internet and the District Network

The Escondido Union School District (EUSD) has a behavior code for all students that details appropriate school behaviors and sets expectations for students. The use of the Internet is a continuance of the school's activity; therefore, the school's code of conduct applies to the use of Internet activities as well. The EUSD network provides students access to web-based content that supports the core curriculum. In addition, the network provides data storage and retrieval, and district created curriculum.

While staff will ensure that high quality online materials are available and promoted, the Internet may include some material that is not suited for students. The district, in compliance with the Children's Internet Protection Act (CIPA), employs a filtering system on all computers within the school district to help protect against inappropriate use.

RULES TO FOLLOW	EXAMPLES
I will use the school computers for educational use only.	Appropriate uses of computers and the network include: • study and research • educational and exploratory programs
I will not use the school computers for illegal or dishonest purposes.	Examples of illegal or dishonest activity: • copying software • sending threatening emails • copying digital art work or printed material illegally • copying another person's work and submitting it as your own
I will not search for, create, or distribute things that are inappropriate for school.	Things that are inappropriate include: • spreading untrue rumors and gossip through the network • downloading or displaying offensive pictures
I will not intentionally create network congestion or damage computer equipment.	Things which could disrupt other users: • downloading large files from the Internet • deleting or changing critical files • using the computer system to gain unauthorized entry into other computer systems • installing unauthorized software • having food or drink around computer equipment
I will not allow others to use my network account.	Examples of unacceptable behaviors: • telling other people your password • leaving a computer logged on
I will not reveal personal details to strangers through the Internet.	Examples of unsafe behaviors: • revealing your name, address, telephone number, or picture to an unknown person by email, chat session, online form, or web page • accepting offers to meet strangers who you have met online

Termination/Revocation of System User Account
The use of the information system is a privilege, not a right, and inappropriate use will result in cancellation of those privileges. Each person who accesses the system will participate in a discussion with a school staff member as to proper behavior and use of the network. EUSD will decide what is appropriate and their decision is final. Access will be denied at any time deemed necessary.

A. The district may suspend or revoke a system user's access to the district's system upon any violation of district policy and/or administrative regulation.

B. Prior to a suspension or revocation of system service or as soon as practicable, the principal or system administrator/designee will inform the system user of the suspended violation and give the system user an opportunity to present an explanation.

Disclaimer
EUSD does not warrant that the functions or services performed by or that the information or software contained on the system will meet the system user's requirements or that the system will be uninterrupted or error-free or that defects will be corrected. The district's system is provided on an "as is, as available" basis. EUSD does not make any warranties, whether expressed or implied including, without limitation, those of merchant ability and fitness for a particular purpose with respect to any services provided by the system and any information or software contained therein.

If you are interested in reading the applicable board policy [BP 6163.4] and its administrative regulations governing the use of technology, they may be accessed at *www.eusd4kids.org/internet_aup.htm* or by calling the Educational Technology office at (760) 432-2167.

Appendix B.
Technology School Board Policy

Instruction   BP 6163.4(a)

STUDENT USE OF TECHNOLOGY (INTERNET)

Student Access to Networked Information Resources

The Board of Education recognizes that as telecommunications and other new technologies shift the ways that information may be accessed, communicated, and transferred by members of the society, those changes also may alter instruction and student learning. The board supports access by students to rich information resources, along with the development by staff of appropriate skills to analyze and evaluate such resources. In a free and democratic society, access to information is a fundamental right of citizenship.

Telecommunications, electronic information sources, and networked services significantly alter the information landscape for schools by opening classrooms to a broader array of resources. In the past, instructional and library media materials could usually be screened prior to use by committees of educators and community members intent on subjecting all such materials to reasonable selection criteria. Board Policy 6161.1 requires that all such materials be consistent with district-adopted guides, supporting and enriching the curriculum while taking into account the varied instructional needs, learning styles, abilities, and developmental levels of the students. Telecommunications, because they may lead to publicly available file servers in the world, will open classrooms to electronic information resources which have not been screened by educators for use by students of various ages.

Electronic information research skills are now fundamental to preparation of citizens and future employees during the Age of Information. The board expects that staff will blend thoughtful use of such information throughout the curriculum, and that the staff will provide guidance and instruction to students in the appropriate use of such resources. Staff will consult the guidelines for instructional materials contained in Board Policy 6161.1 and will honor the goals for selection of instructional materials contained therein.

Students are responsible for good behavior on school computer networks just as they are in a classroom or a school hallway. Communications on the network are often public in nature. General school rules for behavior and communications apply. The network is provided for students to conduct research and communicate with others. Access to network services will be provided to students who agree to act in a considerate and responsible manner.

(cf. 5131 - Conduct)

Independent student use of telecommunications and electronic information resources will be permitted upon submission of permission forms and agreement forms by parents of minor students (under 18 years of age) and by students themselves. Regional networks require agreement by users to acceptable use policies outlining standards for behavior and communication.

STUDENT USE OF TECHNOLOGY (INTERNET) (continued)

Access to telecommunications will enable students to explore thousands of libraries, databases, and bulletin boards while exchanging messages with people throughout the world. The board believes that the benefits to students from access in the form of information resources and opportunities for collaboration exceed the disadvantages. But ultimately, parents and guardians of minors are responsible for setting and conveying the standards that their children should follow when using media and information sources. To that end, the Escondido Union School District supports and respects each family's right to decide whether or not to apply for independent access.

The superintendent or designee shall ensure that all district computers with Internet access have a technology protection measure that blocks or filters Internet access to visual depictions that are obscene, child pornography, or harmful to minors, and that the operation of such measures is enforced. (20 USC 6777, 47 USC 254)

The board desires to protect students from access to harmful matter on the Internet or other on-line services. The superintendent or designee shall implement rules and procedures designed to restrict students' access to harmful or inappropriate matter on the Internet. He/she also shall establish regulations to address the safety and security of students when using electronic mail, chat rooms, and other forms of direct electronic communication.

Disclosure, use, and dissemination of personal identification information regarding students is prohibited.

Staff shall supervise students while they are using on-line services and may ask teacher aides and student aides to assist in this supervision.

Legal Reference: (see next page)

BP 6163.4(c)

STUDENT USE OF TECHNOLOGY (INTERNET) (continued)

Legal Reference:
    EDUCATION CODE
        48980 Required notification at beginning of term
        51006 Computer education and resources
        51007 Programs to strengthen technological skills
        51870-51874 Education Technology
        51870.5 Student Internet access
        60044 Prohibited instructional materials
    PENAL CODE
        313 Harmful matter
        502 Computer crimes, remedies
        632 Eavesdropping on or recording confidential communications
    UNITED STATES CODE, TITLE 20
        6751-6777 Enhancing Education Through Technology Act, No Child Left Behind Act, Title II, Part D
        6777 Internet safety
    UNITED STATES CODE, TITLE 47
        254 Universal service discounts (E-rate)
    CODE OF FEDERAL REGULATIONS, TITLE 16
        312.1-312.12 Children's online privacy protection
    CODE OF FEDERAL REGULATIONS, TITLE 47
        54.520 Internet safety policy and technology protection measures, E-rate discounts

Management Resources:
    CDE PUBLICATIONS
    K-12 Network Technology Planning Guide: Building the Future, 1994
    CDE PROGRAM ADVISORIES
    1223.94 Acceptable Use of Electronic Information Resources
    WEB SITES
    Federal Communications Commission: http://www.fcc.gov
    U.S. Department of Education: http://www.ed.gov
    Commission on Online Child Protection: http://www.copacommission.org
    CDE: http://www.cde.ca.gov
    American Library Association: http://www.ala.org
    CSBA: http://www.csba.org

Policy
adopted: October 23, 2003

ESCONDIDO UNION SCHOOL DISTRICT
Escondido, California

Instruction   AR 6163.4(a)

STUDENT USE OF TECHNOLOGY (INTERNET)

Each school in the Escondido Union School District (EUSD) has a behavior code for all students that details appropriate school behaviors and sets expectations for students. The use of the Internet is a continuance of the school's activity; therefore, the school's code of conduct applies to the use of Internet activities as well.

Personal Responsibility

As a representative of their school, users will accept personal responsibility for reporting any misuse of the network to the system administrator. Misuse may come in many forms, but it is commonly viewed as any message(s) sent or received that indicate or suggest pornography, unethical or illegal solicitation, racism, sexism, inappropriate language, and other issues described below.

Acceptable Use

The purpose of using the Internet is to support research and education by providing access to unique resources and the opportunity for collaborative work. Utilization of the Internet must be in support of education and research to maintain educational objectives of the district. Transmission of any material in violation of any U.S. or state regulation is prohibited. This includes, but is not limited to: copyrighted materials, threatening or obscene materials, or material protected by trade secret. Use for commercial activities by for-profit institutions is not acceptable. Illegal activities are strictly prohibited.

Privileges

Use of the Internet is a privilege, not a right, and inappropriate use will result in cancellation of those privileges.

- All users are forbidden to lend Internet accounts and/or passwords to other users.

- Users shall respect the privacy and confidentiality of others.

- The use of any form of obscene, harassing, or abusive language on-line is prohibited.

- Users must abide by copyright laws and rules. These include unauthorized review, duplication, dissemination, removal, damage, or alternation of files, passwords, computer systems, or programs.

- Vandalism will result in cancellation of privileges. Vandalism is defined as any malicious attempt to harm or destroy data of another user. This includes, but is not limited to, uploading or creation of a computer virus.

- Users shall not publicize your home address or telephone number. Use the school's information.

AR 6163.4(b)

STUDENT USE OF TECHNOLOGY (INTERNET) (continued)

- Students shall not access, post, submit, publish, or display harmful or inappropriate matter that is threatening, obscene, disruptive, or sexually explicit, or that could be construed as harassment or disparagement of others based on their race/ethnicity, national origin, gender, sexual orientation, age, disability, religion, or political beliefs.

(cf. 5145.3 - Nondiscrimination/Harassment)
(cf. 5145.7 - Sexual Harassment)

Harmful matter includes matter, taken as a whole, which to the average person applying contemporary statewide standards, appeals to the prurient interest and is matter which depicts or describes in a patently offensive way sexual conduct and which lacks serious literary, artistic, political, or scientific value for minors. (Penal Code 313)

- Students shall not disclose, use, or disseminate personal identification information about themselves or others when using electronic mail, chat rooms, or other forms of direct electronic communication. Students are also cautioned not to disclose such information by other means to individuals located through the Internet without the permission of their parents/guardians.

- Personal information includes the student's name, address, telephone number, Social Security number, or other individually identifiable information.

- Students shall not use the system to encourage the use of drugs, alcohol, or tobacco, nor shall they promote unethical practices or any activity prohibited by law or board policy.

(cf. 3513.3 - Tobacco-Free Schools)

- Students shall not intentionally upload, download, or create computer viruses and/or maliciously attempt to harm or destroy district equipment or materials or manipulate the data of any other user, including so-called "hacking."

(cf. 5131.5 - Vandalism, Theft and Graffiti)

- Students shall not read other users' electronic mail or files. They shall not attempt to interfere with other users' ability to send or receive electronic mail, nor shall they attempt to delete, copy, modify, or forge other users' mail.

- Students shall report any security problem or misuse of the services to the teacher or principal.

AR 6163.4(c)

STUDENT USE OF TECHNOLOGY (INTERNET) (continued)

Services

The district makes no warranties of any kind, whether expressed or implied, for the service it is providing. EUSD will not be responsible for any damages suffered while on this system. These damages include loss of data as a result of delays, nondeliveries, misdeliveries, or service interruptions caused by the system, or your errors or omissions. Use of any information obtained via the information system is at your own risk. EUSD specifically disclaims any responsibility for the accuracy of information obtained through its services.

The district reserves the right to monitor any on-line communications for improper use. Electronic communications and downloaded material, including files deleted from a user's account, may be monitored or read by district officials to ensure proper use of the system.

(cf. 5145.12 - Search and Seizure)

Security

Security on any computer system is a high priority because there are so many users. If users identify a security problem, they are to notify the system administrator at once. Never demonstrate the problem to other users. Never use another individual's account without written permission from that person. All use of the system must be under the user's own account. Any user identified as a security risk will be denied access to the information system.

A manual shall be provided to parents/guardians and users before accessing the Internet. The manual shall define the rights and responsibilities of users, proper rules of network etiquette, and a contract agreement to be signed by the parent/guardian and user.

Appendix C.
CELDT Language Levels

California English Language Development Test (CELDT)
Proficiency Levels

Level 1-Beginning	Students performing at this level may demonstrate little or no receptive or productive English skills. They are beginning to understand a few concrete details during unmodified instruction, They may be able to respond to some communication and learning demands but with many errors. Oral and written production is usually limited to disconnected words and memorized statements and questions. Frequent errors make communication difficult.
Level 2- Early Intermediate	Students performing at this level continue to develop receptive and productive English skills. They are able to identify and understand more concrete details during unmodified instruction. They may be able to respond with increasing ease to more varied communication and learning demands with a reduced number of errors. Oral and written production is usually limited to phrases and memorized statements and questions. Frequent errors still reduce communication.
Level 3- Intermediate	Students performing at this level begin to allow their English language skills to meet communication and learning demands with increasing accuracy. They are able to identify and understand more concrete details and some major abstract concepts during unmodified instruction. They are able to respond with increasing ease to more varied communication and learning demands with a reduced number of errors. Oral and written production has usually expanded to sentences, paragraphs, and original statements and questions. Errors still complicate communication.
Level 4-Early Advanced	Students performing at this level begin to combine the elements of the English language in complex, cognitively demanding situations and are able to identify and summarize most concrete details and abstract concepts during unmodified instruction in most content areas. Oral and written production is characterized by more elaborate discourse and fully developed paragraphs and compositions. Errors are less frequent and rarely complicate communication.
Level 5-Advanced	Students performing at this level communicate effectively with various audiences in a wide range of familiar and new topics to meet social and learning demands. For students at this level to attain English proficiency of their native English-speaking peers, further linguistic enhancement and refinement are still necessary. Students at this level are able to identify and summarize concrete details and abstract concepts during unmodified instruction in all content areas. Oral and written production reflects discourse appropriate for content areas. Errors are infrequent and do not reduce communication (CELDT Assistance Packet, 2008).

Student Reader Interest Survey, English
(Retitled from Reader Self-Perception Scale, Henk & Melnick, 1995)

Student Reader Interest Survey

Listed below are statements about reading. Please read each statement carefully. Then circle the letters that show how much you agree or disagree with the statement. Use the following:

SA = Strongly Agree
A = Agree
U = Undecided
D = Disagree
SD = Strongly Disagree

Example: **I think pizza with pepperoni is the best.**   SA   A   U   D   SD

If you are *really positive* that pepperoni pizza is best, circle SA (Strongly Agree).
If you *think* that is good but maybe not great, circle A (Agree).
If you *can't decide* whether or not it is best, circle U (Undecided).
If you *think* that pepperoni pizza is not all that good, circle D (Disagree).
If you are *really positive* that pepperoni pizza is not very good, circle SD (Strongly Disagree).

1.	I think I am a good reader.	SA	A	U	D	SD
2.	I can tell that my teacher likes to listen to me read.	SA	A	U	D	SD
3.	My teacher thinks that my reading is fine.	SA	A	U	D	SD
4.	I read faster than other kids.	SA	A	U	D	SD
5.	I like to read aloud.	SA	A	U	D	SD
6.	When I read, I can figure out words better than other kids.	SA	A	U	D	SD
7.	My classmates like to listen to me read.	SA	A	U	D	SD
8.	I feel good inside when I read.	SA	A	U	D	SD
9.	My classmates think that I read pretty well.	SA	A	U	D	SD
10.	When I read, I don't have to try as hard as I used to.	SA	A	U	D	SD
11.	I seem to know more words than other kids when I read.	SA	A	U	D	SD
12.	People in my family think I am a good reader.	SA	A	U	D	SD
13.	I am getting better at reading.	SA	A	U	D	SD
14.	I understand what I read as well as other kids do.	SA	A	U	D	SD

Student Reader Interest Survey (cont'd.)

15.	When I read, I need less help than I used to.	SA	A	U	D	SD
16.	Reading makes me feel happy inside.	SA	A	U	D	SD
17.	My teacher thinks I am a good reader.	SA	A	U	D	SD
18.	Reading is easier for me than it used to be.	SA	A	U	D	SD
19.	I read faster than I could before.	SA	A	U	D	SD
20.	I read better than other kids in my class.	SA	A	U	D	SD
21.	I feel calm when I read.	SA	A	U	D	SD
22.	I read more than other kids.	SA	A	U	D	SD
23.	I understand what I read better than I could before.	SA	A	U	D	SD
24.	I can figure out words better than I could before.	SA	A	U	D	SD
25.	I feel comfortable when I read.	SA	A	U	D	SD
26.	I think reading is relaxing.	SA	A	U	D	SD
27.	I read better now than I could before.	SA	A	U	D	SD
28.	When I read, I recognize more words than I used to.	SA	A	U	D	SD
29.	Reading makes me feel good.	SA	A	U	D	SD
30.	Other kids think I'm a good reader.	SA	A	U	D	SD
31.	People in my family think I read pretty well.	SA	A	U	D	SD
32.	I enjoy reading.	SA	A	U	D	SD
33.	People in my family like to listen to me read.	SA	A	U	D	SD

Survey from the Reader Self-Perception Scale, Henk & Melnick, 1995.

Student Reader Interest Survey, Spanish
(Retitled from Reader Self-Perception Scale, Henk & Melnick, 1995)

Encuesta de Interés de Estudiantes como Lectores

Las oraciones que se indican a continuación, se tratan de la lectura. Por favor lee cada una de éstas, detalladamente. Luego encierra en un círculo las letras que muestren cuánto estás de acuerdo o en desacuerdo con cada oración. Usa las siguientes abreviaturas.

MDA = Muy de acuerdo.
DA = De acuerdo.
NES = No estoy seguro.
ED = En desacuerdo.
MED = Muy en desacuerdo.

Por ejemplo: **La mejor pizza para mi, es la que tiene salami.**   MDA   DA   NES   ED   MED

Si *realmente estás seguro* que la mejor pizza es con salami, encierra en un círculo la abreviatura MDA. (Muy de acuerdo.)
Si *piensas* que la pizza con salami es buena, pero no es la mejor, encierra en un círculo la abreviatura DA. (De acuerdo.)
Si *no puedes decidir* que la pizza con salami es la mejor, encierra en un círculo la abreviatura NES. (No estoy seguro.)
Si *piensas* que pizza con salami no es la mejor, encierra en un círculo la abreviatura ED. (En desacuerdo.)
Si *realmente estás seguro* que la pizza con salami no es la mejor, encierra en un círculo la abreviatura MED. (Muy en desacuerdo.)

1. Pienso que soy un buen lector.	MDA	DA	NES	ED	MED
2. Puedo ver que a mi maestro le gusta escucharme cuando leo.	MDA	DA	NES	ED	MED
3. Mi maestro piensa que leo bien.	MDA	DA	NES	ED	MED
4. Puedo leer más rápido que los demás niños.	MDA	DA	NES	ED	MED
5. Me gusta leer en voz alta.	MDA	DA	NES	ED	MED
6. Cuando leo, puedo descifrar las palabras mejor que los demás niños.	MDA	DA	NES	ED	MED
7. Mis compañeros de clase les gusta escucharme cuando leo en voz alta.	MDA	DA	NES	ED	MED
8. La lectura hace que me sienta bien.	MDA	DA	NES	ED	MED
9. Mis compañeros de clase piensan que leo muy bien.	MDA	DA	NES	ED	MED
10. Cuando leo, no tengo que esforzarme tanto como antes.	MDA	DA	NES	ED	MED
11. Me parece que sé más palabras que los demás niños cuando leo.	MDA	DA	NES	ED	MED
12. Los miembros en mi familia piensan que soy un buen lector.	MDA	DA	NES	ED	MED
13. Estoy mejorando en la lectura.	MDA	DA	NES	ED	MED

Encuesta de Interés de Estudiantes como Lectores (continuación)

14. Entiendo lo que leo tan bien como los demás niños.	MDA	DA	NES	ED	MED
15. Cuando leo, necesito menos ayuda que antes.	MDA	DA	NES	ED	MED
16. La lectura hace que me sienta contento.	MDA	DA	NES	ED	MED
17. Mi maestro piensa que soy un buen lector.	MDA	DA	NES	ED	MED
18. La lectura es más fácil para mí que antes.	MDA	DA	NES	ED	MED
19. Leo más rápido que antes.	MDA	DA	NES	ED	MED
20. Leo mejor que los demás niños en mi clase.	MDA	DA	NES	ED	MED
21. Me siento calmado cuando leo.	MDA	DA	NES	ED	MED
22. Leo más que los demás niños.	MDA	DA	NES	ED	MED
23. Entiendo lo que leo, mejor que antes.	MDA	DA	NES	ED	MED
24. Puedo descifrar palabras, mejor que antes.	MDA	DA	NES	ED	MED
25. Me siento a gusto cuando leo.	MDA	DA	NES	ED	MED
26. Me siento relajado cuando leo.	MDA	DA	NES	ED	MED
27. Leo mejor ahora, que antes.	MDA	DA	NES	ED	MED
28. Cuando leo, conozco más palabras que antes.	MDA	DA	NES	ED	MED
29. La lectura hace que me sienta bien.	MDA	DA	NES	ED	MED
30. Otros niños piensan que soy un buen lector.	MDA	DA	NES	ED	MED
31. Los miembros en mi familia piensan que leo muy bien.	MDA	DA	NES	ED	MED
32. Me da gusto cuando leo.	MDA	DA	NES	ED	MED
33. Los miembros en mi familia les gusta escucharme cuando leo.	MDA	DA	NES	ED	MED

Appendix E.
Project iREAD Teacher Application

2010-2011 iREAD application

First Name:

Last Name:

EUSD e-mail address:

What is your primary location?

Expected Grade/Subject for next year (if in in a special program, please list).

I confirm that I have read the informational flyer and that I can attend all listed meetings: Yes/No

Please answer the following questions:
1. One of the skills necessary for this to be successful is your ability to handle complex projects -- please give examples of how you've done that in your classroom.

2. Please list examples of technology integration in lessons or projects (with students using technology) that you have done in your classroom.

3. Give an example of an audio project that you think may be useful in the classroom for supporting reading comprehension.

4. Explain how you have a track record of follow-through on projects.

5. Explain how you have at least an intermediate level of technology proficiency.

6. Why do you want to be a part of this group?

7. List the name of at least one EUSD contact familiar with your experiences listed above.

Appendix F.
District Teacher Evaluation Form

CERTIFICATED PROFESSIONAL EVALUATION

CERTIFICATED EMPLOYEE _____ School _____ Grade _____

Assignment _____ Track _____

Temporary ☐   Probationary 1 ☐   Probationary 2 ☐   Permanent ☐

PERMANENT EMPLOYEE RATING SCALE	NON PERMANENT EMPLOYEE RATING SCALE
1. U (Unsatisfactory)	1. PN (Practice Not Consistent with Standard Expectation)
2. NI (Needs Improvement)	2. DP (Developing Practice)
3. MS (Meets Standard)	3. MP (Maturing Practice)
4. ES (Exemplifies Standard)	4. EP (Experienced Practice)

Beginning of the year Conference _____   Midyear Conference _____   Final Conference _____
                                    Date   (required for Temps/Probs) Date   Date

Formal Observation Date(s): _____   _____   _____   _____

CIRCLE IDENTIFIED ELEMENTS OF FOCUS	MIDYEAR (required for Temps/Probs)				FINAL			
STANDARD I – Engaging and Supporting All Students in Learning	1	2	3	4	1	2	3	4
1.1 Connect students' prior knowledge, life experience, and interests with learning goals								
1.2 Use a variety of instructional strategies and resources to respond to students' diverse needs								
1.3 Facilitate learning experiences that promote autonomy, interaction, and choice								
1.4 Engage students in problem solving, critical thinking, and other activities that make subject matter meaningful								
1.5 Promote self-directed, reflective learning for all students								
STANDARD II – Creating and Maintaining Effective Environment for Student Learning	1	2	3	4	1	2	3	4
2.1 Create a physical environment that engages all students								
2.2 Establish a climate that promotes fairness and respect								
2.3 Promote social development and group responsibility								
2.4 Establish and maintain standards for student behavior								
2.5 Plan and implement classroom procedures and routines that support student learning								
2.6 Using instructional time effectively								
STANDARD III – Understanding & Organizing Subject Matter for Student Learning	1	2	3	4	1	2	3	4
3.1 Demonstrate knowledge of subject matter content and student development								
3.2 Organize curriculum to support student understanding of subject matter								
3.3 Interrelate ideas and information within and across subject matter areas								
3.4 Develop student understanding through instructional strategies that are appropriate to subject matter								
3.5 Use materials, resources and technologies to make subject matter accessible to students								
STANDARD IV – Planning Instruction & Designing Learning Experiences for All Students	1	2	3	4	1	2	3	4
4.1 Draw on and value students' backgrounds, interests, and developmental learning needs								
4.2 Establish and articulate goals for student learning								
4.3 Develop and sequence instruction, activities, and materials for student learning								
4.4 Design short-term and long-term plans to foster student learning								
4.5 Modify instructional plans to adjust for student needs and respond to ongoing assessments								
STANDARD V – Assessing Student Learning	1	2	3	4	1	2	3	4
5.1 Establish and communicate learning goals for all students								
5.2 Collect and use multiple sources of information to assess student learning								
5.3 Involve and guide students in assessing their own learning								
5.4 Use results of assessments to guide instruction								
5.5 Communicate with students, families, and other audiences about student progress								
5.6 Students demonstrate progress towards the attainment of grade level academic standards								
STANDARD VI – Developing as a Professional Educator	1	2	3	4	1	2	3	4
6.1 Reflect on teaching practice and plan professional development								
6.2 Establish professional goals and pursue opportunities to grow professionally								
6.3 Work with communities to enhance professional practice								
6.4 Work with colleagues to improve professional practice								
6.5 Assumes adjunct duties as equitably assigned to the staff								
6.6 Adheres to the rules and regulations of the school and district								

S PERS 166A (Revised 2001-02)

OVERALL RANKING BY STANDARD: 2 or more elements rated as "**U**" or "**PN**" will result in an overall standard rating of "**U**" or "**PN;**" 3 or more standards 1-6 rated as "**U**" or "**PN**" will result in an overall rating of "**U**" or "**PN.**" **For permanent staff, assignment to PAR will result with 3 or more standards 1-5 rated as "U" or a total of 6 elements in Standards 1- 5 rated as "U" as per Side Letter 02-03.**

MIDYEAR EVALUATION (required for temps/probs)

Standard 1 _____ Standard 2 _____ Standard 3 _____ Standard 4 _____ Standard 5 _____ Standard 6 _____

OVERALL EVALUATION _____

Midyear Evaluation Comments:

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\
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Evaluatee's Signature	Date	Evaluator's Signature	Date

☐ Check if employee is possible non-reelection (non permanent only)
☐ Check if recommended for voluntary participation in PAR. PAR information provided to employee. Employee is responsible for contacting PAR panel.

FINAL EVALUATION (required for all employees being evaluated)

Standard 1 _____ Standard 2 _____ Standard 3 _____ Standard 4 _____ Standard 5 _____ Standard 6 _____

OVERALL EVALUATION _____

Final Evaluation Comments:

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\
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Evaluatee's Signature	Date	Evaluator's Signature	Date

☐ Check if assigned to PAR due to unsatisfactory ranking (permanent only)
☐ Check if recommended for voluntary participation in PAR. PAR information provided to employee. Employee is responsible for contacting PAR panel.

OK to file_____   Data Entry_____   Notification to PAR_____

Appendix G.
NWEA MAP Reading Normative Data, RIT Levels

NWEA MAP Reading Normative Data, RIT Levels

	2008 READING STATUS NORMS (RIT VALUES)					
	Beginning-of-Year		Middle-of-Year		End-of-Year	
Grade	Median	Mean	Median	Mean	Median	Mean
K	146	147.6	151	152.4	155	156.3
1	160	160.2	167	166.5	173	171.9
2	179	179.7	186	186.0	190	189.6
3	192	191.6	197	196.3	200	199.0
4	201	200.1	205	203.7	207	205.8
5	208	206.7	211	209.6	212	211.1
6	213	211.6	215	213.8	216	214.8
7	217	215.4	219	217.3	219	217.9
8	220	219.0	222	220.6	223	221.2
9	222	220.9	223	221.9	224	222.6
10	226	223.9	227	224.9	228	225.4
11	227	225.2	228	225.6	228	225.6

NWEA MAP Language Normative Data, RIT Levels

2008 LANGUAGE USAGE STATUS NORMS (RIT VALUES)						
	Beginning-of-Year		Middle-of-Year		End-of-Year	
Grade	Median	Mean	Median	Mean	Median	Mean
2	180	181.2	188	188.3	192	191.5
3	193	192.6	199	198.0	202	200.5
4	202	201.0	216	204.9	208	207.0
5	208	207.2	211	210.2	213	211.8
6	213	211.7	215	214.0	217	215.1
7	217	215.1	218	217.3	219	217.7
8	220	218.4	221	219.8	222	220.4
9	221	219.4	221	220.0	222	220.8
10	223	221.6	224	222.2	225	222.9
11	225	223.6	226	225.1	226	224.6

Appendix I.
Reading Self-Perception Study

The Reader Self-Perception Scale

Listed below are statements about reading. Please read each statement carefully. Then circle the letters that show how much you agree or disagree with the statement. Use the following:

SA = Strongly Agree
A = Agree
U = Undecided
D = Disagree
SD = Strongly Disagree

Example: **I think pizza with pepperoni is the best.**   SA   A   U   D   SD

If you are *really positive* that pepperoni pizza is best, circle SA (Strongly Agree).
If you *think* that is good but maybe not great, circle A (Agree).
If you *can't decide* whether or not it is best, circle U (undecided).
If you *think* that pepperoni pizza is not all that good, circle D (Disagree).
If you are *really positive* that pepperoni pizza is not very good, circle SD (Strongly Disagree).

	1. I think I am a good reader.	SA A U D SD
[SF]	2. I can tell that my teacher likes to listen to me read.	SA A U D SD
[SF]	3. My teacher thinks that my reading is fine.	SA A U D SD
[OC]	4. I read faster than other kids.	SA A U D SD
[PS]	5. I like to read aloud.	SA A U D SD
[OC]	6. When I read, I can figure out words better than other kids.	SA A U D SD
[SF]	7. My classmates like to listen to me read.	SA A U D SD
[PS]	8. I feel good inside when I read.	SA A U D SD
[SF]	9. My classmates think that I read pretty well.	SA A U D SD
[PR]	10. When I read, I don't have to try as hard as I used to.	SA A U D SD
[OC]	11. I seem to know more words than other kids when I read.	SA A U D SD
[SF]	12. People in my family think I am a good reader.	SA A U D SD
[PR]	13. I am getting better at reading.	SA A U D SD
[OC]	14. I understand what I read as well as other kids do.	SA A U D SD
[PR]	15. When I read, I need less help than I used to.	SA A U D SD
[PS]	16. Reading makes me feel happy inside.	SA A U D SD
[SF]	17. My teacher thinks I am a good reader.	SA A U D SD
[PR]	18. Reading is easier for me than it used to be.	SA A U D SD
[PR]	19. I read faster than I could before.	SA A U D SD
[OC]	20. I read better than other kids in my class.	SA A U D SD

(continued)

The Reader Self-Perception Scale

[PS]	21. I feel calm when I read.	SA	A	U	D	SD
[OC]	22. I read more than other kids.	SA	A	U	D	SD
[PR]	23. I understand what I read better than I could before.	SA	A	U	D	SD
[PR]	24. I can figure out words better than I could before.	SA	A	U	D	SD
[PS]	25. I feel comfortable when I read.	SA	A	U	D	SD
[PS]	26. I think reading is relaxing.	SA	A	U	D	SD
[PR]	27. I read better now than I could before.	SA	A	U	D	SD
[PR]	28. When I read, I recognize more words than I used to.	SA	A	U	D	SD
[PS]	29. Reading makes me feel good.	SA	A	U	D	SD
[SF]	30. Other kids think I'm a good reader.	SA	A	U	D	SD
[SF]	31. People in my family think I read pretty well.	SA	A	U	D	SD
[PS]	32. I enjoy reading.	SA	A	U	D	SD
[SF]	33. People in my family like to listen to me read.	SA	A	U	D	SD

The Reader Self-Perception Scale (RSPS)

Appendix J.
Project iREAD Teacher Professional Development

Escondido Union School District
Project iREAD
Professional Development Outline
Fall 2010

Project iREAD has a strong staff development component. Required activities for this 2010-2011 year include a minimum of 23 hours as follows:

- A 1-hour pre-meeting for teachers new to iRead for 2010-2011 to learn about administering the Iowa Test of Basic Skills (Reading components only).
- A 4-hour "kickoff" where all iRead teachers meet to learn what to expect for the coming year. After a general portion with all present, experienced iRead teachers were separated so they could learn new skills and strategies (e.g. how to most effectively handle all of the iPods when new system software comes out), while Newbies remain to learn the basics: equipment, projects due, etc.
- There is a 2-hour monthly meeting that again includes general material necessary for all, and then dividing into 2 (or sometimes 3) sub-groups to get material appropriate for their experience level. There is also planned a grade level sharing time where topics appropriate to iRead for their grade level can be shared/discussed. Sometimes they are given a specific task (e.g. sharing of project ideas with grade level peers) and sometimes they decide the topics most important to them at their grade level.

In addition, there are periodic optional trainings on specific topics that may be of interest to iRead teachers that couldn't be covered at a regular meeting because of time. Topics may include learning a new app, learning classroom management strategies, or similar topics of interest. These sessions are held after school for about 90 minutes.

And, finally and informally, there are many calls and emails throughout the year from iRead teachers asking, "How can id o X" or "Why isn't my Y working correctly". These informal contacts definitely serve as staff development.

Baseline content for IREAD professional development includes:
Basic iPod touch equipment training/configuration
Overview of iREAD'S pre- and post- assessment, expectations, contract
Introduction and set-up of Edmodo
Introduction to volume licensing
Learning theory
Technology mentoring
iTunes set-up: managing apps, playlists, smart, apptivities
Recording skills-audio with Voice Memo

Project iREAD
Professional Development Outline (Cont'd)

Content-
Applications policy
Keynote
Procedures for classroom management
Project 1-Develop an iPod reading comprehension routine, using 1 of the 6
reading comprehension strategies
Project 2-Using the *Storyrobe* application to address 1 of 6 reading
comprehension strategies via iPods
iTunes photos management
Free apps management
Voice Memo, Sonic Pix management
Movie wallpaper setting
Routines sharing
Adobe Photoshop Express
Escondido Youth media festival
Project 3-Students create a reading strategy pitch, which they select based
upon student reading data
iPod pacing
Routines for use in various subject areas
Student blogging
On-line teacher reflections
Evaluation of teacher and student projects

Note:
1. District-adopted reading strategies include: (1) predict and infer; (2)
monitor and clarify; (3) questioning; (4) summarizing; (5) visualizing; and
(6) evaluating.
2. Key to each professional development session: grade level and content level
teacher articulation

Appendix K1.
Student Interview Protocols, English

Student Interview Script and Questions, English Version

Script: Thank you for agreeing to be part of this discussion today. You are a special group of students because you have been using iPod touches in your classroom during this school year. I would like to ask you several questions about how you've been using the iPod touches and how you feel about using them. This interview is part of a study that the district is conducting to understand how the iPod touch technology works in classrooms. Your opinions are very important to the study.

Your parents' signed a permission slip that allows you to participate in this student group interview. Even with your parent's permission, your participation in this group interview is 100% voluntary. This means you can choose to not participate in the interview. The interview is not an evaluation in any way. It is not a test, and it is not a part of your grade in any way. The information that students tell me will be shared in a confidential way without using any students' names. (Will give an example, "Student A said...") If at any time during the interview you feel uncomfortable, you may raise your hand and we will stop the interview, with no problem. I am taping this interview so that I can remember all of the important things you share with me. Your thoughts and opinions are important to me. Do you have any questions for me about the interview? Are you ready to begin?

1. The use of iPods in your classroom is new for you this year. Tell me about how your classroom has changed because of the iPods.

2. Has the iPod helped you in school? How has the iPod helped you in school?

3. Becoming a good reader is hard work. In what ways has the iPod helped you do well in reading?

4. Since I don't have an iPod, can you tell me what kinds of reading activities you do with the iPod? How is this learning different than learning those skills in a classroom without iPods?

5. If you were videotaping a commercial in order to talk parents into buying an iPod touch for their child, what three things would you want them to know about learning and the iPod?

6. What kinds of things does your teacher do with iPods?
   a. Think back about your teacher from last year...Does this year's teacher teach differently than last year's teacher that didn't have iPods?
   b. Tell me about reading and language arts time in the two classes.

7. Tell me about a time when you used the iPod touch on your own and it turned out great. Tell me what you did and what was it that made it great?

Student Interview Script & Questions, English Version (cont'd.)

8. Thinking about (teacher's name here), what has he/she done with iPods that has helped you the most?

9. As a student, I understand that you speak another language in addition to English, as your first language at home. Do iPod touches help you learn English? (If yes...) in what ways does the iPod help you learn English?
    a. In listening?
    b. In speaking?
    c. In reading?
    d. In writing?

10. Tell me about the best activity your teacher has done this year using the iPods. Tell me why it was the best, and what made it the "best" activity so far?

11. Do you have computer at home?

12. (If yes...) Is the computer connected to Internet?

13. (If yes...) Are you allowed to use the computer?

14. About how often do you use the computer and for how much time?

15. Do you have a cell phone?

16. An iPod touch?

Appendix K2.
Student Interview Protocols, Spanish

Student Interview Script & Questions, Spanish
Guión y Preguntas para la Entrevista Estudiantil

Guión: Gracias por aceptar ser parte de esta entrevista estudiantil el día de hoy. Ustedes son un grupo especial de estudiantes, que este año escolar han estado usando los *iPod touches* en sus salones de clase. Me gustaría hacerles varias preguntas para averiguar cómo usan los *Ipod touches* y que opinan con respecto a su uso. Esta entrevista es parte de un estudio que está llevando a cabo el distrito escolar para conocer cómo la tecnología de los *Ipod touches* funcionan en las clases de instrucción. Sus opiniones son muy importantes para este estudio.

Sus padres firmaron un formulario de autorización, que les permite participar en esta entrevista estudiantil. Aun con el permiso de sus padres, su participación en esta entrevista es 100% voluntaria. Esto quiere decir que pueden decidir por no participar en esta entrevista. Esta entrevista de ninguna manera es una evaluación. Tampoco es una prueba; y de ninguna manera es parte de su calificación. La información que me dan los estudiantes, se compartirá de manera confidencial sin usar los nombres de los estudiantes. (Por ejemplo: "El Estudiante A dijo..."). Si en cualquier momento durante la entrevista se sienten incómodos, pueden alzar la mano y suspenderemos la entrevista, sin ningún problema. Voy a grabar esta entrevista para que después pueda recordarme de todas las cosas importantes que compartieron conmigo. Sus pensamientos y opiniones, son importantes para mí. ¿Tienen preguntas que quieran hacerme acerca de la entrevista? ¿Están listos para comenzar?

1. El uso de los *iPods* en sus clases de instrucción, es algo nuevo para ustedes este año escolar. Quiero que me digan cómo han cambiado sus clases de instrucción, después de usar los *iPods*.

2. ¿Les ha ayudado el *iPod* en sus estudios? ¿Cómo les ha ayudado el *iPod* en sus clases?

3. El llegar a ser un buen lector, toma mucho trabajo. ¿Cómo les ha ayudado el *iPod* a mejorar sus habilidades en la lectura?

4. Ya que no tengo un *iPod*, ¿pueden decirme cuales son algunas de las actividades de lectura que hacen con el *iPod*? ¿De qué manera es diferente este aprendizaje al aprendizaje de lectura que reciben en las clases que no usan los *iPods*?

5. Si estuvieran filmando un comercial con una videocámara para convencer a los padres de familia que le compren un *iPod touch* a su niño, ¿cuáles son las tres cosas que les dejaría saber a los padres sobre el aprendizaje y el uso de los *iPods*?

6. ¿Qué cosas enseñan sus maestros con los *iPods*?
   a. Piensen en sus maestros del pasado año escolar, ¿qué cosas enseñan de manera diferente sus maestros este año escolar en comparación con los maestros del pasado año escolar que no usaron *iPods*?
   b. Comparen sus clases de lectura y artes de lenguaje de este año escolar con las clases del pasado año escolar.

7. Descríbanme sus experiencias cuando usaron los *iPods* por su propia cuenta, y tuvieron buenos resultados. Díganme lo que hicieron. ¿Qué fue lo que hicieron para lograr estos resultados?

Student Interview Script & Questions, Spanish (cont'd.)

8. Hablemos un poco de sus maestros, (los nombres de los maestros). ¿Qué cosas han hecho sus maestros con los *iPods*, que les ha ayudado bastante con tus estudios?

9. Cómo estudiantes, tengo entendido que como su primer idioma en casa, hablan otro idioma en vez de inglés. ¿Les ayuda el *iPod* para aprender inglés? (Si responden que sí les ayuda…) ¿De qué manera les ayuda el *iPod* para aprender inglés?
   a. ¿Para escuchar?
   b. ¿Para hablar?
   c. ¿Para leer?
   d. ¿Para escribir?

10. Díganme cuál ha sido la mejor actividad que su maestro ha hecho este año escolar, usando los *Ipods*. Díganme la razón por la cual fue la mejor actividad. ¿Qué fue lo que hizo ésta "la mejor actividad" hasta ahora?

11. ¿Tienen computadora en casa?

12. (Si responden que sí tienen…) ¿Están conectados a la Internet?

13. (Si responden que sí …) ¿Les dan permiso usar la computadora?

14. ¿Con qué frecuencia usan la computadora? ¿Por cuánto tiempo la usan?

15. ¿Tienen un teléfono celular?

16. ¿Tienen un *iPod*?

Appendix L.
School Board Consent

July 28, 2010

Dear Members of the U.C.S. D. Institutional Review Board,

I am the President of the Escondido Union School District's Board of Education. Ms. Jennifer Walters, Superintendent of Schools in the Escondido Union School District, has asked for the school board's permission to conduct a research study regarding the one-to-one implementation of mobile learning devices at ten of the elementary schools within the district.

Ms. Walters has given an overview of her proposed research to the school board. I understand that Ms. Walters will be gathering student reading achievement data from 40 classrooms, student surveys, student interview results, student written reflections, and classroom videotaped observations for the purpose of exploring how mobile learning devices (iPod touches) are used in our classrooms with reading, and particularly exploring the benefits and limitations of their use with English language learner students.

The study will begin in September 2010 and conclude in June 2011. I am aware that the primary goals of this study will be to evaluate whether English language learners (ELL) students with individual iPod touches have greater gains in reading achievement and efficacy in reading over English language learner students in classrooms without such devices. Additionally, Ms. Walters will explore whether or not ELL students in iPod touch classrooms are able to reduce the achievement gap between White students, and identify the benefits and limitations of such technology for language and literacy.

Please accept this letter as consent from the Escondido Union School District for Ms. Walters to conduct this study at the ten elementary classrooms.

Sincerely,

Joan Gardner
Board of Education President

University of California, San Diego
Consent to Act as a Research Subject

**Mobile Learning Devices: An Inquiry into Elementary Education Reform
for the Improvement of English Language Learners' Literacy**

Jennifer L. Walters, under the supervision of Dr. Amanda Datnow, Professor and Director, UCSD Educational Studies, with approval of the Escondido Union School District Board of Education, is conducting a research study to find out more about the student utilization of mobile learning devices *(iPod touches)* in elementary classrooms. You have been asked to participate in this study because you are an elementary teacher, either with the one-to-one devices in your classroom, or you are a comparable teacher who does not have the devices in his/her classroom. There will be approximately 40 teacher participants in this study. The purpose of this study is understand how teachers and students use *iPod touches* in the content area of language arts, to explore their impact on reading achievement, and to study the possible relationship between the devices and a reduction in English language learner students' achievement gap.

If you agree to be in this study, the following will happen to you:
Teachers will be asked to administer a student survey to all students in his/her classroom. The Reading Interest Survey will be given at the beginning of the school year and in Month 7. A written script for teachers will accompany the student surveys, and both will be available in English and Spanish. Survey administration time is 30-45 minutes.

Participation in this study may involve some added risks or discomforts. These include:
1. A potential for the loss of confidentiality. This is highly unlikely since no teacher names or student names will be used. Participants and survey results will be coded numerically to ensure anonymity. Research records will be kept confidential to the extent allowed by law. Research records may be reviewed by the UCSD Institutional Review Board.
2. Although the survey is brief, there is a possibility students may become bored or fatigued. Because the survey is entirely voluntary, students may skip a question or discontinue the survey if this occurs.
3. The administration of this survey and its student contents do not in any way create a risk for the teacher or his/her students. The results are in no way related to any evaluation or judgment of the teacher or students. The results are not a component of anyone's evaluation or grade and will not be shared with a teacher's direct supervisor.

Because this is a research study, there may also be some unknown risks that are currently unforeseeable. You will be informed of any significant new findings.

The alternatives to participation in this study are for students to respond to the survey in a less than complete way by skipping a question(s), or to not participate in the survey, wherein the teacher is asked to provide an alternate activity such as reading a book.

There may or may not be a direct benefit to you from participating this study. The Reading Interest Survey results for your students will be shared with you. The investigator, however, may learn

more about how to optimally implement mobile learning devices, and society may benefit from this knowledge.

Participation in research is entirely voluntary. You may refuse to administer the survey with the students in your classroom at any time without penalty or loss of benefits to which you are entitled.

The researcher may remove you from the study without your consent if the researcher feels it is in your best interest or the best interest of the study. You may also be withdrawn from the study if you do not follow the survey instructions given you by the study personnel.

You will be told if any important new information is found during the course of this study that may affect your wanting to continue.

There is no compensation for administering this survey. There is no cost to you for participating in this study.

Your school principal and/or the Technology Media Services Director has explained this study to you and answered your questions. If you have other questions or research-related problems, you may reach Jennifer Walters at (760) 707-9129. You may call the Human Research Protections Program Office at (858) 455-5050 to inquire about your rights as a research subject or to report research-related problems.

You have received a copy of this consent document.

You agree to participate.

_____   _____ _____
Subject's signature   Witness   Date

University of California, San Diego-Escondido Union School District
Consent to Have Your Child Act as a Research Subject

**Mobile Learning Devices: An Inquiry into Elementary Education Reform
for the Improvement of English Language Learners' Literacy**

Jennifer L. Walters, under the supervision of Dr. Amanda Datnow, Professor and Director, UCSD Educational Studies, with approval of the Escondido Union School District Board of Education, is conducting a research study to find out students' use of mobile learning devices (*iPod touches*) in elementary classrooms. As a parent of a student in one of a selected fourth- or fifth-grade classroom, your permission is requested for your child to participate in this study. Your child may or may not be in a classroom with one-to-one technology devices. There will be approximately 500 student participants in this study. The purposes of this study are to understand how teachers and students use *iPod touches* in the content area of language arts and to explore their impact on reading achievement.

If you agree for your child to be in this study, the following will happen to him/her:
Students will complete a Reader Interest Survey in the classroom, administered by the classroom teacher. The survey will be given at the beginning of the school year and in Month 7 of the school year. Survey administration time is 30-45 minutes, and it will be available in English and Spanish.

Participation in this study may involve some added risks or discomforts. These include:
1. A potential for the loss of confidentiality. This is highly unlikely since no teacher names or student names will be used. Student names and survey results will be coded numerically to ensure anonymity. Research records will be kept confidential to the extent allowed by law. Research records may be reviewed by the UCSD Institutional Review Board.
2. Although the survey is brief, there is a possibility students may become bored or fatigued. Because the survey is entirely voluntary, students may skip a question or discontinue the survey if this occurs.
3. The administration of this survey and its contents do not in any way create a risk for the teacher or his/her students. The results are in no way related to any evaluation or judgment of the teacher or students. **The results are not a component of a student's evaluation or grade.**

Because this is a research study, there may also be some unknown risks that are currently unforeseeable. You will be informed of any significant new findings.

The alternatives to participation in this study are for students to respond to the survey in a less than complete way by skipping a question(s), or to not participate in the survey, wherein the teacher is asked to provide an alternate activity such as reading a book.

There may or may not be a direct benefit to students from participating this study. The Reading Interest Survey may serve students to reflect on how they feel about reading. The researcher, however, may learn more about how best to use mobile learning devices for educational purposes, and society may benefit from this knowledge.

Parent Informed Consent Form (for minor students) - English (cont'd.)

Your child's participation in the survey is entirely voluntary. Your child may refuse to participate in the survey at any time without penalty or loss of benefits to which he/she is entitled.

The researcher may remove your child from the study without your consent if the researcher feels it is in the child's best interest or the best interest of the study. The student may also be withdrawn from the study if he/she does not follow the survey instructions given by the teacher.

You will be told if any important new information is found during the course of this study that may affect your wanting to continue.

There is no compensation or cost for your child participating in this study.

Your child's classroom teacher and/or the school principal has explained this study to you and answered your questions. If you have other questions or research-related problems, you may reach Jennifer Walters at (760) 707-9129. You may call the Human Research Protections Program Office at (858) 455-5050 to inquire about your rights as a research subject or to report research-related problems.

You have received a copy of this consent document.

I agree to permit my child to participate in the Reader Interest Survey.

_____   _____   _____
Subject's signature   Witness   Date

Appendix N2.
Parent Consent for Participating Student, Spanish

La Universidad de California de San Diego (*UCSD*) y el Distrito Escolar de Escondido (*EUSD*)
Consentimiento para que su niño sea participante en un estudio

Los dispositivos portátiles de aprendizaje: Un estudio sobre la reforma de enseñanza primaria para mejorar la lectoescritura de estudiantes del idioma inglés (*ELL*)

La señora Jennifer L. Walters, bajo la supervisión de la Dra. Amanda Datnow, la profesora y directora de estudios educativos de la universidad *UCSD*, con la aprobación de la mesa directiva del distrito escolar *EUSD*, está realizando un estudio investigativo para averiguar el uso estudiantil de los dispositivos portátiles de aprendizaje (*iPod touches*) en los salones de clase   de las escuelas primarias. Como padre de familia de uno de los alumnos del salón de clase de cuarto o quinto grado que fue seleccionado, necesitamos su permiso para que su niño pueda participar en este estudio. Su niño posiblemente estará o no estará en un salón de clases donde habrá enseñanza individualizada con dispositivos tecnológicos. Habrá aproximadamente 500 participantes en este estudio. El propósito de estudio es averiguar cómo los maestros y sus alumnos utilizan los *iPods touches* en las disciplinas de lenguaje; y examinar el efecto que   tienen en el rendimiento de la lectura.

Si usted acepta que su niño participe en estudio, se llevarán a cabo los pasos a continuación: Los alumnos participarán en la encuesta sobre la lectura, *Reader Interest Survey*, que será administrada por el maestro del salón de clase. Se realizará la encuesta a principios del año escolar; y en el séptimo mes del año escolar. La encuesta durará de 30 a 45 minutos y estará disponible en inglés y español.

La participación en este estudio, puede implicar algunos riesgos o causar incomodidades. Éstos incluyen:
1. La posibilidad de la pérdida de confidencialidad. Es muy improbable que esto ocurra, ya que no se usarán los nombres de los maestros ni los nombres de los alumnos. Los nombres de los alumnos y los resultados de las encuestas, serán codificados por números para asegurar el anonimato.
2. Aunque la encuesta es breve, es posible que los alumnos se sientan aburridos o cansados. Debido a que la participación en esta encuesta es totalmente voluntaria, si esto ocurre, los alumnos pueden omitir algunas preguntas o solicitar que discontinúen la encuesta.
3. La administración de esta encuesta y su contenido, de ninguna manera crean un riesgo para el maestro o sus alumnos. Los resultados de ninguna manera se relacionan a ninguna evaluación u opinión del maestro o sus alumnos. **Los resultados no forman parte de un componente de una evaluación estudiantil o de una calificación escolar.**

Debido a que este es un estudio investigativo, puede ser que haya algunos riesgos desconocidos, que en este momento sean imprevisibles. Se les informará con respecto a cualquier nuevo hallazgo importante.

Las alternativas en cuanto a la participación en este estudio, son para aquellos alumnos que tomen la encuesta en forma incompleta, omitiendo una o más preguntas o que decidan no participar en la encuesta; en dónde se le solicita al maestro que le dé al alumno otra actividad que pueda hacer, como leer un libro.

Parent Informed Consent Form (for minor students) – Spanish (cont'd.)

El investigador realmente puede obtener más informes en cuanto a cómo mejor usar los dispositivos portátiles para fines educativos; y nuestra sociedad puede beneficiar de estos conocimientos.

La participación de su niño en este estudio, es totalmente voluntaria. Su niño puede optar por no participar en el estudio en cualquier momento, sin ningunas consecuencias o sin ninguna pérdida de beneficios autorizados.

El investigador puede remover del estudio a su niño, sin su consentimiento, si el investigador opina que sería en beneficio del alumno o en beneficio del estudio. También pueden sacar al alumno del estudio, si él o ella no siguen las instrucciones de la encuesta que les dé el maestro.

Se le proporcionará cualquier nueva información importante que surja en el transcurso de este estudio, que pueda afectar su deseo para seguir participando.

No habrá ninguna compensación o ningún costo para que su niño participe en este estudio.

El maestro de su niño o el director escolar le han explicado este estudio; y le han contestado sus preguntas. Si tiene otra pregunta o duda o algún problema relacionado al estudio, por favor comuníquese con la señora Jennifer Walters al, (760) 707-9129. También pueden comunicarse a la oficina del programa, *Human Research Protections Program*, al (858) 455-5050 para obtener mayores informes con respecto a sus derechos como participante en el estudio o para informarles de cualquier problema relacionado al estudio.

Usted ha recibido una copia de este documento de consentimiento.

Doy mi permiso para que mi niño participe en la encuesta sobre la lectura, *Reader Interest Survey*.

_____   _____   _____
Firma del participante   Testigo   Fecha

Appendix O1.
UCSD Parent Audio-taping Consent, English

University of California, San Diego
Audiotape Recording Consent Form

As part of this project, an audiotape recording will be made of your child during his/her participation in a small group interview about using mobile learning devices in his/her classroom as part of a research project. The information will help the school district evaluate the use of technology in classrooms. Please indicate below the uses of these audiotape recording to which you are willing to consent. This is completely voluntary and up to you. In any use of the audiotapes, your name will not be identified. You may request to stop the taping at any time or to erase any portion of your taped recording.

1. The audiotapes can be studied by the research team for use in the research project.

          Initials

2. The audiotapes can be used for scientific publications.

          Initials

3. The audiotapes can be reviewed at meetings of scientists interested in the study of using mobile learning devices in elementary classrooms in English-language arts.

          Initials

4. The audiotapes can be reviewed in classrooms to students.

          Initials

5. The audiotapes can be reviewed in public presentations to non-scientific groups.

          Initials

6. The audiotapes can be used on television and radio.

          Initials

You have the right to request that the tape be stopped or erased during the recording.

You have read the above description and give your consent for the use of audiotapes as indicated above.

_____   _____
Signature   Date   Witness   Date

UNIVERSIDAD DE CALIFORNIA EN SAN DIEGO
FORMULARIO DE AUTORIZACIÓN PARA HACER GRABACIONES EN AUDIO

Como parte de este proyecto, se hará una grabación en audio de su niño durante su participación en este proyecto de investigación. Por favor indique más abajo los usos de estas grabaciones en audio, que usted está dispuesto a autorizar. Esta grabación en audio es completamente voluntaria y la autorización depende totalmente de usted. Durante cualquier uso de las cintas de audio, no se mencionará su nombre. Usted puede solicitar que dejen de grabar en cualquier momento o que borren cualquier parte de su grabación.

1. Las cintas de audio pueden ser estudiadas por el equipo de investigación para ser usadas en el proyecto de investigación.

                                                      Iniciales

2. Se pueden usar las cintas de audio para publicaciones científicas.

          Iniciales

3. Se pueden usar las cintas de audio en las reuniones de científicos, que estén interesados en el estudio de:

_____ .

          Iniciales

4. Se pueden usar las cintas de audio con estudiantes en salones los de clase.

          Iniciales

5. Se pueden usar las cintas de audio en presentaciones públicas a grupos no científicos.

          Iniciales

6. Se pueden usar las cintas de audio en la televisión y el radio.

          Iniciales

Usted tiene el derecho de solicitar que dejen de grabar o que borren cualquier parte de la cinta durante la grabación.

Usted ha leído la descripción mencionada más arriba y autoriza el uso de las cintas de audio anteriormente indicadas.

_____   _____

Firma   FECHA   Testigo   FECHA

Appendix P1.
Child Assent

Student Focus Group Interviews

Reading is an important skill. The school district and some researchers want to understand how 4th and 5th grade students feel about reading.
If it is OK with you, we would like to ask you some questions about reading. Your interview answers will help us to understand how to best teach reading.

> If you do not want to answer the interview questions, that's OK. Even if your parents have given permission for you to answer the questions, you may still choose not to answer them.
> If you change your mind and do not want to do this anymore after you start, that's OK too. These questions are not a part of your grade. Do you have any questions about this?
> If you choose not to participate, you can return to your classroom and your regular school work.

If you write your name on the line, it means you read this, or your teacher read it to you. Signing your name means that you want to answer the questions.

_____   _____

Signature of Student   Date

_____   _____

Signature of Researcher   Date

Appendix P2.
Consentimiento del alumno

Entrevistas en grupo del enfoque estudiantil

La lectura, es una habilidad importante. El distrito escolar y algunos investigadores quieren llegar a conocer qué es lo que piensan los alumnos de grados 4 y 5 acerca de la lectura.

Si estás de acuerdo, queremos hacerte algunas preguntas acerca de la lectura. Las respuestas que nos des, nos ayudará a conocer las mejores maneras para enseñar la lectura.

Si no quieres contestar las preguntas de la entrevista, no hay problema. Incluso aunque tus padres te hayan dado permiso para contestar las preguntas, quizás todavía no quieras contestarlas.

Si cambias de opinión y no quieres seguir después de que haya comenzado la entrevista, tampoco hay problema. Estas preguntas no formarán parte de tus calificaciones. ¿Tienes alguna pregunta acerca de esto?

Si decides no participar en la entrevista, puedes regresar a tu salón de clases para seguir haciendo tu trabajo escolar normal.

Si escribes tu nombre sobre la línea, esto quiere decir que leíste esto, o que tu maestro le dio lectura a la hoja. Al firmar tu nombre, esto quiere decir que quieres contestar las preguntas.

_____   _____

Firma del alumno   Fecha

_____   _____

Firma del investigador   Fecha

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