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Mobile Learning and English Language Learners: A Case Study of Using iPod Touch As a Teaching and Learning Tool

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Abstract:

Educators have become increasingly interested in the learning benefits that mobile technology can provide to students in and out of classrooms. While there is considerable enthusiasm for using mobile devices to support learning with their multimedia capabilities, portability, connectivity, and flexibility, there is a paucity of research evidence about whether such mobile technology can facilitate learning for K-12 students, specifically the English Language Learners (ELL) population. This case study examined how ELL teachers and their students at two middle schools used the iPod touch to support their teaching and learning and explored the potential benefits of using such mobile devices as a teaching and learning tool. Using multiple quantitative and qualitative data sources from both teachers' and students' perspectives, the findings suggested that incorporating the iPod touch in ELL instruction provided significant support for improved learning capacity along with distinct challenges. The results indicated that in spite of the challenges teachers faced when integrating the iPod touch in their instruction, mobile learning could bring unique technological and pedagogical affordances to ELL students.

Introduction

Educators have become increasingly interested in the learning benefits that mobile technology can provide to students in and out of classrooms through various features for information access, communication, collaboration and creating digital products (Banister, 2010; Chen & Huang, 2010; Hwang & Chen, 2012; Lin, Wong, & Shao, 2012; Looi, Seow, Zhang, So, Chen, & Wong, 2010; Özdemir, 2010). With the accelerated development of mobile technology and its growing popularity, as well as the potential benefits of mobile devices for ubiquitous learning, empirical research is much needed (Prensky, 2010; Traxler, 2011).

Mobile technology has been seen as a valuable technology resource for students in K-12 education, especially in serving those student populations who may not have adequate technology access after school, such as English Language Learners (ELL) (Craig, Paraiso, & Patten, 2007; Cummins, 2000; Lacina, 2008; Patten & Craig, 2007). Helping ELL students succeed in regular classrooms presents unique challenges. These students often enter schools with varied levels of English language proficiency and may require additional support for academic success. While there is considerable enthusiasm for using mobile devices to support learning with their multimedia capabilities, portability, connectivity, and flexibility, there is a paucity of research evidence about whether such mobile technology can facilitate learning for K-12 students, specifically the ELL population.

The purpose of this study is to understand how mobile devices, such as the iPod touch, can be used to support the teaching and learning of ELL students at middle school level, and to explore the potential benefits of these devices as a teaching and learning tool.

Review of Literature

Mobile Learning: Affordances and Challenges

Mobile handheld devices have been improved to function as miniature computers utilized by teachers and students for personal use. In recent years, the technical advancements of mobile devices have garnered educators' attention for the unique affordances they can offer in a classroom setting. This technology provides a combination of flexibility, accessibility, and interactivity with online resources unlike other typical classroom technologies such as desktop computers.

Perhaps the most well documented affordances of mobile devices are their inherent portability and their wireless connectivity. The ability to take the device anywhere and connect to the Internet allows the user to not only retrieve information from a global Web 2.0 system but also support the users in "sharing, organizing, managing and creating information" from remote locations at any given time (Chen & Huang, 2010, p. 70). During the school day, students have the ability to quickly and quietly access information from their desk to facilitate their participation in class discussion (Brown, 2011) or talked in the cafeteria during their lunch break (Hwang & Chen, 2012). Outside of school, students can use the devices at the mall or on the bus, extending their learning capability beyond the regular school day (Chen & Chung, 2008; Motiwalla, 2007; Sha, Looi, Chen, Seow, Wong, 2012). The connectivity to the Internet by mobile devices can support contextually relevant, just-in-time learning (Jeng, Wu, Huang, Tan, & Yang, 2010; Liu & Chu, 2010). The combination of mobility and accessibility provides students the opportunity to draw connections to previously learned content knowledge, gain new knowledge and further develop problem-solving skills (Liu, Tan, & Chu, 2009).

An ever-present concern for educators is how to keep students interested in what they are learning. Mobile technology supplies students with access to interactive multimedia tools that can improve learning and student engagement (Guazzaroni, 2012; Looi et al., 2011). Current

mobile devices are typically equipped with digital production features such as a camera, video and audio recorder. Moreover, there are thousands of applications available, with an increasing number aimed at education. The multimedia capabilities provide students interactive practice materials at the touch of a button. Students can watch video recordings, read study material, and record audio. They can stop, rewind, and fast forward through materials at their own pace, giving them the independent control over the pace they receive information (Banister, 2010), which allows students to determine their own learning process. Such affordances offered by mobile devices provide educators with a way to motivate students to learn and to individualize students' learning, giving students a greater sense of ownership and responsibility for their own learning (Kervin & Hindle, 2007; Ridenour, Blood, Simmons, Crouch & Johnson, 2011).

While the technological affordances are significant, there are challenges in the educational use of mobile technology. The implementation of mobile technology into a school system or classroom "requires careful planning and commitment from all partners" to manage the pedagogical and administrative logistics (Wang, Wiesemes, & Gibbons, 2012, p.575). None of the handheld mobile devices were specifically designed with education in mind and usage in an educational setting can present difficulties. The small screen size makes it difficult to view documents and create multimedia projects (Brown, 2011). The small, individualized devices also allow students to veer from the assigned task easily without immediate detection. Teachers have to develop ways to oversee the use of the devices within the classroom environment and to ensure students are on task (Banister, 2010; Mifsud & Mørch, 2010). Additionally, teachers often have to take on the role of device managers, making sure that all the devices are charged and updated to run properly, so that they can be incorporated into a lesson effectively. There is an investment of time and money to oversee the devices (Banister, 2010).

In addition, teachers are faced with the challenge of finding relevant educational materials appropriate for their students. While the number of applications available has increased dramatically since the inception of mobile applications and many of these now target a K-12 audience, finding applications that specifically suit the content area being taught requires extensive time on the part of the teacher (Banister, 2010; Liu, Navarrete, & Wivagg, 2013).

Using Mobile Technology to Support English Language Learners

One student group who may benefit from mobile devices such as the iPod touch is English Language Learners (ELL) (Craig et al., 2007; Patten & Craig, 2007). ELL students are those who speak diverse languages such as Spanish, French, Portuguese, Chinese, and Japanese. With different levels of English proficiency (some have been in US schools for several years, while others are new to English language instruction), they represent distinct academic challenges in language acquisition (Cummins, 2000). By providing the capacity for listening, speaking, reading, and writing skills, it is possible that mobile devices can provide immediate learning affordances for language learners. By engaging the language learner in situated tasks through mobile technology, "language can be used to amplify students' intellectual, aesthetic, and social identities" (Cummins, 2000, p. 544). If ELL students can have access to technology affordances through the use of mobile devices such as iPod touch, it is possible to empower them in managing their learning and at their own pace (Craig et al., 2007; Patten & Craig, 2007). Due to the popularity of mobile devices, ELL students, who may be socially marginalized in a typical school setting, can also find the device as a "cultural tool" (Craig et al., 2007, p.1840) that allows them to feel included into the school culture. While the educational value of being part of the "popular culture" (p.1840) is difficult to assess, this type of access allows for socially contextualized learning (i.e. access to spontaneous learning in social settings) as well as

motivational engagement. Furthermore, the use of mobile devices like the iPod touch can facilitate the academic language learning vital for success in school through the access of authentic, contextualized resources. Community, family, and peer interactions, for example, are socio-cultural assets that can promote extended learning contexts beyond the classroom through the use of mobile devices (Borrero & Yeh, 2010).

Research indicates English Language Learners can potentially benefit from using mobile devices. We are interested in examining how mobile devices such as iPod touch are used as a teaching and learning tool for ELL students. The following research questions guided our inquiry:

1. How do ELL teachers use mobile devices such as iPod touch to help ELL students learn?
2. How do ELL students use mobile devices such as iPod touch to help their learning?
3. What do ELL students think of using iPod touch as a learning tool?
4. What do ELL teachers think of using iPod touch as a teaching tool?

Method

Research Context and Participants

This research took place in a medium-sized school district in south central Texas with a 2010 enrollment of about 17,000 students in grades K-12 and covering an area of about 600 square miles. In 2009, the district decided to purchase iPod touch devices and provided them 24/7 to its ELL middle students and teachers both in and outside classroom. The goal of this iPod project was to provide ELL students with resources to help them learn English and provide additional support for their other classes. Two ELL teachers from two different schools and their students were the participants of this study. The teacher (Virginia) of the first class (Class 1, hereafter) had taught in public schools for 26 years and this was her second year as an ELL

teacher. She taught three classes per day to ELL students and two of these were dedicated to beginner ELL students. The second teacher (Claire and Class 2, hereafter) had taught seven years and this was her third year teaching middle school ELL students. She taught four periods of ELL classes with three of these dedicated for beginners. Claire taught ELL class exclusively while Virginia also taught three periods of English Language Arts (see Table 1). Pseudonyms were used for the participants to maintain confidentiality.

Table 1

Demographics of the Teachers

Teacher name	**Grade**	**Subjects**	**Teaching Experience**
Ray	1st	All	4 Years
Kelly	1	All	3 Years
Cindy	3	Math and Science	7 years
Molly	4	English Language arts & Social Studies	8 years
Ellie	5th	Social Studies/ELA	22 years
Jim	6-12	Mathematics	5 years
Jane	K-12	Instructional Technology	18 years
Ann	7 &8	Speech & Health	7 years
Lima	8	ELA	26 years
Al	8	8th Grade Math/Algebra	6 years

The middle school where Virginia taught had around 800 students and 44% of these were economically disadvantaged, 44% Hispanic, 50% White, and 5.4% Limited English Proficiency (LEP). Only 4.6% of students were enrolled in the ELL program, and there were a few LEP students not enrolled in ELL class due to parent refusal. The middle school Claire taught in also had around 800 students, with 16% economically disadvantaged, 66% White, 25% Hispanic, and 2.2% LEP with all of these LEP students enrolled in the ELL class.

Data Sources and Analyses

This study took place over the course of one school year (2010-2011). A case study approach was used as examining iPod touch use with ELL students indicated a delimited context with a particular focus on the phenomenon providing a "bounded system" of study (Merriam, 2009, p. 40), and the case study method allows an in-depth examination to provide a heuristic illumination of understanding iPod touch use in education as a "complex social" unit of investigation (Merriam, 2009, p. 50). While the case method limitation may include potential biases through reliance on the investigators' observation and interpretation, the accounting for human elements, within the case, is argued to provide a greater insight and holistic understanding of iPod touch use for ELL students.

To address the research questions, multiple data sources were collected for the purpose of triangulation (Creswell, 2009; Mathison, 1988). Multiple data sources, presenting information from multiple perspectives, can provide a more complete and in-depth picture of what was happening with iPod touch use in the classrooms. Data sources consisted of 1) interviews with teachers, 2) classroom observations, 3) students surveys, 4) artifacts from the students (such as students' notes of their thoughts), and 5) interviews with selected students.

Interviews with teachers and classroom observations. Four interviews were conducted with each of the two teachers throughout the school year: When they began the iPod touch project at the beginning of the school year, at the mid-point and toward the later part of the school year, and a final interview at the end of the school year. Thirty questions designed by the research team sought to understand the teachers' experience, perceptions, and classroom practices toward iPod touch use. Questions varied across interviews because of the different focus for each interview. Sample questions included:

- How are you using the iPod touch?

- How did you use the iPod touch in your teaching? What has worked and what has not?
- In your opinion, does the iPod touch make a difference in the students' learning? Can you give examples? In what way are they learning? How does that compare to student learning without the iPods?
- Do you see any challenges in using the iPod?
- Please describe how does the iPod touch help student learning? How does it constrain student learning? Please give examples.
- What, if any, challenges are there in developing iPod touch activities? Examples?
- How is iPod touch used outside of the school day?

The interview questions were provided to the teachers prior to each interview. During the interviews, the teachers used the questions as a guide and were free to respond in any way they wanted, to elaborate, or to omit any questions as they wished. When necessary, follow-up questions were asked. All interviews were conducted face-to-face or by telephone conference, audio-recorded, and then transcribed. A total of 7.5 hours of interviews were conducted. Using the guidelines by Miles and Huberman (1994), each interview transcript was independently coded by one researcher. A list of initial codes was generated. Then, each coded interview was checked by a second researcher and the codes were verified, modified, and/or refined. These codes were organized and categorized into emerging themes. During the coding process, the researchers constantly compared data, codes, categories, and themes (Creswell, 2009), and re-analyzed and resolved any disagreements until the inter-rater reliability reached 100%. Appendix A provided the categories, themes, descriptions, and sample quotes.

Four classroom observations with each teacher were performed. To ensure capturing most of what happened in the classroom, two researchers conducted all but one set of the

classroom observations with the remaining conducted by only one of the researchers due to a schedule conflict. After each observation, each researcher first wrote what he or she had seen in the classroom and then these observation notes were compiled and verified by the second researcher who observed the same class. After all observations were completed, a researcher compiled all observation notes and wrote the summaries. These observation notes were analyzed using the same method as the analysis of the interviews. Throughout the data collection process, the research team met every week to discuss what they observed in different classrooms, shared insights, and performed peer debriefing.

Surveys. Students were given three surveys (at the beginning, middle, and end of the school year). The survey questions aimed at finding out 1) the amount of usage of the iPod touch as reported by the students at school and at home, 2) any applications they used often and found useful, and 3) how they liked iPod touch and activities using it. Survey questions included "How often do you use the following applications or features at school on average each week?"; "How often do you use the following applications or features at home on average each week?"; "After using the iPod touch for an entire school year, on a scale of 1 - 5, how much do you like using the iPod touch?"; and demographic questions such as "Is this school year the first time you have used an iPod touch?" and "Do you have a cellphone that can get on the internet?"

As these were ELL students, English and Spanish versions of the first survey were created. However, none of the students chose the Spanish version so only the English version was used for surveys 2 and 3. Survey responses were analyzed descriptively and frequency data were tallied. Since not all students completed all questions in all surveys, the results provided the percentages of those who responded the questions.

Open-ended responses. We asked the students to respond to a few open-ended questions in the late part of the second semester. The teachers asked the students to handwrite their responses as a practice for using English. These questions were 1) Which iPod touch activities have you learned the most from? Why? 2) How do you use the iPod touch at home? Why do you use it in that way? 3) Besides the language class, does using the iPod touch help you learn in other subjects? If so, how? The content of these artifacts were typed up and analyzed using the same procedure as in the interview analysis.

Interviews with students. To gain a more in-depth understanding from the students' perspective, toward the end of the school year three students were selected with the teachers' assistance: each at a different English language learning level: beginning, intermediate, and advanced. An interview was conducted with each student to understand his/her perspective. Sample interview questions included:

- Do you think using the iPod touch helped you learn? Why or why not?
- How do you feel about doing school activities using the iPod touch as compared to doing them without the iPod touch?
- Do you use the iPod touch differently at school than at home? If so, in what ways?
- Do any family members show any interest in using the iPod touch? If so, in what ways?

One interview was conducted via Skype and two were face-to-face. These interviews were audio-recorded and transcribed. They were analyzed following the same procedure as the analysis of the interviews with teachers.

Results

Teachers' Use of iPod Touch in Their Classrooms and Their Perception

Interviews with the teachers and the classroom observations revealed three main themes: Technological affordances, pedagogical affordances, and challenges. They were discussed as follows.

Technological affordances. The teachers, Virginia and Claire, asserted that the iPod touch provided the students with substantial support in their language learning and content area courses through different iPod's features. Both teachers also described the extended learning provided through the assigned learning activities for homework. Teacher-created activities such as audio readings and voice recordings provided the students continued exposure to learning materials otherwise absent at the ELL students' homes. Moreover, Wi-Fi enabled iPods provided the students' families with Internet connectivity as well as learning resources for all family members. The technological affordance delineated were: 1) language learning, 2) content learning, 3) multimodal learning support 4) extended learning time, and 5) home-school connection.

The teachers had their students use the devices as reading support with audio trade books and textbooks as well as recording reading passages in English for their students. The language translation apps along with the dictionary and thesaurus provided immediate language learning support for the students during class and throughout the school day. For example, Claire pointed out this affordance with the digital flash card app, "They go find a picture and the name of the picture, we use [the app] *Comic Life* for that, so they have a picture and vocabulary word and at the beginning they add a Spanish word to it." Additionally, videos and movies provide a rich source of language support, which allows the students to learn English from the character dialogue. The teachers specified the dictionary and thesaurus as critical to their students as immediate support for reading and writing.

Similarly, learning in content areas was supported through a variety of apps and learning games. The access to online resources provided timely references that ELL students needed for completing their school assignments in their content area courses. Specific apps and games offered them visual and audio support of many content areas such as math, science and social studies. The school district downloaded audio textbooks on these iPod devices to provide additional reading support that are much needed for some of these ELL struggling for reading the content topics. The resources available were in a variety of forms from simple references to subject specific readings such as chemistry or physics. Providing images, audio, and video relating the content areas in a more accessible manner allowed students to access multimedia enabled information in language, math, science and social studies.

Virginia and Claire described the extended learning time affordance provided by the iPod touch. With its capacity for access to the Web and teacher-provided resources loaded on the device, the students had around the clock support for their learning, if needed. Additionally, the teachers referred to the support as a "private tutor." Access to various needed resources provided students with self-supportive learning at their language level. Virginia spoke of the importance to the student learning by "giving them [students] self-confidence in the sense of being able to find answers on their own without breaking down and asking a person and it saves the kid in giving them the references right at their hand."

The affordance of home-school connection supported not only the student's connectivity to the school information and resources but also provided their families access to Internet resources. The teachers indicated that the students' parents, who otherwise did not have access to the Internet, could access not only their children's school assignments and grades, but also other information useful to them. For example, Virginia shared with us an example that family

members used their children's iPod touch taken home to look for jobs: "so many of these families' only connection to that technology world is the iPod. And the whole family uses it. Parents use it to check grades. I had searches on one. It was a job inquiry. I was checking what the students were looking at and it came up, 'job inquiry' or 'job application'. I went back to the kid and asked, 'Are you filling out job applications?' Oh no, Dad was doing that." Additionally, siblings, who similarly had limited Internet access, were able to share readings, play educational games, watch science videos and access online dictionaries and encyclopedias for their extended learning beyond the school day. Appendix B provided a sample List of iPod apps made available to the students.

The teachers also commented on the social desirability, indicating that possession of the iPod touch did not hold the potential stigma of other learning tools and actually provided a source of pride and status. The popularity of the iPod allowed the students a sense of social belonging. Virginia elaborated on the self-confidence building, "I think those iPods have done so much for their egos. They're so much more proud of who they are, they're so much proud, there's so much pride in what they do." The iPod touch devices were perceived as impartial and could support the students without stigma or judgment of ability level. This finding is encouraging and warrants future research.

Pedagogical affordances. From the pedagogical perspective, the affordances identified by the teachers were: differentiated instructional support, collaborative learning support, and access to Internet resources. Using iPod touch in a variety of ways to support instruction, the teachers considered the device an aid in addressing ELL student's individual learning needs. English language levels of these ELL were significantly different from each other. To address this challenge, the teachers loaded applications and games that could provide additional support

to their students. For instance, one ELL student needed primary English support with alphabet sounds or pronunciation while other more advanced learners needed help in reading fluency. Virginia described her experience in class with the student use of the devices, "They can turn it on and get themselves busy, no matter what we're doing." Claire added that the device "allows more development, more customized learning." Furthermore, student collaboration was also supported with using applications such as *eLocker*, which allows for online text communication with other students and the teacher. Virginia elaborated on her use for collaborative learning in a group singing activity with high school honor students who were paired up with ELL students, "We took songs and made the Karaoke so that they practiced all that, we used all that, we did, I think the thing with the high school has been huge [with] all the interaction."

Although Virginia was using the older iPod touch model (without camera) while Claire had a more recent model, both perceived that the devices provided the capacity for learning support for the students. The learning in the classroom engaged the learners in the multimodal affordance via resource available on the Internet and the learning support extended beyond a single classroom period to support throughout the school day and at home.

Challenges. The challenges identified were how to integrate iPods for effective teaching, monitoring student work, managing the devices, and Wi-Fi connectivity issues. Among these challenges, learning how to manage and integrate the devices created a significant time requirement of the teachers. Likewise, some technical issues surfaced that can potentially limit the effectiveness of using the devices for instructional purposes.

The teachers described that for effective integration of the devices, they had to spend time finding appropriate materials and resources for classroom use. For example, Claire created classroom worksheets based on YouTube language pronunciation videos as a follow-up to the

classroom lesson. Extra time was also needed to synch the devices with resources and apps. Effective integration also requires adapting teaching strategies to leverage the advantages of the device.

Monitoring the students' work was also identified as time intensive. The students were required to audio-record readings as homework, as well as other activities such as video production. The viewing and listening to all of the digital products proved to be overwhelming to these two teachers in terms of keeping up with the activities and making sure that the students were complying with the homework assignments.

While the size and portability of the device are in many ways advantageous; they also present challenges; the devices were easy to steal, lose, or unintentionally damage. Our data revealed that some of the devices were left in pockets and washed in the laundry. In addition, at the end of the school year, a number of the devices were stolen from one of the classrooms. Thus, one of the very affordances of the mobile devices posed a problem as shown in this study in keeping track and not losing or damaging them.

The wireless affordance also has the potential to create technical challenges. The use of numerous devices simultaneously from a single location proved to be a special technical problem as the school wireless system was overwhelmed on several occasions as seen in our observations, either not allowing access or being overloaded. Such technical problems will ultimately affect how the teachers teach.

Classroom observations. The classroom observations, offering insights for the data triangulation, showed that the teachers implemented the iPod devices in a variety of ways that included the use of various online resources such as dictionaries, maps, and games. In one particular observation, Virginia required the students to access a news resource, listen to the

newscast and fill out a corresponding worksheet with facts, opinions and questions about the topic. On another occasion, Claire had the students look up some vocabulary words from a traditional language learning activity, and then make digital comics with speech bubbles using the vocabulary words in illustration. The use of the Internet was a key factor in the integration of the device. When students had problems accessing the Internet, which was observed on a number of occasions, the activity faltered until the connectivity was established.

The teachers were able to fit the iPod touch use into the existing middle school instructional setting in which the teacher directed and monitored the learning activities. During one observation of Claire's class, there was a presentation of homework videos produced by the students interviewing their parents on the topic of education. A common strategy that was repeatedly seen in both classes was the adaptation of typical classroom language and reading activities to include various features of the iPod touch. Example activities observed included silent, individual audio-book reading sessions and read-along dictionary support. Claire also used a pronunciation YouTube video that was accessed by the students before they completed a worksheet on the language lesson. The use of the device to fill in gaps in time was also observed. Virginia allowed the students to play a game called *Oregon Trail* on the iPod after the students had completed their required language assignment and some students opted to play other games.

During the observation periods, the students engaged in using the devices for the classroom language activities. However, due to the size of the device display, how the students used the iPod touch was difficult to observe and document. Other than looking directly over a student's shoulder and asking the students what they were doing and thinking, using typical and

non-obtrusive classroom observation techniques presented a challenge for the researchers to document what features/apps the students were using and how.

Students' Use of iPod Touch in Their Learning and Their Perception

Reported usage at school and at home via surveys. We surveyed the students how often they used the available features that were on their iPod touch on a weekly average both at school and at home. Students' responses indicated that during the mid-school year at school: Two-thirds of them spent a few minutes to about one hour using the features, and one-third of the students spent 2-5 hours using those features while a few students spent more than 5 hours (see Table 2). Students reported using all of the features, which can be grouped into three categories: Resources (e.g. calculator, calendar, accessing Internet, maps, listening to music and podcasts, and checking weather), media creation tools (voice recorder, notes, still and video cameras) and other applications. Teachers' interviews and classroom observations indicated students used the media creation tools to complete school assignments. When comparing middle-of-school usage to end-of-school usage, the survey data showed that a considerable percentage of students used resource tools and media creation tools for two or more hours per week during the middle of the school year; however, at the end of the school year, almost all of the students reported using these applications 0-1 hour per week.

Table 2

Student Responses to: "How often do you use the following applications or features at SCHOOL on average each week?"

Resource Tools	Duration in hours	Mid-year %	End-year %
Calculator	0-1	48.1 (*n*=27)	94.2 (*n*=17)
	2-5	40.7	5.9
	More than 5	11.1	0
Calendar	0-1	77.8 (*n*=27)	100 (*n*=17)

	2-5	11.1	0
	More than 5	11.1	0
Internet	0-1	45.8 (*n*=24)	94.1 (*n*=17)
	2-5	37.5	5.9
	More than 5	16.7	0
Maps	0-1	66.7 (*n*=24)	100 (*n*=16)
	2-5	29.2	0
	More than 5	4.1	0
Music	0-1	73.1 (*n*=26)	76.5 (*n*=17)
	2-5	11.5	23.5
	More than 5	15.4	0
Weather	0-1	56.0 (*n*=25)	87.5 (*n*=16)
	2-5	36.0	12.5
	More than 5	8.0	0
Podcasts	0-1	64.0 (*n*=25)	94.1 (*n*=17)
	2-5	24.0	5.9
	More than 5	12.0	0
Media Creation			
Voice Recorder	0-1	58.3 (*n*=24)	94.1 (*n*=17)
	2-5	29.2	5.9
	More than 5	12.5	0
Notes	0-1	57.7 (*n*=26)	94.1 (*n*=17)
	2-5	26.9	5.9
	More than 5	15.4	0
Still Camera	0-1	76.2 (*n*=21)	100 (*n*=14)
	2-5	19.0	0
	More than 5	4.8	0
Video Camera	0-1	50.0 (*n*=20)	100 (*n*=15)
	2-5	35.0	0
	More than 5	15.0	0
Other Applications			
	0-1	63.1 (*n*=19)	81.2 (*n*=16)

	2-5	21.1	18.8
	More than 5	15.8	0

Note: Not all students responded to each question. % indicated the percentage from the students who completed the question. This is also the case for Table 3. Other applications mostly included games the teachers downloaded for the students.

Their responses showed similar results for usage at home: During the mid-school year, two-thirds of the students spent a few minutes to about one hour using the features, and one-third of the students spent 2-5 hours for using most of features, and a few students spent more than 5 hours (see Table 3). When comparing mid-of the school year to end-of-school year usage, the majority of the students reported spent a few minutes to about one hour using the features. A small percentage of the students spent between 2-5 hours using the above features. A few interesting observations can be made comparing school and home usages: Approximately 63% of the students spent 2 or more hours using the Internet at home (with 25.9% spent more than five hours at home while 16.7% spent more than five hours at school). That is, more students spent more time using the Internet at home than at school. This is also true for listening to music with 40.7% spent 2-5 hours at home while 11.5% at school and 25.9% spent more than 5 hours at home while 15.4% at school. On the other hand, none of the students reported spent more than five hours using calculator at home while 11% reported did at school. Another trend was that there was a decreasing weekly usage for both at school and at home.

Table 3

Student Responses to: "How often do you use the following applications or features at HOME on average each week?"

Resource Tools	Duration in hours	Mid-year %	End-year %
Calculator	0-1	66.7 (*n*=27)	82.3 (*n*=17)
	2-5	33.3	17.7
	More than 5	0	0
Calendar	0-1	85.2 (*n*=27)	93.8 (*n*=16)

	2-5	7.4	6.2
	More than 5	7.4	0
Internet	0-1	37.0 (*n*=27)	93.8 (*n*=16)
	2-5	37.0	6.2
	More than 5	25.9	0
Maps	0-1	64.0 (*n*=27)	94.1 (*n*=17)
	2-5	20.0	5.9
	More than 5	16.0	0
Music	0-1	33.3 (*n*=27)	76.4 (*n*=17)
	2-5	40.7	23.6
	More than 5	25.9	0
Weather	0-1	54.2 (*n*=24)	88.3 (*n*=17)
	2-5	25.0	11.8
	More than 5	20.8	0
Podcasts	0-1	57.7 (*n*=26)	93.8 (*n*=16)
	2-5	30.6	6.2
	More than 5	11.5	0
Media Creation			
Voice Recorder	0-1	51.9 (*n*=27)	94.2 (*n*=17)
	2-5	25.9	5.9
	More than 5	22.2	0
Notes	0-1	50.0 (*n*=26)	94.1 (*n*=17)
	2-5	38.5	5.9
	More than 5	11.5	0
Still Camera	0-1	71.4 (*n*=21)	100 (*n*=13)
	2-5	19.1	0
	More than 5	9.5	0
Video Camera	0-1	50.0 (*n*=20)	100 (*n*=13)
	2-5	40.0	0
	More than 5	10.0	0
Other Applications			
	0-1	63.7 (*n*=22)	76.4 (*n*=17)

2-5	22.7	23.6
More than 5	13.6	0

Students' perception. We asked the students in the surveys to name three features they used most often and found most helpful. Students' responses showed the three features they used most often are: Accessing Internet, listening to music, and using the calculator both during mid-school year and at the end of the school year for resource tools. They found the Internet and calculator most helpful. For media creation tools, they used the voice recorder and video camera most often, which was followed by notes, and they considered the voice recorder and notes most helpful (see Table 4).

Table 4

Student Responses to: Three Features They Used Most Often and Find Most Helpful

		Three Features You Use the Most Often		*Three Features You Find the Most Helpful*
	Features	Mid-School Year %	End-School Year %	End-School Year %
Resource Tools				
	Internet	48.1	64.7	57.7
	Music	44.4	70.6	15.4
	Calculator	44.4	52.9	65.4
	Weather	18.5	23.5	11.5
	Calendar	14.8	11.8	15.4
	Maps	7.4	23.5	19.2
	Podcasts	7.4	0	11.5
Media creation				
	Voice Recorder	48.1	11.8	30.8
	Video Camera	37.0	5.9	3.8

	Notes	14.8	17.6	30.8
	Still Camera	3.7	0	3.8
Other Application				
		3.7	0	15.4

Note: % indicated the percentage from the students who completed the question. As the participants were allowed to choose any three features, the total percentages for this question do not add to 100%.

Student interviews and artifacts. Three students were interviewed near the end of the school year for their perceptions of iPod touch use for learning: Jill, advanced ELL student, Emily, an intermediate ELL student, and Gong, a beginning ELL student. Jill and Emily were interviewed individually in a face-to-face setting while Gong was interviewed via Skype in Chinese by one of the researchers.

The interview analysis revealed that the students appreciated and enjoyed using the iPod touch for learning. The students were able to depend on the device for real time support with translator function and dictionary/thesaurus access. For example, Gong, originally from China, said that it helped him to understand what the teacher said in class. He preferred learning with the iPod "because it's convenient and fun." Gong described how listening to audio recordings for pronunciation helped him and made him comfortable with speaking in English.

Emily described, " [If] I didn't know a word in English, I just went to dictionary and they changed it from Spanish to English." She elaborated on her assigned homework involving the iPod, "We had to read like a chapter, and then record it on the iPod." She described her use of the iPod for learning, "I went to [play] many games of math." She asserted that besides the fun of using the iPod touch, "I practice more in the iPod."

Likewise, Jill described her homework of math learning, " [For Math] helped me with the iPods cause I have trouble in math, and Ms. [Virginia] usually puts like more games in there, that

are more mathematical questions and I usually do those every time I do my home work, the math." As a more experienced English language learner, Jill described her iPod use, "Just like when I was reading the book, I would stop it and look up the word I didn't know… we would read a chapter or two and for our assignment we had to record ourselves and give a summary for each." She further elaborated that her mother was also engaged in iPod learning along with her 9 year-old sister at home, "she would be with me while I was using the iPod and I would teach her like do the math and reading with chicken [game]." Additionally, beside enjoying listening to music, "just for fun" and playing learning games, she said the without the iPod, "I would be lost."

Consistent with the responses of these three students, other students concurred with expressions of engagement and learning in their open-ended responses. For example, John wrote, "I use the iPods at home to help me in ELA so I can pass ELA [test]." Caroline wrote of a specific moment, "I had science homework and I had to use the periodic table but I didn't have it so I just took my iPod and look in Google, 'Periodic Table' and there it was."

Discussion

Using iPod Touch As a Teaching Tool

With multiple quantitative and qualitative data sources, from both teachers' and students' perspectives, the findings of this case study suggest that incorporating the iPod touch in ELL instruction provided significant support for improved learning capacity along with distinct challenges. As indicated in the findings, the iPod touch provided the teachers with a valuable tool for supporting the ELL students in their academic efforts and allowed the students to access reference resources immediately and easily for completing class assignments (Craig et al., 2007; Patten & Craig, 2007). This finding is consistent with the studies positing that mobile devices are

able to support student learning in traditional classroom learning settings (Banister, 2010; Demouy & Kukulska-Hulme, 2010; Lacina, 2008; Pollara, & Broussard, 2011). Moreover, such support exceeds the traditional classroom resources by enabling easy and quick access to multimodal resources through the use of images, video, and audio for visual as well as audio support of text. These multimedia-enriched resources are especially important for language learners to help develop their language skills and content specific academic language that they are to study (Bos, Terlouw, & Pilot, 2009; Moreno & Mayer, 2007; Morris & Easterday, 2008; Yu, Lai, Tsai, & Chang, 2010). More importantly, teachers can provide appropriate and differentiated learning activities by selecting different content materials to meet their students' specific learning needs regardless of language acquisition levels. As shown in the study, one key aspect of the teaching support is using mobile devices to support the students' learning at their individual level (Dale, 2008; Mifsud & Mørch, 2010; Morris & Easterday, 2008). For instance, for teachers who have students with different language needs, using mobile devices allows for them to coordinate students' learning at the appropriate level regardless of the student's home language. The teachers can provide their students with diverse multimodal learning resources for primary as well as more advanced learning needs.

Additionally, the integration of the iPod devices enabled the teachers to assign homework, such as reading passages that the students can listen to and as they read, they can record their own readings for language fluency development (Demouy & Kukulska-Hulme, 2010; Patten & Craig, 2007). Thus, through using the mobile devices, learning is extended well past the school day for the extended academic engagement critical for struggling learners (Demouy & Kukulska-Hulme, 2010; Shohel & Power, 2010). In this study, teachers were able to send the student messages and coordinate learning activities via secure online systems such as

eLocker. Using mobile devices made the communication between the teacher and student and teacher and students' parents in a manageable and timely manner. Teachers can provide the students and their parents with information and feedback in support of the students' academic endeavors through effective teacher-parent communication (Looi et al., 2010; Wang, Shen, Novak, & Pan, 2009).

Using iPod Touch As a Learning Tool

The iPod touch provided the ELL students with a "private tutor" (as one of the teachers in this study called it). Students can find just-in-time support for their learning needs at their particular level when they need it. The results showed such basic tools such as calculator, dictionary, and thesaurus were useful to these ELL students in facilitating their learning, in addition to the Internet and multimedia capabilities. Moreover, the finding supports the related literature that shows having possession of such popular mobile devices is sometimes perceived to provide ELL students with socio-cultural capital in a non-judgmental way for learning (Banister, 2010; Borrero & Yeh, 2010; Cummins, 2000; Morris & Easterday, 2008) and a "cultural tool" (Craig et al., 2007, p.1840) for a sense of belonging to the US school culture. Surveys and interviews with the students themselves indicated that the students had mostly positive perception toward using the iPod touches both at school and at home, and considered it as a useful tool to assist their learning. Students' interviews, offering first-hand accounts of how the devices were used specifically at home, showed they were able to leverage the apps and games for educationally relevant play and learning. While they found ready support at their disposal with Internet reference access, they also used the device to complete homework and extend their learning beyond the school walls. By providing the students 24/7 access to the device, the

students' learning was extended past the classroom hours (Demouy & Kukulska-Hulme, 2010; Kukulska-Hulme, 2010; Mifsud & Mørch, 2010).

The students' parents as well as siblings also used the devices for access information on the Internet. This is particularly important because these ELL students and their families were provided the Internet access through the devices allowing the affordances made available to families who would otherwise not have technology access at home (Mouza, 2008; Smythe & Neufeld, 2010). Although providing Internet access to students' families was not a goal of this iPod touch project and was thus not a specific focus of this research, family Internet access may have some latent, yet positive, impact on student learning in accelerating acculturation among their family members.

Furthermore, having constant access to the devices allowed the students to use them in multiple subject areas that go beyond English language learning. By providing access to multimodal learning in math, science, and social studies, the students had access to different materials in their content areas, and thus have opportunities to improve their language skills as well as content knowledge (Looi et al., 2011; Morris & Easterday, 2008; Pollara, & Broussard, 2011). With ubiquitous access to teacher presentations, games, and other educational resources, the students can continue learning beyond the classroom. Therefore, teachers and students are provided an opportunity for a pedagogical shift from teacher-centered instruction to student-centered, self-regulated learning (Looi et al., 2010; Shih, Chen, Chang, & Kao, 2010).

The results from the students' surveys indicated that the highest use of the iPod touch occurred during mid-school year when teachers and students were engaged in using the resource and media creation tools as part of weekly learning activities. The usage, however, decreased noticeably toward the end of the school year. This decrease could be explained in part by the fact

that much of the school time during the end of the school year was spent in preparing for various state mandated tests and end-of year curriculum tests and testing itself. A possible future research direction can be to look into the usage variability across the school year and/or curriculum units.

Challenges Of Using Mobile Devices in K-12 Classrooms

Using mobile devices in the classroom, such as the iPod touch, also created challenges for educators. Foremost, time is needed to learn how the devices can be effectively used as well as finding online resources that can best support student learning and decrease extra demands on teachers (Ertmer & Ottenbreit-Leftwich, 2010; Smythe & Neufeld, 2010). While teachers and students both consider some apps useful for supporting learning, they may have different views about other tools. For example, the teachers in this study indicated the calculator use as problematic with a number of students. The use of the calculator by specific students was described by the teachers as a "crutch" that inhibit the memorization of multiplication 'facts' that are required in middle school assessments. On the other hand, students' responses in the surveys indicated the calculator function as a preferred and useful tool. The questions that surfaced seem to be what resources (tools, apps) are useful, to what extent, and how they can be used for learning (Banister, 2010; Vogel, Kennedy, & Kwok, 2009). Further research is called for in order to understand and address these issues.

Managing the devices in terms of monitoring student reading recordings, checking the devices for appropriate student use; and synching the devices with appropriate apps and games were shown to add additional time demand on the classroom teachers. The logistics of maintaining the devices for the students are argued to be a substantial challenge to the teachers (Banister, 2010). Support at the school administrative level and appropriate training are

necessary for teachers to implement a mobile learning initiative as described here (Vogel et al., 2009).

Technical issues such as providing Internet access to many devices at school and wireless outages are also identified as hindrance to classroom activities. Wireless infrastructure needs to be addressed when multiple devices are in use. How to avoid breakage by accidental dropping or being washed with clothing is also an important consideration. Additionally, theft of the iPod touch may be a constant threat. Students may lose or have the device stolen during classes or on the bus.

Implications for Teachers and School Technologists

The results of this study have several important implications for teachers and instructional technologists who use or are considering using mobile devices to improve ELL instruction. First, integrating these devices appears to impact students' learning in a positive way. Students with the devices used them readily and may access learning tools in places and situations where they would not have convenient access to other tools. Even in the school environment where other resources exist, results from this research suggest that students prefer the convenience, portability, and social acceptability (and even desirability) of the iPod touch.

The fact that middle school students in this study had positive perception toward using the iPod touch also has important implications for implementation. Teachers and instructional technologists do not need to convince students to use the devices or try to overcome resistance or disinterest. This inherent motivation for ELL students to use the iPod touch means that teaching efforts can be focused on teaching students how to use the device to assist their learning.

Another implication is that programs that allow full-time possession of the iPod touch differ from programs where the devices are just available in the classroom. In addition to the

evidence that students used the devices for informal learning outside of school, this research showed that students often shared the devices with their families. While most school districts do not have a specific goal or mandate of providing the Internet access to the families of ELL students, teachers and instructional technologists should understand that family sharing occurs and should look for ways that this can indirectly improve student learning.

While giving students full-time possession of the iPod touch has benefits, this approach also increases the challenges that these relatively expensive devices will be lost, stolen, or damaged. The risk of damage, loss, and theft as well as the expense and effort to maintain the devices is not the only challenge associated with using mobile devices as a learning tool. Effective deployment also requires investment in professional development for teachers and in the technology infrastructure for the school district. While there are clear advantages to use the iPod touch as a teaching and learning tool for ELL education, the costs and challenges are something each school needs to evaluate when deciding whether or how to implement a program using these devices.

Limitations of the Study

This study is limited in that students' usage of iPod touches was collected through self-reported data. Because the iPod touch was not equipped with data collection software, we were unable to collect usage data. We had to rely on students' own responses in the surveys.

Conclusion

This study investigated the potential benefits and challenges of using the iPod touch as a teaching and learning tool for ELL students in a middle school setting. The results indicated that in spite of the challenges teachers faced when integrating the iPod touch in their teaching, the wide-ranging, diverse set of resources and capabilities to support English language education

made available by mobile devices such as iPod touch, has led to an overall positive outlook towards the use of mobile devices in a traditional school environment. The convenience, individual guidance, and educational play made available through the device encouraged ELL students and teachers to access information for educational purposes. These findings indicate that mobile learning brings unique affordances for ELL students.

Nonetheless, further investigation is needed in ameliorating the challenges that mobile learning poses for K-12 classrooms. How can more time for teacher learning and implementation be infused into a school day requires a response from the educational community. Additionally, augmenting the capacity to expand mobile device use as a school-wide resource requires formulation. How to involve wide community support for mobile learning may require a broader participation in the visionary and dynamic changes to the existing educational settings.

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Appendix A

Themes Identified From Teachers' Interviews and Sample Quotes

Themes	Categories	Description	Sample Quotes
Technological Affordances			
	Language learning	Translator, dictionary, thesaurus, dictionary with multimodal (visual and audio) support; Reading/writing/speaking support for practice and reinforcement of language skills	[Claire] We have math doc games, grammar games, I upload, different Youtube or Teacher tube videos, Powerpoints on the different subjects that they're usually provided by the teachers so actually if they have to work them, finish and assignment or anything, they can look at those, exactly what they see in the classroom. [Virginia] We use it for everything from looking up words and definitions, to empowering their writing, to helping them read better and being oral speakers, the line is endless and their learning is endless because they realize more and more that it can do.
	Content learning	Science, Math, Social Studies resources, games and applications support learning	[Claire] They really like the games but we have so many math games and then what do we have, math zombie, math max, lemonade [Virginia] I used s lot of the science videos and I try to keep it on the topic that the science teachers are teaching
	Multimodal support	Visual support of learning through images, video, PPT, audio recordings, and listening	[Claire] Having the iPod and reading to the iPod or listening or watching a video,

		supports learning by reinforcing the different communication modes	makes it easier [Virginia] They have to write a sentence correctly, it gives them the picture…all the words are on a little roler, you have to roll and pick out which one is right
	Extended learning time	Supports the student in the classroom and extends learning past the school day; Access of learning resources at all times	[Claire] iPod keeps that possibility of extending that teaching time, learning time. [Virginia] I just think it's a huge asset at home, just for the extra language. We made such a huge jump going from the prior year.
	Home-school connection	Internet support allows the parent direct access (otherwise not available due to low SES); Provides the student feedback through online grades and assignment access; Sibling learning support extends the value of the device	[Claire] the iPod brings a family into the issues of learning [Virginia] I think their connection to the school and feeling safe, it's a big part of that, a big part of making the program work, because so much of that is at home. I had searches on one, it was a job inquiry.
Pedagogical Affordances			
	Differentiated instructional support	Provides support on demand at the appropriate learning level (private tutor) for student self-sufficient learning; provides for different	[Claire] They're in charge of their education [Virginia] I give instructions: 7th grade, you go to this video, 8th grade you go to this video, but I put them all on there
	Collaborative learning	Learning network support e.g., eLocker for communication	[Claire] They get their own information and they get into

	support	other students as well as teachers	groups, they discuss the question, they have different points of views [Virginia]
	Internet resource access	Internet search capacity allows for ubiquitous access to online resources	[Claire] This is what we're studying on, this is what you're going to do, you're going to be searching on your own [Virginia] We pull out the iPods and I was showing them maps… the whole world is on there.
Challenges			
	Managing the devices	Distribution/retrieval, synching applications/games/video	[Virginia] They changed their passwords and we couldn't get into it and you know, for us to, and that's a huge thing, when it comes up, when we sync all 42 of those and it pops up, so and so, added this and so and so added that, that is, and you got to go back and restore. [Claire] I really need someone, teacher aid or someone that takes care of the syncing and to check out, check in, all that kind of stuff.
	Device loss	Theft of the device is always a problem due to its portability and social value	[Claire] we had a couple of iPods that went missing and with cracked screen, I hate to see that, but no way to control that, and some of them they come in tears and say, I fell on it. [Virginia] I had 2 iPods that went into the washing machine this year, those kids have lost theirs for next year

		too now
Learning how to integrate	The integration effort takes a considerable effort and time with little external direction. The teacher learn as they go	[Virginia] I was just flying by the seat of my pants. [Claire] It is really time consuming because you had to look for all the information…videos or all the material to sync with the iPods
Monitoring student work	Keeping up with the student reading assignments is time consuming when listening to recorded readings.	[Virginia] [check student's work] While I'm folding laundry at home, while I'm cooking dinner at home. [Claire] Some of them, recorded some music, cause they didn't know that I was going to check on them…kids who haven't read in the past, they're reading right now, and you can see the difference, you definitely see it
Wi-Fi connectivity issues	The school wireless system may not meet the demand of a large number of units access at the same time.	[Claire] Sometime the system is down so, you prepare a lesson with it and you can't use it that day [Virginia] I had like 56 wireless trying to hook up to 1 hub. It overwhelmed the hub; the hub shut down

Appendix B

Sample List of iPod Apps Made Available to the Students

20Q Mind Reader Free	
6501 Crazy Facts	iPolygons
A+ Math Facts Multiplication Flash Cards	K12 Algebra 1 Study & Review
abc PocketPhonics lite	Kids Can Read
Adding Integers & Subtracting Integers	Lemonade Stand
AFactor Tree	Math Tutor- Angles
Algebra Level 1	Math Tutor- Area
Algebra Level 2	Math Zombie
Audio Sight Words	McGraw- Hill K-12 eFlashcards
Brain POP featured movie	Mild EleMents: Free Periodic Table
Chimes- The Game	Mobicip
Civilization Revolution	Montessori Approach to Vocabulary- Animals
Coaster Physics	Multilingual Picture Dictionary- Lite
Consecutive Integers	Newton's Laws
ConvertFrac Fractions	Pangaea
Decimal To Fractions	PencilBot ESL Blue Level
Dictionary!	PencilBot ESL Green Level
Documents to Go	PencilBot ESL Red Level
Dragon Dictation	Polygons- Easy Math Fun
Enigmo	PrefixSuffix: English Language Word Roots
Everyday Mathematics Addition Top It	Punctuation and Capitalization
Everyday Mathematics Baseball Multiplication	Science Glossary
Flash Cards	Sentence Builder
FlashMath	Short Vowel Mahjong
Founding Fathers Quotations and Documents	SimpleMath.com
Fraction Factory	Spanish English Dictionary and Translator
Fractions App	Speedy Reader
Fractions Multiply & Divide	Speller
Geometry Workshop	The Oregon Trail
Google Translate	Today in History
Grammar 1	Vocabulary Bubble Free
Grammar Girl	Who Has the Biggest Brain?
Grammar Jammers Middle School	Word Crumble
GrammarPrep: Apostrophes	Word Scramble
GrammarPrep: Capitalization	Word Warp
GrammarPrep: Fragments, run-ons and comma splices	Words- Synonyms & Antonyms