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JOHANNA PRINCE
University of Maine at Farmington

English Language Learners in a Digital Classroom

English language learners (ELLs) experience linguistic, cultural, and cognitive shifts that can be challenging and at times lead to isolation for ELLs. While education technology may be an instructional resource and engage learners, devices alone do not shift instructional practices or lead to student gains. This case study was performed at an international school in Europe to investigate the experiences of 4th-grade ELL students and their teaching in a 1-to-1 iPad device classroom. Three main findings emerged from the study: iPads have specific functionalities that can be used to support ELL students; ELL students were engaged with using the iPads in content lessons; and study participants, including teachers and students, perceived language and cognitive growth in ELL students when using the iPad. However, there were also challenges found in the study. To mitigate some of these challenges and build on the success of this study, the researcher suggests developing a common vision for technology integration, using collaborative models of ELL teaching and investing in professional development.

Introduction

Technology has been shown to be engaging for students and teachers in the classrooms of today, and consensus is growing that technology is a useful tool for teachers and students (Paraiso, 2010; Purcell, Heaps, Buchanan, & Friedrich, 2013; Silvernail & Gritter, 2007).The thoughtful use of technology to support teaching has been shown to have a positive impact on the cognitive development of students in preschool (Revelle, Reardon, Mays Green, Betancourt, & Kotler, 2007); primary grades (Genlott & Grönlund, 2013; Mathison & Billings, 2008); upper elementary grades (Schmidt

& Gurbo, 2008; Suhr, Hernandez, Grimes, & Warschauer, 2010); and middle schools. The current study adds to the research on how technology may support English language learners (ELLs) who are developing a full range of language skills. As can be seen in Figure 1, ELL students need both Basic Interpersonal Communication Skills (BICS) and Cognitive Academic Language Proficiency (CALP) (Cummins, 1984, 2008).

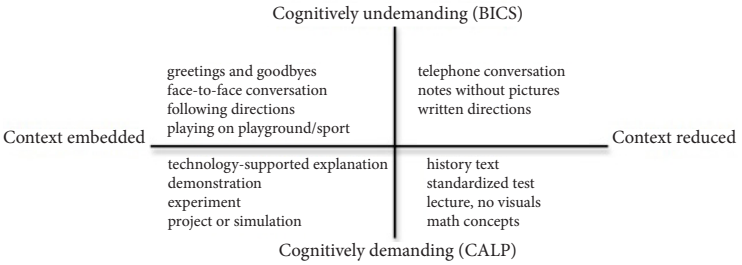

Figure 1. Cummins's framework of language skills.

Research on One-to-One Programs

The current study examined language development across the BICS-CALP framework of fourth-grade ELL students who were using individual iPads to support learning, and therefore it is important to understand the previous research on the one-to-one devices for learning. Many positive gains were found in one-to-one programs across contexts and settings (O'Dwyer, Russell, Bebell, & Tucker-Seeley, 2005; Sauers & McLeod, 2012; Suhr et al., 2010). Researchers have found promising evidence that one-to-one initiatives targeted to support specific goals can be useful to students and teachers. While researchers have reported on the positive findings regarding educational technology use, some negative trends are worth noting. There have been inconclusive or negative results on academic outcomes (Carr, 2012; Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010; Sheppard, 2011). In addition, some studies have found that the presence of laptops does not correlate to gains in all content areas, and they found that achievement increases were correlated with only some academic areas (Silvernail & Gritter, 2007; Silvernail, Pinkham, Wintle, Walker, & Bartlett, 2011).

In addition to research on one-to-one devices in general, it is also important to understand the affordances and uses of the iPad in the classroom. The first iPads were released in April of 2010 and were not originally customized for the educational landscape, but teachers, parents, and students quickly began using them for many pur-

poses. The iPad has great potential for the educational setting because of the size, memory, portability, and functionality it offers (Ireland & Woolerton, 2010). Researchers have found increased engagement and mixed academic gains when iPads have been used (Carr, 2012; Milman, Carlson-Bancroft, & Boogart, 2012; Sheppard, 2011). In a small study of students with emotional disturbance (ED), the use of an iPad was directly correlated with both greater quantity of math problems solved and greater accuracy (Haydon et al., 2012).

ELLs and Educational Technology

A body of literature and research is developing on how using technology may benefit ELL students (López, 2010). Much of the current research in using educational technology with ELL students has been done with older students (Arslan & Şahin-Kızıl, 2010; Kinash, Brand, Mathew, & Kordyban, 2011); or in middle schools (Berryman, 2011; Paraiso, 2010); or in science classrooms (Mathison & Billings, 2008). As can be seen in the review of the literature, there is great interest and potential for technology to support ELL students. However, there are few current studies with an upper-elementary population of students using iPads to support content knowledge and English development simultaneously. The following research questions guided the study:

1. What are fourth-grade experiences within a one-to-one social studies classroom?
    a. How did iPad experiences impact learning social studies content?
    b. How did iPad experiences impact learning English?

Methods

Setting and Research Sample

The case-study methodology was used because of the desire to seek multiple perspectives; the complexity of understanding teacher practice; the emergent technology; and the goal of exploring a new field of inquiry as potential baseline for further study (Creswell, 2007; McMillan & Schumacher, 2010). The study was conducted at an international school where the language of instruction is English, although 60% of the students are ELLs. Given the language profile of the students, instruction may occur in a sheltered (pullout) setting by the ELL teacher, it may be in the classroom with the support of the ELL teacher, or the classroom teacher may deliver instruction. ELL status has been shown to affect classroom performance (Sturtevant & Kim, 2010), and students at different levels of ELL proficiency can experience different rates of language development (Mathison & Billings,

2008). Full academic language proficiency takes between four to seven years to attain, so the fourth graders in this sample provided a varied picture of how iPads affect language and content learning.

The school enrolls equal numbers of male and female students. However, the research classroom comprised all males. All students from one fourth-grade classroom were recruited, and all participated in the study once parental consent and child assent were obtained. Table 1 is a profile of the student participants in the research classroom.

Table 1
Student Participants

Name	*Primary language (L1)*	*Other languages (L2)*	*English level*	*Date started at school*	*Length of time at school*
Fabrizio	Italian	English	High	Sept 2012	4 months
Giovanni	Italian	Learning English	Beginner	Jan 2013	0 months
Grigory	Russian	Learning English, Italian	Beginner	Sept 2012	4 months
John	English	Learning Italian	Native	Sept 2012	4 months
Lorenzo	Portuguese, Italian	English, Spanish	High	Sept 2007	5.5 years
Maxim	Russian	French, English	Medium	Sept 2012	4 months
Nikolay	Russian	Italian, English	High	Sept 2009	3.5 years
Pavel	Russian	Learning English, Italian	Beginner	Sept 2012	4 months

Note. All names are pseudonyms.

Data Collection and Analysis

The data for this project were collected in the 2012-2013 academic year. During the year the content-area classes (science and social studies) were specifically designed to integrate technology. The researcher taught the classroom teacher about the technological, content, and pedagogical framework (TPACK) from Mishra and Koehler

(2006), and they collaborated to create units with specific content-knowledge goals, English language goals, technology applications, and pedagogical choices to support and enrich the connected goals. Data were collected through interviews, artifacts, observations, and journals. Interviews are a hallmark method of qualitative research (Glesne, 2006; Seidman, 2006), and multiple interviews were used to explore the experience of using iPads to support English and content-knowledge development. Translators were provided when necessary. All interviews were audio recorded and transcribed.

More than 30 student artifacts were also gathered, representing a variety of work samples from the iPads. These artifacts were collected as another way to understand the learning process and to see what type of work had been produced. Classroom observations were also conducted during history class to help triangulate findings. Two in-depth observations were conducted during social studies lessons, and each observation lasted one hour and 40 minutes.

As the data were collected they were entered into NVIVO, a computer-based qualitative software, for storage, organization, and management. The data-analysis process began simultaneously with the collection of data. The researcher performed multiple readings of the data and used a constant comparative method for coding (Glaser & Strauss, 1967). The design of the study used multiple data sources, interviews, artifacts, and observations to triangulate findings. A researcher journal and member checking with participants were used to enhance trustworthiness of the findings.

Results

Three main findings emerged from the study: iPads have specific functionalities that can be used to support ELL students; ELL students were engaged with using the iPads in content lessons; and study participants, including teachers and students, perceived language and cognitive growth in ELL students when using the iPad.

Finding 1

The first finding from the study was that participants thought there were specific attributes of the iPad that had benefits for the fourth-grade ELL students. The first was the international settings that are built into the iPad and that allowed for multiple keyboards. The next was the variety of ways the iPad could be used to support visual learning and language translation. The final benefit was that the iPad allowed for multimodal demonstration of learning.

International Settings. The international features of the iPad were useful to students and teachers. While on a traditional keyboard

the user can alter the language but does not see a new alphabet, on the iPad the characters of the new alphabet do appear, and this visual keyboard was beneficial to participants. Jack, the specialist teacher for English language learners, discussed this feature in his third interview: "I just hit the little globe, it switches ... all the keys show their new name." The visual keyboard appears in Figure 2.

Figure 2. English and Russian iPad keyboard displays.

Visuals Learning and Print Translation. A second useful function of the iPad is the way in which it gave ELL students access to language through a visual dictionary of an image search. It is very easy for a student to quickly find a visual image, and as Elizabeth, the regular classroom teacher, said, "The fact that we can go on Google Images and pull up a picture of whatever. ... That is really the quickest, easiest way" for students to learn new vocabulary. The quick image search was often easier and more useful than using a print translation for a word.

There were some ways that the iPad could be used to support development of content-area vocabulary. The ELL coordinator, Valentina, gave the following example of how the device could be used to support building domain-specific vocabulary:

> We used iPads, we used flash cards ... [we] put the term in English, a definition, a sentence that used that term, a picture if we could find it, and then we would translate it into their native language ... the teacher started telling me, "It is great, now when I ask what is a river bank, they actually raise their hand because they know what it is."

These domain-specific vocabulary words then became a foundation for the ELL students to build on.

The iPad also served an important function in promoting communication between the students and teachers when the teacher did not speak a student's language. Students mastered a complicated practice to translate text. As a time-saving mechanism the classroom teacher emailed, or used tools such as Dropbox, to share documents with students. Students could copy and paste text or words into the translator. Jack explained the importance of having the texts available in digital format: "For the ELL kids taking texts, translating them, poring through ... without the technology it would have been amazingly tedious for one of us to translate. ... The technology really helped them get a general idea." The researcher was able to witness the importance of translation features during the second interview with Grigory. During the first interview a translator had supported the student to ensure comprehension, but in the second interview Grigory declined the use of a translator and instead used his iPad.

Grigory: French and the English was fighting and the English need to pay the … how do you say this word?
Researcher: Do you need to look it up?
Grigory: Yeah [looks in Google Translate] okay [long time as he searches] oh, they need to pay war debt.

While Grigory's English still has errors, he is able to explain the tension between the colonists and the British Empire in pre-Revolutionary War times. Also evident in this exchange was the student's natural use of the iPad as part of his processing.

Demonstrating Learning. The iPad is low profile and is therefore highly portable and does not put a barrier between the student and teacher. The researcher observed students bringing devices to different situations and teachers as they began to view the device as integral to their learning. Jack reflected on how students used the iPad:

> I watched them overcome a weakness in English. They learned enough vocabulary to understand a process. The content was rich and important. ... Technology allowed them to express that and share it, when Grigory was able to do his little thing, he did it on my iPad. I have kept it, I haven't dared get rid of it. Hearing his little soft voice and his Russian accent, seeing what his little finger drew, it was amazing.

Jack played the recording, and tears developed in his eyes. Grig-

ory, with a thick Russian accent, correctly illustrated and narrated the path of blood flow in a human body. Jack kept the file as a reminder of learning. In Jack's retelling of the experience, the iPad had been used to create learning experiences in which Grigory could demonstrate his knowledge of the science content using his developing English language.

The data from this study revealed that the iPads were personalized devices and were useful learning supports for the ELL students in the research classroom. Students were able to set other languages on the keyboards and to customize the translation dictionary for their own use. Students began to see the iPad as a tool that they could use in a variety of ways. The ability to repeat translations, and reexamine texts, meant that students could work at their own pace.

Finding 2

The affective domain of learning is the emotional connection and engagement students feel to their class, teacher, and content. Students can progress through the different levels of this domain, each of which signals a greater level of engagement. The levels can be seen in Figure 3 (Krathwohl, Bloom, & Masia, 1964).

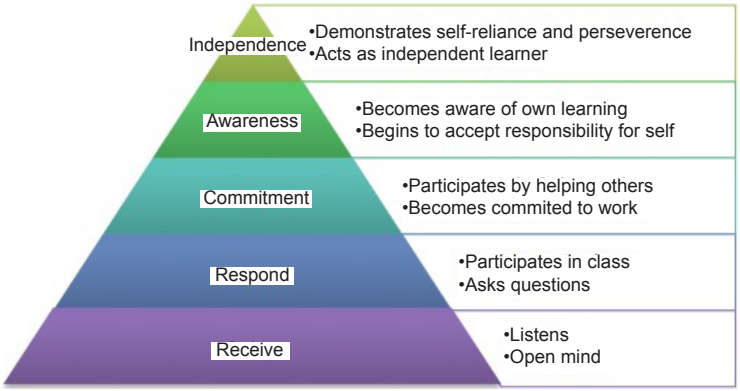

Figure 3. Taxonomy of affective domains (Krathwohl, Bloom, & Masia, 1964).

Reception. At the bottom level of this taxonomy for affective development is the condition of students' receptivity to instruction. ELL students often struggle in large group settings, but with the iPad present, fourth-grade students in this study had a device to engage with. This is not to say that these students were never off-task or withdrawn from instruction during iPad use; however, they were observed to

need less redirection when the iPad was present. Jack, the ELL specialist teacher, was the more reluctant user of technology and he reported that overall he thought that students were more engaged with learning when they had the device in front of them. His suspicion was that it provided access to context clues in the lessons, and therefore it kept the ELL students connected to learning. One concern with new technology is that the motivation to use the tool will wear off. However, during this study there was no indication that the motivational nature of the iPad had decreased. The findings from this study indicated that iPads might be an appropriate device to help ELL students become open to instruction and receptive to the learning environment.

Response. At the next level of this taxonomy, students are increasingly interested and engaged with the content. In this particular study, participants observed various features of the iPad that helped to promote student interest. In January, Jack, the ELL specialist teacher, explained how he used video on the iPad with a reluctant student: "Yesterday a kid thought that the animal he is doing his research project on is dumb. ... I had him find a YouTube on it, and he saw this thing changing shape and colors … then he wanted to study about the cuttlefish." Specific apps also promoted interest in continued interaction. For instance, Puzzling Plates and iQuakes were two apps that students used on their own time. This engagement with the science content meant that students continued to expand their knowledge of the geology content. The ability to extend learning through Internet searches was observed in the way students asked new questions of the content when using the iPad. Jack recalled how students kept asking questions during the study of China; for instance, they were curious about the need for the Great Wall, the transitions between dynasties, and the various inventions of the Chinese people. Jack speculated that "being able to find information quickly encourages them to ask questions, and to think." The students and teachers found many ways to use the devices to support students' responding to content using new English language.

Commitment. Commitment to the learning process could be observed in the investments these fourth-grade students made in learning the technology and their ability to teach their peers about new content. The iPads helped to engage some students because they liked technical aspects of the device. In the research classroom, one of the lowest-level ELL students helped John, the native English speaker, with the technology. When students act as teachers to each other it can be very engaging because they feel useful and helpful. A second way that the students used iPads to demonstrate a commitment to learning was by sharing knowledge. Elizabeth explained,

> They corrected each other ... some of them didn't have something right, and they said, "Oh, what about this" or "you forgot this part" … The kids actually notice[d] each other's learning ... then [went] back and fix[ed] it, rather than for me say it.

A third way that students and teachers used iPads to build commitment to learning was through the storage of a student's documents, which meant that teachers and students could easily reference earlier pieces and note progress through comparing documents. In particular the iPad was useful to students to support the process of drafting, correcting, and revising written work. Elizabeth expressed this sentiment, "I was breathing a sigh of relief that my students were catching their own grammatical and spelling mistakes and fixing them without stalling or complaining about it. ... They are more motivated to fix errors on a screen."

Awareness. As students engage with school, they can become more aware of their own learning and take more and more responsibility for organizing their learning, and this awareness is characteristic of learners at the next level of the taxonomy. In this specific study, teachers had to provide scaffolding and reminders to students to help develop this awareness and independence. Also, although the students did not use the word *independence* in their interviews when describing their actions, they showed that they had progressed toward it. Nikolay demonstrated his awareness that he wanted a feature and used what he knew about the "+" symbol's usually being a space to add features. He then was independent in his ability to insert a new feature into his presentation. Participants gave examples of moments when they observed, or enacted, an awareness of a need to know something and then pursued that knowledge with the iPad. As mentioned earlier, this shifted the responsibility of learning to the student and may have helped to build more motivation to engage with the content.

Independence. As students progress through increasing engagement with school, the highest level of the affective domain would be that at which students take complete ownership of their learning. The data in this case study do not show evidence of this level of independence. There are likely multiple reasons this was not observed. Completely intrinsic learning typically develops in later adolescence. Therefore, 9- to 11-year-olds may not achieve this kind of independence in a controlled school environment, and even if they do, the iPad may not support this kind of pursuit. The length of the study and the failure of interview questions to explore this topic may be other reasons this part of the domain was not observed.

While complete independence was not observed, there were ways

that participants perceived students were becoming independent learners. Elizabeth described the connection between iPad use and independence in the third interview in June. She said, "I think it puts them in charge of their own learning, especially when we were doing all those research projects." Students also became more independent and self-reliant for translation. Jack observed this change in Pavel, who got "pretty independent about looking up words in Russian, not always turning to Nikolay or Maxim. … I think it is learning to solve your own problems, and not make it someone else's problem; you figure it out for yourself."

Concerns Regarding Engagement. As seen in the data above, there were many examples of how students used the iPads to engage with learning. However, teachers expressed some concerns about the iPads. The highly tactile nature of the iPad tempted students to play, swipe, and switch apps during lessons. Jack also thought that sometimes the students saw the device as a game center, not as a learning tool. An additional concern that students mentioned was the fact that a few times programs did not work correctly, and in a few instances students lost work. Overall, however, both students and teachers reported that the device itself, the apps, and the learning experiences during these months were engaging for this group of fourth-grade ELL students. The engagement and motivation promoted interaction with content and use of English.

Finding 3

Participants perceived that using an iPad supported students as they developed language skills, content knowledge, and cognitive academic language. The researcher did not use any quantitative measures of content knowledge or English proficiency as part of this study. She used the teachers' observations, participant reflections, and her own observations of the ways iPads were used to explore these cognitive gains.

English Language Skills. The primary goal of the grant written to support the purchase of the fourth-grade iPads was to support English language learners with both receptive and expressive English language. Seven of the eight students thought that during the study their understanding of English grew. With some students, the researcher observed growth in English proficiency between the first to the second interview. In the first interview with Grigory, a translator was present for the whole interview. Contrast this to the second interview, when the student was able to share, "Yesterday I and Ms. Kline was working together and I was working faster and I was reading faster and I thought, and she understand me." Grigory's language is still

characterized by ELL speech patterns; however, he communicated his message. The school uses a language-immersion model that helps students build skills quickly, and Grigory's development in four months was noticeable growth. However, both he and the teachers believed that the iPad contributed to this rapid growth.

In Giovanni's second interview, he relied on Italian to explain himself but explained before the translator had spoken, indicating receptive comprehension. When asked about this change, even the student believed his English was improving, as was demonstrated when his translator reported, "Thanks to the translator [pointing to the iPad] he can get to know more words." The iPad is one tool that allows students greater access to content by making academic vocabulary comprehensible.

Cognitive Academic Language Proficiency. During this research study the classroom teacher and the researcher purposefully planned for instruction of cognitive academic language, along with the integration of specific technologies. Participants perceived a relationship between the positive development of cognitive academic language and the use of the iPad. Jack explained the language-development pattern for ELL students, and that teachers must work on the integrated academic-language development: "Having it be integrated with the content areas they are studying is much superior to just going through an English program." Jack explained the way that both content and English can grow at the same time.

> They have to learn the structures of the language to learn the history. But they learn the structures of the language as they learn the history; it is those discussions about the history that reveal to them these new bits of vocabulary and these new structures.

Elizabeth provided an example of how students built CALP with the iPad project. She said:

> They took information that they gathered ..., took notes on, put it into Inspiration web ... which they filled out into sentences and then they were able to put into paragraphs. … They wouldn't have had all the other extra tools such as Google Translate, and even just the online dictionary ... *Encyclopedia Britannica*, all the things they were able to use to help understand.

Content Knowledge. In addition to perceived gains in English, participants also thought that the activities they did with the iPad contributed to better understanding of the history content. These

interviews were conducted over a six-month period, and while certainly during this time students would be expected to make language gains even without the iPads, the teachers involved in the study reported that the students with iPads were gaining English and content knowledge more quickly than students they'd worked with in settings without iPads. Students reported, in the second interview, that they perceived they understood more of each history class (see Table 2).

Table 2
Students' Self-Perceptions of History Comprehension

Name	***Primary language (L1)***	***English level***	***First interview:*** How much of each history class do you feel understand?	***Second interview:*** Do you feel you understand more of each history class than you used to? How much more?
Fabrizio	Italian	High	Most of it	Yes
Giovanni	Italian	Beginner	"Nothing"	Yes: Little more than half
Grigory	Russian	Beginner	Half	Yes: More than half
John	English	Native	More than half	Yes
Lorenzo	Portuguese, Italian	High	More than half	Yes
Maxim	Russian	Medium	Half	Yes: More than half
Nikolay	Russian	High	More than half	Same
Pavel	Russian	Beginner	Less than half	Yes

Seven of the eight students reported feeling that they grew in how much of each history class they understood. In comparing Giovanni's interviews, one can see his growth in content knowledge. In the first interview, Giovanni lacked comprehension and his frustration is clear. At this point he had participated in almost a month of history classes. When asked, through a translator, about what he had studied in history, he responded, "*io capito niente,*" which means "I understand nothing." In May, during the second interview, Giovanni was able to respond to questions and explain his ideas. This time, when

asked what he could explain about the American Revolution, he was able to explain, through the translator, about the taxes and Quartering Act that were angering the colonists.

This qualitative study allowed the researcher to see the iPad in action as it was used to support content knowledge. In Grigory's second interview, he used the iPad to help him explain himself when the researcher asked him what he was most proud of. He did not recognize the word "proud" so the researcher prompted him to translate the word, and then he was able to say, "I think this [President essay] because it was hard and it was interesting." In this interview Grigory demonstrated two different uses of the iPad: first to quickly translate a word from Russian that he could not recall, and then to translate a word from English to Russian that enabled him to respond to the question.

Another way the iPad supported content-knowledge acquisition was that the iPad provided multiple resources whereas a history text would have had more limited content. Lorenzo said, "You can go on more websites and in a textbook we would just have one source." Grigory agreed when he said, "We find all what we need. … Like we can find on Internet or *Encyclopedia Britannica*." *Britannica Online* is a resource that was mentioned repeatedly. Articles in this web-based encyclopedia are prepared at three different difficulty levels, but all on the same topic. The multiple levels of *Britannica Online* meant that the teacher could provide differing levels of text. Participants saw the iPad as contributing to their access to information, and as enabling them in unique and novel ways to demonstrate their content knowledge. Overall, participants perceived positive development of English and content knowledge during the lessons with the iPads. Students shared projects that were most significant for their learning, and these were often the projects that spanned both Language Arts class and Social Studies.

Summary

Participants in the study thought that the iPad was beneficial in numerous ways. The first benefit that participants reported was the built-in functionalities of the iPad to support ELL students. A second benefit seen in the research study was the fact that the iPads were engaging for students, and students were motivated to participate with the iPads. Participants also perceived an increase in learning of English, content, and cognitive academic language with the use of the iPad. These various data points suggest that the iPads were useful tools to support learning.

Discussion

This exploratory and conceptual case study was designed to investigate the experience of implementing iPads with fourth-grade ELL students. What follows is a discussion of the findings and the relationship of those findings to prior research.

iPads Can Be Learning Supports for ELL Students

iPads have unique affordances that support ELL students, including personalization and scaffolded supports needed to increase success. Participants commented on the customization of the technology, including language settings, international keyboards, and reliable access to translation, as important affordances. The adults in the study all reported believing that the iPad was a positive learning support for ELL students because of its ability to promote affective engagement and provide cognitive scaffolding. The findings in the current study reinforce positive findings of iPad uses with ELLs and other students (Carr, 2012; Haydon et al., 2012; Heinrich, 2013; Maher, 2013; Sheppard, 2011). In this study, iPads were used for vocabulary instruction, an essential component of ELL instruction (Barr, Eslami, & Joshi, 2011; Beck, McKeown, & Omanson, 1987). iPad use, in conjunction with *Britannica Online* and other tools, provided modified content and comprehensible input to ELL students (Coleman & Goldenberg, 2010; Goldenberg, 2008). The current study also extends the research from other studies that indicated that iPads have the potential to support students and teachers (O'Dwyer et al., 2005; Sauers & McLeod, 2012; Suhr et al., 2010). The easy user interface, touch screen, and natural proclivity of youth toward technology make the iPad a positive support even for young ELL students.

iPads Contributed to Positive Behavioral and Academic Growth in Students

Participants in this study reported that both students and teachers felt motivated and engaged by the technology. Students who are engaged in their learning are more likely to persist in difficult situations and to concentrate on learning in the classroom (Haydon et al., 2012; Maher, 2013; Paraiso, 2010). In the current study the teacher reported that students were "hungry" for the technology and asked about using it. Neither the classroom teacher nor the ELL teacher observed a decline in student interest in using the iPads. This finding was consistent with recent studies of iPad programs that also reported sustained engagement (Bebell & Kay, 2010; Milman et al., 2012). Suhr et al. (2010) also presented high levels of affective engagement in one-to-one settings. Reports of increased engagement are supported by the

few existing studies on using technology with ELL students (Mathison & Billings, 2008; Paraiso, 2010).

In the current study the iPads contributed to the understanding of affective engagement in a variety of ways. The first way the device promoted engagement is through a natural and easy interface, which created a low barrier to entry for student receptivity to instruction. ELL students accessed tools that allowed increased participation in class by providing personalized learning supports. These supports, and engaging resources such as YouTube, helped to pull ELL students back into their work. Both the classroom teacher and ELL teacher thought the iPad had helped shift the responsibility for learning to the students.

The data from this study indicated that participants perceived that the iPads had contributed to students' ability to make progress in language goals and acquiring new content knowledge. Participants reported that when students were using the iPad, they relied less on other people for translation, expressed greater vocabulary, and reported positive feelings about their growth in English language acquisition. Additionally, students were observed to have grown and also self-reported growth in cognitive academic language. The findings from the current study build on a small body of literature that explored the potential of educational technology to support, differentiate, and personalize learning for ELL students. Much of this initial research suggests positive contributions of carefully used educational technology (Arslan & Şahin-Kızıl, 2010; López, 2010; Maher, 2013; Paraiso, 2010; White & Gillard, 2011). Little research existed on the experience of upper-elementary ELL students using iPads to learn both content and English language skills.

The current qualitative findings relate to existing quantitative findings on one-to-one computing initiatives. English is one domain in which quantitative studies have shown that one-to-one environments correlate with higher educational outcomes. However, these studies do not expressly examine language acquisition in ELL students, but rather they consider mainstream populations. For example, Bebell and Kay (2010) found performance on ELA state assessment scores for seventh graders in a one-to-one environment were above those of a control comparison group at a statistically significant level. Lowther, Ross, and Morrison (2003) also reported positive gains in writing scores for students in a one-to-one laptop program. In another study of fourth-grade mainstream classes, students in the one-to-one laptop program performed at a higher level than control-group peers in literacy response and writing (Suhr et al., 2010). Last, Shapley et al. (2010) found that the strength of one-to-one implementation and

access to technology is a consistent and positive predictor of performance on the state assessment in reading. The initial positive qualitative findings from this study, coupled with the larger-scale quantitative findings from mainstream classrooms, provide a foundation for further research about ELL students using iPads in a one-to-one environment.

Implications and Recommendations

In addition to the findings, analysis, and conclusions, I would also like to make recommendations for how this small-scale case study might contribute to the work in the field with ELL students.

Use iPads With Students

A first and clear recommendation from this research is for schools with ELL students to buy and implement these devices in support of the ELL students. Student participants in this study represented a wide linguistic profile, and as they reported preferences, perceptions, and usefulness of different applications and projects, it became clear that these varying uses supported students in different elements of this framework. The researcher recommends that the language goals be considered and matched with the functionality of applications (see Figure 4).

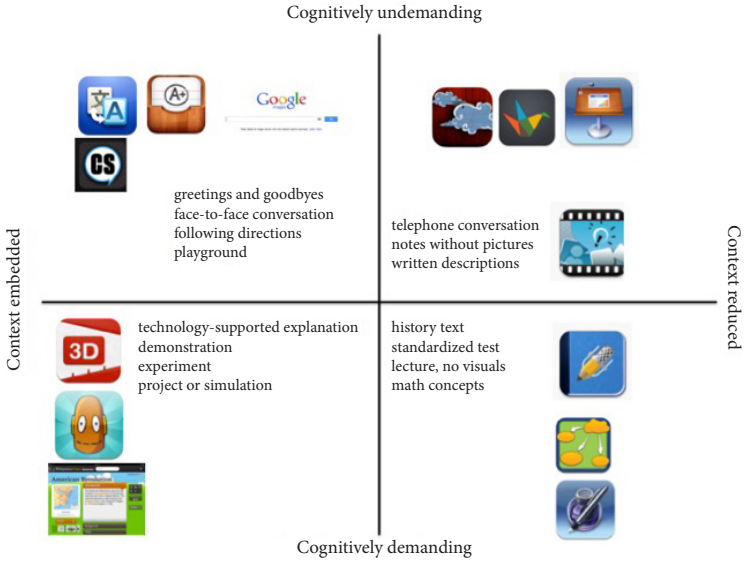

Figure 4. Researcher-proposed apps for different language domains framework.

In the top left quadrant of Figure 4 is the first and most common language ELL students will learn. The apps that were most useful to students in this area of development were Google Translate, image searches, vocabulary flash cards, and comic strips. The visuals in each are essential bridges for a new ELL student who can make immediate use of the iPad.

In the bottom left quadrant is language with more cognitive challenges. 3D Timeline, BrainPop, and *Britannica Online* are useful to developing or middle-level proficient speakers of English. 3D Timeline allows students to build historical time lines that are supported with images, videos, and links. BrainPop uses short engaging movies to introduce new concepts and the closed-captioning (CC) functionality can enhance the usability for ELL students as it provides both print and oral English for them to follow as they listen. *Britannica Online* is a web-based encyclopedia with three reading levels, additional images, maps, and Google Translate integrated into the dashboard.

In the top right quadrant, language is context reduced but not as cognitively demanding. These developing students can use Puppet Pals to quickly make movies to help students practice expressive language and fluency. Haiku Deck may be useful, as it is a highly visual way to present content and uses of limited text. It would be appropriate as the first visual presentation software before using a more text-heavy Keynote or PowerPoint. Using Keynote was beneficial to students because it helped to promote information literacy for students. ExplainEverything is presentation software that allows for voice recording and animation in addition to still images and presented text. Students were able to articulate their understanding of vocabulary, content, and processes using this app.

The most demanding area of language development is context-reduced and cognitively demanding language, found in the bottom right quadrant. It was found that Inspiration, Pages, and Notability are useful scaffolds for ELL students working on this area of language. Inspiration is a concept-mapping app that allows students to place items in a visual presentation first, and then it can be changed to an outline and exported to Pages, where students can begin writing. Notability allows students to take and store notes. They can import documents, take notes, or create a personalized reference manual.

As teachers begin using apps with ELL students, this framework may be a useful conceptual model for helping teachers align language goals and app choice.

Teach Information Literacy

A second, but related, recommendation for teachers is to ex-

plicitly teach information literacy. This includes spending time with some basic technological functions of using the device. It also means helping students become stronger consumers of information through checking authority of sources and corroborating facts they find on the Internet. Since students can easily become content creators, they need guidelines on fair use and copyright. The ease of making movies, slides, or mashups of existing content is great. However, students need to learn how to give credit, when they can use materials, and what they can use from other sources. Students also need to learn how to use material to inform, not replace, their own thinking. The specific assigned tasks, and the related instruction provided by the teacher, can go a long way in promoting students' ethical and legal use of material. Original tasks that are focused on creating new ideas are essential since they do not allow students to simply copy and paste but demand higher-level thinking skills. iPads should be used to accomplish these goals, rather than replacing the skill-and-drill of worksheets or other approaches to mastering basic facts.

Conclusion

This study had several limitations, including the small, single-gender sample. Additionally, the author's role as a researcher and a teacher at the school may be a limitation given her relationships with staff and students. Finally, as is true in any qualitative data design, this case study was not experimental in nature and is not supported with statistical conclusions about the student outcomes. However, the findings from this case study show that participants perceived positive experiences for teaching and learning with one-to-one iPads. Therefore, future directions for research may include quantitative and experimental designs.

Future research might focus on the following areas. First, a larger and more diverse sample of ELL students would enrich these findings. The student participants came from high socioeconomic standing, had literacy in their L1, and almost all had parents who were literate in English. Therefore an expanded study of ELL students using iPads would help to enrich the understanding of the ways in which these devices can support ELL students. Second, researchers may want to focus on the unique ways different apps support ELL students. More research may provide a useful tool for mainstream and ELL teachers to approach iPad integration within their practice. Finally, future research may include quantitative measures of academic gains by ELLs using iPads.

Author
Dr. Johanna Prince is the director of Graduate Programs in Education at the University of Maine at Farmington. Her research and teaching focus on leveraging educational technology for developmentally appropriate pedagogy and andragogy. She has taught in K-12, undergraduate, and graduate education programs in the US and Switzerland.

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