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PROMISING INSTRUCTIONAL PRACTICES FOR ENGLISH LANGUAGE LEARNERS

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ABSTRACT

Aim/Purpose	The purpose of this exploratory case study was to understand how teachers, working with English Language Learners (ELLs), expanded their knowledge and instructional practices as they implemented a one-to-one iPad® program.
Background	English Language Learners experience linguistic, cultural, and cognitive shifts that can be challenging, and at times lead to isolation for ELLs. While technology can be engaging, devices alone do not shift instructional practices, nor lead to student learning. Technology must be leveraged through shifts to pedagogical practice and linked thoughtfully to content goals.
Methodology	This research was conducted through a qualitative case study of educators at an international school.
Contribution	This study describes promising pedagogical practices for leveraging 1:1 mobile devices for ELLs.
Findings	iPads can be a support for ELL students. One-to-one iPads allowed teachers to experiment with new pedagogical approaches, but this development varies greatly between teachers. During the 1:1 implementation there were challenges reported.
Recommendations for Practitioners	In order 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.
Recommendation for Researchers	Researchers should continue to document and observe the learning outcomes of ELL students in 1:1 environments, including an experimental study.
Impact on Society	ELLs can benefit from 1:1 technology, and new pedagogical practices. For teachers to implement these new practices conversations on philosophy, engagement with families, and consistent professional development.
Future Research	Future research can continue to expand the population of ELL students in 1:1 mobile learning environments; and the most powerful pedagogical practices.
Keywords	English Language Learners; 1:1 iPads, pedagogy

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INTRODUCTION

The purpose of this qualitative case study was to understand the experiences of teachers as they implemented one-to-one iPads to support English Language Learners (ELLs). Teaching ELLs presents challenges and opportunities for educators. As ELL students transition into, and through K-12 education, there are significant linguistic, cultural, and cognitive shifts that are occurring happen against the backdrop of typical development changes. These transitions can be challenging, and at times lead to isolation for ELLs. Using technology as part of instruction may be a promising practice for both cognitive and non-cognitive development of ELLs. Specifically, the researcher sought to explore the following questions during this study

- What was the lived experience of teachers who are beginning to implement one-to-one iPads with 4th grade ELL students?
- What were the rewards and challenges of such a project?

During this case study, the researcher sought to describe promising practices for leveraging iPads to support ELLs. As well as to observe, document, and analyze the experience of teachers as they engaged in metacognition about their practice. Throughout the study the two central teachers reflected on their own understanding of high quality technology integration. The educator's feedback included both negative and positive perceptions of the one-to-one (1:1) iPad environment with ELL students. The challenges observed in this project may be instructive for other ELL professionals and school leaders thinking about high quality technology integration to support ELLs. Additionally, the findings from the study paint a positive picture for the promising of using technology to support pedagogical practices of educators.

In the following literature review, the researcher presents the foundation for this case study: first, a definition of high quality technology integration; second, the existing research on technology integration and learner outcomes; third, a summary of research on effective instructional practices with ELL; fourth, contradictory research; and finally, the need for this study to fill the gap between existing technology integration research and existing research on pedagogical approaches for ELL students.

LITERATURE REVIEW

Technology has been shown to be engaging for students and teachers (Paraiso, 2010; Silvernail & Gritter, 2007), and there is growing consensus that technology is an important part of education (Purcell, Heaps, Buchanan, & Friedrich, 2013). Additionally, 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. While researchers have found evidence of increased student learning in technology-rich environment, the devices alone do not shift instructional practices, or lead to increased student learning (Bebell & Kay, 2010; Drayton, Falk, Stroud, Hobbs, & Hammerman, 2010; Sauers & McLeod, 2012).

HIGH QUALITY TECHNOLOGY INTEGRATION

Given the consensus that teachers must make shifts in instructional practices to realize the investment in devices, researchers and practitioners have sought a framework to understand how to leverage technology. In this study, the researcher will use The Technological, Pedagogical, and Content Knowledge (TPACK) framework as a conceptual model for high quality technology integration. According to Koehler and Mishra (2008) TPACK:

> is the basis of effective teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in

> constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of student's prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones. (pp. 17-18)

The model is represented by a Venn diagram, as can be seen below in Figure 1.

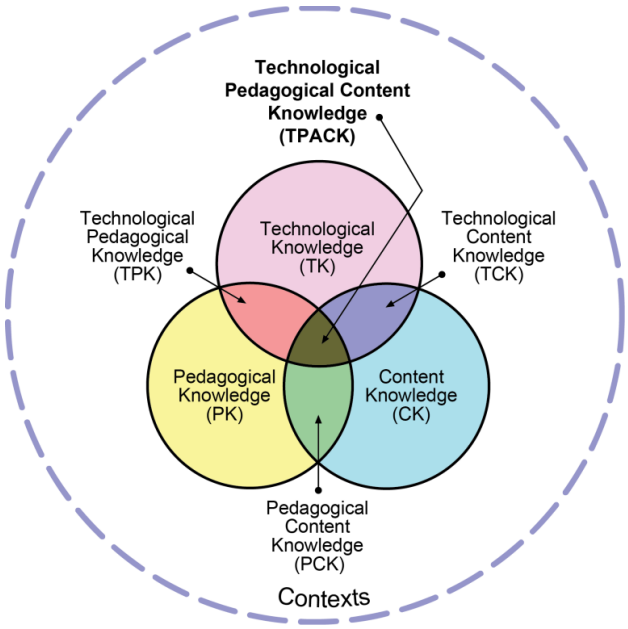

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Figure 1. Technological, Pedagogical, and Content Knowledge Framework (TPACK)

Teachers must have knowledge and skills in all three areas of the model. Isolated knowledge of these domains is insufficient, because it is the complex and dynamic intersection of these elements that allows teachers to create high quality instruction and technology integration. The next section will explore specific investigations of technology, and the connections to student learning.

Technology to Support Learning

The use of technology for teaching and learning has been shown to benefit students in a variety of settings (Bebell & Kay, 2010; Genlott & Grönlund, 2013; Mathison & Billings, 2008; Sauers & McLeod, 2012; Schmidt & Gurbo, 2008; Suhr et al., 2010). For instance, Genlott and Gronlund (2013) performed a quasi-experimental study on the impact of collaborative online writing in four first-grade classrooms. The team found both quantitative gains in academics, and qualitative reports documented student excitement and motivation. There are a number of studies on using technology in middle school to engage ELL students. One study was a qualitative analysis of a classroom based research project to engage and support middle school learners through the use of online learning tools (Paraiso, 2010). Paraiso reported significant gains for ELL students using technology to support learning. Mathison and Billings (2008) found students were able to produce more evidence of content retention when L1 podcasts were used to support learning. Despite these pockets of promising practices, or specific technological solutions, there has been little investigation of how educators implement 1:1 mobile device programs for ELLs.

There have been other studies of one-to-one mobile learning environments. Sauers and McLeod (2012) conducted a meta-analysis of research on 1:1 computing initiatives, and found benefits includ-

ed: measurable gains on standardized test for the technology-enhanced experimental group; and improved GPAs. Additional qualitative research has explored improved interest, attendance, and motivation for teachers and students participating in 1:1 projects (O'Dwyer, Russell, Bebell, & Tucker-Seeley, 2005; Suhr et al., 2010). As a personal device, the iPad has great potential for the educational setting because of the size, memory, portability, and functionality it offers (Ireland & Woolerton, 2010). There are some studies that specifically explore the role of the iPad in an educational setting (J. Carr, 2012; Haydon et al., 2012; Milman, Carlson-Bancroft, & Boogart, 2012; Sheppard, 2011). Researchers in these various studies acknowledged specific functionalities of the iPads; and also highlighted the need for pedagogical practices to harness the power of these devices.

Pedagogical Practices for English Language Learners

While there is little prior research on the quality technology integration with ELLs, there is a wide body of research on other pedagogical practices that benefit ELL students. In the last fifty years researchers examined how dual language, or bilingual practices, support students learning English versus how immersion programs work (Carlo et al., 2004; Cheung & Slavin, 2005; Han, 2012; Rolstad, Mahoney, & Glass, 2005). Other researchers investigated the length of time it takes for ELL students to become fully proficient in the mainstream classroom, suggesting that full academic language proficiency may take up to seven years for students (Barr, Eslami, & Joshi, 2011; Coleman & Goldenberg, 2010; Hakuta, Butler, & Witt, 2000). Students participating in bilingual instruction, and with prolonged transition times, academically outperformed peers who did not experience these supports (Rolstad et al., 2005). This is further supported by research done by Cheung and Slavin (2005) who found that transitional supports, such as access to Native Language/Language 1 (L1) materials and translations, were beneficial for ELLs.

Given that mainstream classroom teachers rarely speak all the L1 languages of their students, or have all materials available in translation, it is reasonable to assume that technology may be a viable option for supporting students as it can be customized to a home language which allows students to use their native language to develop L2 language and content knowledge. Furthermore, Han's (2012) findings indicate that school level factors including: ELL services to students, resources, and professional development explained one-third of the variance in academic performance as measured by standardized tests. This research is a strong foundation for investigating teacher practices.

Contradictory Research

While researchers have reported on the positive findings regarding educational technology use, there are some negative trends that are worth noting. One issue is that while some positive gains in achievement results have been found, there have also been inconclusive or negative results on academic outcomes (J. Carr, 2012; Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010; Sheppard, 2011). Second, any gains are not consistent across all content areas (Silvernail & Gritter, 2007; Silvernail, Pinkham, Wintle, Walker, & Bartlett, 2011). A third challenge in some studies was the level or connectivity, or reliability, of the wireless network (Sheppard, 2011; Wheeler & Hayata, 2014). Another issue was that teachers and administrators do not always believe in the efficacy of digital tools (Shapley et al., 2010). These negative attitudes might exist because of the learning curve and time involved for teachers. Researchers have found that there has been insufficient professional development to truly help teachers change practice and incorporate the new technology (Drayton et al., 2010; Shapley et al., 2010; Wheeler & Hayata, 2014). Additionally, teachers have concerns about distractibility and lower task persistence rates when students have quick access to facts (N. Carr, 2010; McLeod & Lehmann, 2012).

Need for Research

Given the large cost of most educational technology projects, both in human and financial captial, the potential benefits evident in previous research and concerns listed above help to cast a spotlight

on the need to identify and promote promising practices for teachers of all students. However, there is a clear gap in the research on the efficacy of one-to-one mobile environments to support ELL students. The purpose of this qualitative case study was to fill this gap, and explore promising instructional practices for teachers working with ELLs, and conceptualize how educators understand and expand their practice with leveraging technology through an examination of both the benefits and challenges with implementing a one-to-one mobile learning environment.

METHODS

CONTEXT

The study was conducted in an English-speaking school in Switzerland. The primary language of instruction at the school is English, although 60% of the students at the school are not native speakers of English. The students at the school are overwhelming from affluent, multi-lingual and multi-national households. Many students already had access to technology at home with a laptop, iPad, or cellular phone. However, these devices were primarily reported, and observed, to be used for gaming purposes. At the school there already was a shared permanent computer lab for teacher use, and two shared carts of laptop computers as well. Prior to the project described below, iPads were not commonly used in the classroom by either teachers, or students. The school employed a full IT staff, and one Pk-6 Technology Integrator. There was a strong wireless network in place, although a few classrooms did need increased access points for the wifi. The school administration made funding available for competitive submissions for technology projects, and the researcher was awarded a grant from the school to purchase one-to-one iPads (1:1) and for fourth graders, and Apple TVs for the two classrooms to allow for wireless projection. There was no comprehensive professional development for the educators involved in this project nor direct instruction in iPad use for the students. The research project, and resulting conversations allowed for some professional development for the educators involved, and the students learned in context as new apps and skills were used during the six-month implementation, and data collection phase, between January to June of 2013.

Participants

This article presents findings regarding the educators at a single site. The case was chosen as a purposive case given the unique language profile of the students, the project to adopt iPads, and the researcher's connection to the school. The researcher was employed as a teacher at the school during the data collection phase. Within this site the researcher focused on two teachers, and used a multi-case approach to examine the practices of each educator within the site context, and to compare the experiences of the two educators. In addition to the two central educators, the Head of the Elementary School, the Instructional Technology Coordinator, and the ELL Coordinator were interviewed to help provide context. An overview of those participants is provided in Table 1.

Elizabeth, the mainstream classroom teacher, and Jack, the ELL teacher, were at the center of this inquiry into teacher practice. At the beginning of the year, the researcher met with these participants to discuss elements of successful technology integration, including an introduction to the TPACK framework mentioned previously, and determine interest in participating in the study. Once interest was established, the researcher followed all protocols for the protection of human subjects. First, she ensured permission through the K-12 International School Administration to use the site for her research. Once that approval was granted, she submitted, and was approved to conduct her research by the Institutional Review Board at the university where the researcher was also a student during the project.

Table 1. Educator participants

	Nationality	Primary Language	Other languages	English Fluency	Length of Interview (mins)
Elizabeth Kline (Classroom teacher)	American	English	Beginner Italian	Native Speaker	~180
Jack Tilmun (ELL teacher)	American	English	Russian (fluent) Italian (fluent) French (fluent)	Native Speaker	~180
Charles Leeks (Head of Elementary School)	American	English	None	Native Speaker	60
Valentina Mendosa (English as Additional Language Coordinator)	Swiss	Italian	English	Fully bilingual	75
Sam Silvan (K-8 Instructional Technology Coordinator)	American	English	Beginner Italian	Native Speaker	45

Note: All names are pseudonyms

Research design

Qualitative methods were used to construct this in-depth exploratory multi-case study (Creswell, 2007). A multi-case approach was chosen to investigate the classroom practices, and educator insights of implementing a new pedagogical approach and technology into everyday practice. Interviews, observations, and artifacts were collected in a six-month window from January to June of 2013. All data collection methods were designed to help create a rich picture of the educators' understanding and development of skills with leveraging technology for ELL students. A qualitative case study methodology was chosen because of the researchers immersion (Creswell, 2007; McMillan & Schumacher, 2010) in the setting; a desire to seek multiple perspectives in a complex setting (Wilson, 2012); the complexity of understanding teacher practice (Bialystok & Hakuta, 1995); the emergent technology; and the goal of exploring a new field of inquiry as potential baseline for further study. The site was a purposeful sample given the unique ELL population, and the recent investments in educational technology to support teaching and learning (Patton, 2001). In addition, the researcher was able to access this role, and as such her presence as an observer, and a participant at the site must be considered (Esterberg, 2002). To enhance the trustworthiness of this report, the researcher engaged in reflexive journaling to document her own experience during the project as a participant, and as the researcher (Lincoln & Guba, 1986). In addition member checking and triangulation helped to ensure the researcher constructed a shared picture of the project.

Data Collection and Analysis

Data sources

During the six months of data collection, the researcher gathered educator journals, conducted semi-structured interviews, engaged in classroom observation, and collected student and teacher artifacts. The two central educators, Jack and Elizabeth, collaborated on a shared electronic journal in which they each reflected weekly on the use of the 1:1 iPads with the ELL students, along with the successes, frustrations, and questions that emerged. In addition to this informal reflection, the researcher also conducted three formal interviews with each educator individually. These interviews used a semi-structured protocol, and lasted 45 to 90 minutes, and were audio recorded. During these in-depth interviews the researcher examined teacher experience and perceptions of their own development, along with perceptions of student learning. The interview protocols were structured to have

participants review and reflect on the comments made during previous interviews to enhance validity of the findings (Creswell, 2012). Classroom observations were an integral part of the data collection, and allowed the researcher to notice how the teachers were using the iPads to collaborate, and support ELL goals, along with content and technology learning.

Analysis

All interviews were audio recorded, and then loaded into QSR' International's NVivo Software for transcription and analysis. Field notes were taken during interviews, and analytic memos were added to NVivo to document researcher thoughts and observations. All interviews were transcribed verbatim in NVivo, and student artifacts were also loaded. During data collection the researcher kept an informal list of emerging ideas, but once all data collection was completed, she read and reviewed all journals, transcriptions, observation notes, and artifacts prior to applying any codes. To begin the researcher created profiles of the central educators (Seidman, 2006). These profiles were both shaped by the specific data, and shaped the researcher's construction of the central themes in this exploratory case study. In the first iteration of the coding process, the researcher read and applied open codes. In the second round of coding she applied a constant comparative process of analysis (Corbin & Strauss, 1990). In the third reading she continued using an inductive process of coding to generate categories.

In addition to using NVivo to support the process of coding and creating hierarchies of codes, the researcher also used visual conceptual models to document her understanding of the knowledge and skills-development in two individual teachers to highlight the different experiences of the central educators. These visual models are consistent with qualitative analysis techniques such as diagramming and concept maps, and typologies suggested in the literature (Creswell, 2012; Patton, 2001).

Limitations

There were limitations to this study: a small sample, an affluent population, and the qualitative nature of the data means the case serves to illustrate an experience, rather than make generalizable conclusions. Finally, as is true in any qualitative data design this case study was not experimental in nature and therefore is not supported with statistical conclusions about the student outcomes as a result of the 1:1 iPad project. Additionally, there was not a comparison classroom to gauge progress even through the lens of qualitative research. Despite these limitations, the researcher does make conclusions on the value of using 1:1 mobile devices for ELLs.

Findings

In this section the researcher presents three findings that help to shed light on promising instructional practice for ELLs. The themes that emerged from the data analysis process were centered on (a) new pedagogical practices, (b) variance in teacher development, and (c) challenges faced in the 1:1 project.

Finding 1: New Pedagogical Practices

The members of this case study explored and reflected on learning environments that support ELL students, and the role of technology within this ecosystem. The Head of the Elementary School gave this overview of a successful learning environment for ELLs:

> … where they felt safe to make mistakes ... wherein they could respond in various ways, both verbal and non-verbal, to demonstrate that they had certain skills and knowledge ... wherein the instructional input came in various modes and various forms in order to help them overcome any deficits they may have with the written or spoken language. So it would, it might be, multi-sensory, pictures, sounds, gestures ... very interactive.

ELL students, similar to their peers, benefit from environments with multiple modes of representation, engagement, and expression. Jack and Elizabeth both saw how technology could be used to support both English acquisition and content area goals. In Elizabeth's second interview, she explained this interplay, and the role that technology played in opening learning experiences for ELL students, "but the technology, the more skills they build with it, and the more their English came along because of that, now we can just do so much with the content." An example project was when students conducted research online, using their iPads, and Google translate, then created a web using Inspiration Maps. An example of an inspiration map is provided in Figure 2. Using the built-in functionality of this app the students were able to export the web to a word processing document, and then complete a simple essay about the president they were researching.

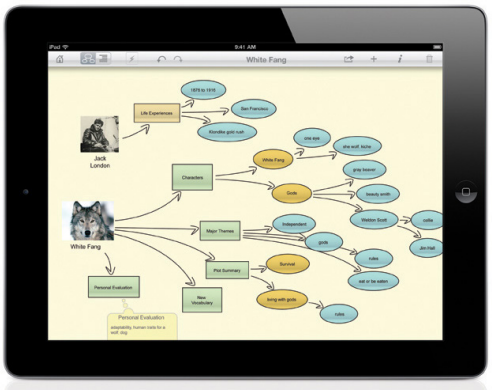

Figure 2. Concept map created with Inspiration

Elizabeth reflected on the pedagogical shifts she made to support her ELL students, and the integral role of technology:

> We put in a document that is reworded for them so that they can go through and highlight and use Google Translate to look up the words and Google Images if they need to find a picture. And put the word in Russian if some of them are learning Russian and so, and then at the bottom to answer questions once they have really digested the meat of the material. So it is not overwhelming them with all the details they may not even understand in the textbook, but it is preparing the material so that it is reachable for them.

Jack agreed "an iPad is flexible ... the more they [ELLs] start to look for ways to figure things out ... I think this technology gives them even more chance to figure out how they learn and figure out a system that works for them." He recalled a movie that one student created about the circulatory system as being a powerful example of this intersection.

Sam, the PreK-8 Instructional Technology Coordinator, also believed technology could support differentiated instruction for ELLs:

> students aren't stuck learning in one specific way, only from the teacher or textbook, which may be hard for an ELL student to work with, or demonstrating understanding in one specific way, an ELL student may not be able to express her understanding in essay form yet, but may be able to put together an e-book with pictures, key terms, and people that show how a historical event unfolded …

Both of the Head of the Elementary School, and the Instructional Technology Coach, highlighted the fact that the iPad provided each student with multiple modes for receptive language and expressive language, and as such was a positive support for students. However, the actual implementation of these tools was in the hands of Elizabeth and Jack, the classroom educators. Elizabeth was open about the fact that leveraging the technology for ELL students was an area of growth for her. She

talked about the fact that her teaching changed significantly as a result of having the iPads in her classroom.

> [The biggest shift in my instructional practice] is trying to find a way ... to teach the content so they can understand the gist of it. For example, when we were learning about the Boston Tea Party and the Boston Massacre and all the different events leading up to the American Revolution, it was finding a way to make it make sense to them. Why all these things that happened to them, and the order it happened in leading up to the war. And, so for that a lot of visuals, images, talking about it, from their perspective, what they could understand, it was just ... using the technology. I mean I can't really think actually about teaching that unit without it [laughs].

As an example of how much her practices shifted with the use of the iPad to support her ELL students, she recalled the Newspaper project that students had created in this unit. Students had made extensive use of their devices to read, translate, and take notes on various important documents. Then, using a template in the word processing application Pages®, which is a registered trademark of Apple. They learned how to pull together the research to create a newspaper.

Figure 3. Student produced Patriot News with Pages®

The teachers and leaders both saw specific affordances of the iPad to provide for a multimodal learning environment for the ELL students, and affordances of the iPad technology to shift teaching practice. The mobile and personal nature of the device were among the important affordances of the iPad. The educators appreciated, and returned to the need to remain focused on the language and content learning goals for students, not simply using the technology because it was new and different.

Finding 2: Variance in Teacher Development

Despite the fact that all educators involved in the project, including the Head of the Elementary School, The Instructional Technology Coach, and the ELL Coordinator, felt strongly about the potential of how the device could be leveraged for learning, the actual shifts in teacher practice were variable. Teacher practice is highly personal, and informed by many different factors. Elizabeth, the classroom teacher, and Jack the ELL support teacher, both worked to embed the use of iPads to support teaching and learning. Both Elizabeth and Jack had experience teaching, but neither had used iPads in a 1:1 setting, nor had they engaged in substantially professional development with using technology to enhance practices. Each teacher experienced unique development of skills, and different changes in attitudes during the study. The original TPACK model is represented by a Venn diagram, as was seen in Figure 1.

Below is more detailed information about each teacher's development, and included is a visual representation of the teacher's knowledge and skills. In these representations the size of the TPACK cir-

cles indicate the strength of the educator's knowledge and skills in that area. Additionally, the position, and level of overlap in the circles indicate the intersections of these domains.

Elizabeth's experience

The classroom teacher, Elizabeth, was in her sixth year of teaching, and her first year at the school. She is a native speaker of English, and does not identify as speaking other languages. She indicated some prior training in working with ELL students, but this year was her first formal experience. Elizabeth was eager to be involved in the project, and readily accepted the TPACK conceptual model in initial conversations in the fall.

When the study began in early January, Elizabeth was asked to think of a lesson or assignment that demonstrated strong technology integration. Her response demonstrated some confusion on how the technology had related to the content goals of the lesson. In her recall she first referred to the wrong app – *Notability* instead of *Explain Everything*). Second, she was unable to find the file because she had not developed a strong organizational system, and had not assigned specific students to certain devices. Then, she could not easily find the video. Once she did find it, the first page of the project had a 'draft' on it, and the second page had the actual project. She had trouble remembering how to advance from one slide to the other.

Early in the study, Elizabeth was honest about the content knowledge and technology knowledge being weaker areas of her practice. Elizabeth's growth in practices began with general excitement for technology integration, to a much more reflective and nuanced understanding of how she might plan for and consider the role of technology in her teacher. The researcher constructed a visual representation of Elizabeth's initial and concluding TPACK skills (Figures 4 and 5).

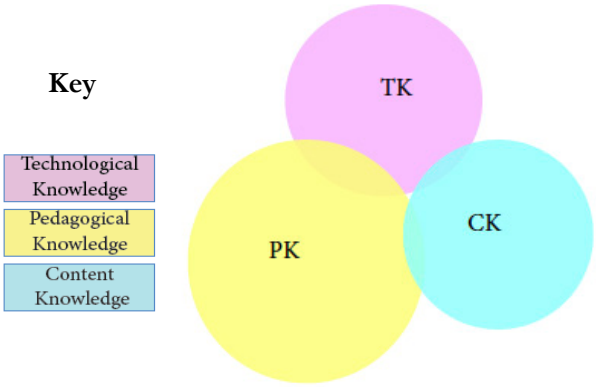

Figure 4. Elizabeth's initial TPACK

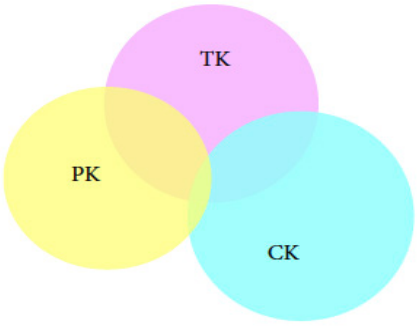

Figure 5. Elizabeth's concluding TPACK

In May, Elizabeth was able to give much more depth to her understanding of high quality technology integration, she said, "… the way I understand this is: that technology, content and pedagogy are all interconnected...there is a sweet spot right in the middle ... Where we are using the technology to help them access the content, but still with good teaching strategies." She articulated the importance of guiding her technology choices and pedagogical choices with a clear vision of her content goals:

> … it is worth it to find apps that are ... motivating, valuable, enriching to the curriculum, that don't feel just like a total game with no point, because the kids don't even like those. I think there was one we tried for chemistry ... and Nikolay said 'well, all this does is blow things up' ... planning for and selecting apps or projects, I think it is really knowing your curriculum well to really know what it is you are looking for in the apps because otherwise everything can kind of look good.

She noted even students are able to judge when an app or activity was appropriate for learning or void of connection to the content. At the conclusion of the study, Elizabeth was focused on ensuring that the technology supported her content and language goals for her ELL students. Her development was very different than Jack, whose experience is outlined next.

Jack's experience

The ELL teacher, Jack, was in his 21st year of teaching, and his third year at the school. Prior to arriving in Switzerland, he was a second-language teacher to native English speakers. Jack was fluent in many languages besides English. Jack began with strong content knowledge, and knowledge of language acquisition. He initially indicated more hesitancy around the utility of the iPad to support his teaching practices, but was willing to reflect and explore new ideas. In the first interview he said the following about the TPACK model:

> **Jack:** ... I guess this [TPACK] model is saying that this delivery method in school is bringing something extra to the table. This, using electronic machines will uh, will increase what we can accomplish with our techniques and our content.
>
> **Researcher:** Do you agree?
>
> **Jack:** [long pause] I am pausing a long time, aren't I?
>
> **Researcher:** you are, but it is okay.
>
> **Jack**: I definitely don't disagree...

Jack was honest about his passion for the content, and his pedagogy, and his trepidation about the role of technology within this practice. The researcher created a visual representation of Jack's development. As can be seen in Figure 6 Jack had large pedagogical and content knowledge – of English acquisition, languages, and the 4th grade curriculum. In Figure 7, Jack's concluding TPACK is presented.

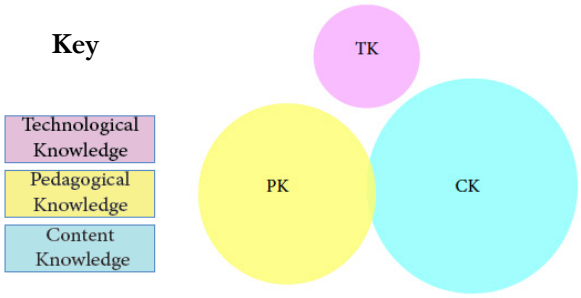

Figure 6. Jack's initial TPACK

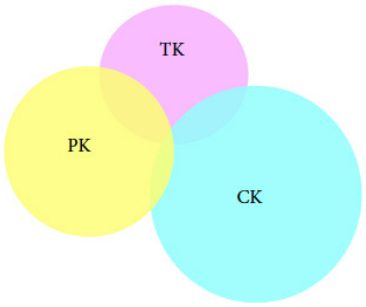

Figure 7. Jack's concluding TPACK

In his second interview, Jack was slightly more positive about how technology might support his content goals and be situated within his pedagogical practices. He said:

> there has to be balance between the information, the techniques for delivering it, and the tools that they can use to learn and to use it. Sometimes in this age of whiz-bang technology, some people are scared by it, so they don't use the technology, some people are so excited about it, they think it is good as long as it is technology because it is something… [TPACK] reminds you that the success only happens when these things come together

Jack recalled an instance when this did not happen for him, and that was with the vocabulary cards program A+ Pro (App Holding, 2014). An example card can be seen in Figure 8. Within this program, students could create double side flashcards for new vocabulary. In the image below, the student had recorded a translated version of the definition in his native Russian. As Jack reflected on the

limitations of his experience with this program, he highlighted the fact that his early technological pedagogical knowledge (TPK) was limited, and therefore he did not know enough how to make the program work for his students, and as such it had felt like wasted time for their learning.

Figure 8. Example A+ Pro flashcard (photo used with permission)

Even at the end of the study, it was clear that despite his growth with technological knowledge he did not see the technological elements as important as the other pieces: "I think the technological piece is not as important as the others, it is important, and it is a great vehicle but good teaching can happen without it, it can't happen without the others." He did however acknowledge:

> ... but there is a certain truth about [TPACK], when your pedagogy is strong, and you have something worthwhile to teach and you have knowledge of technology that can help you deliver it, and then you can help the kids practice it, that is a pretty potent approach. So there is truth in here, even if, I mean as I was saying I think these [pointing to pedagogy and content] circles are more important than this one, that doesn't mean 'this' isn't making the center part stronger, the technological knowledge.

At the end of the study, when asked to think of a specific example of high quality technology integration, Jack recalled *The Puzzling Plates* app (Tasa Graphic Arts, 2016); a few screen shots can be seen in Figures 9 and 10. He said, "kids of any English level could see that the volcanoes and earthquakes happen where the plates meet … It is tough to imagine a clearer and more impressive way for them to discover these scientific facts." He was able to identify and describe a nuanced an example of when the technology was well integrated to support both the English and content area goals.

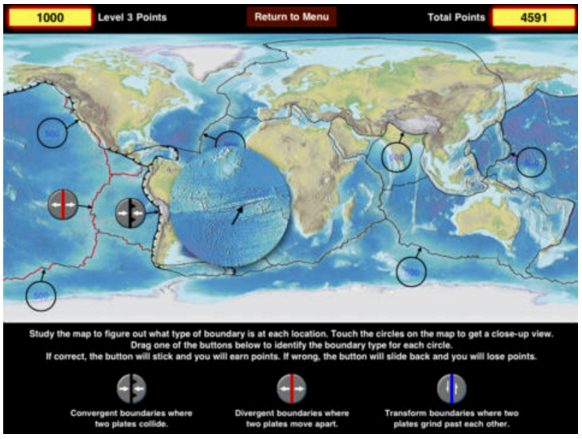

Figure 9. Tectonic Plates

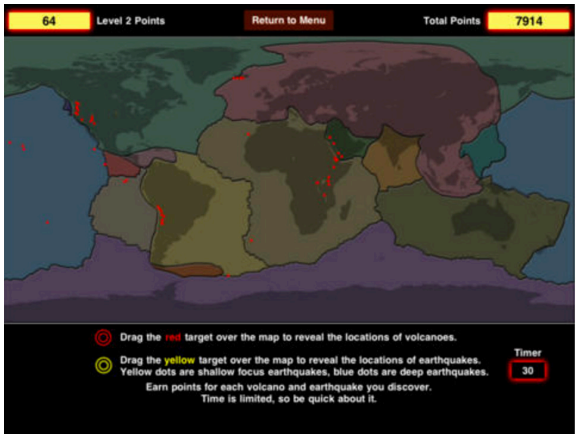

Figure 10. Volcanic Activity Zones

Images used with permission from Tasa Graphic Arts (2016)

The highly individualized development of teacher practice is an essential finding in this study. Teachers will react and enact such change differently based of their prior experiences and personal beliefs. This exploratory case study of two individuals helps to place the development of new knowledge and skills with technology integration into the context of practice, and may provide a foundation for a more nuanced way to operationalize the development of teacher practice when integration technology into teaching and learning.

Finding 3: Challenges Encountered

While there were many positive perceptions reported in the research study of how integrating technology may benefit ELL students, participants also reported challenges and barriers experienced during this shift.

Technical issues

Participants did note there were some issues with the devices and functioning of specific apps, and noted their own weaknesses with the technical elements of using new tools. Losing work, either due to an app bug or user error, was cited in the study as a frustration. Elizabeth agreed that one of the more frustrating issues was when students lost work or experienced technical difficulty. She said, "I kept trying to put him off and say 'there has got to be a way' and really I just didn't know. And the times when I don't know are the most frustrating because I feel kind of stupid." In her second interview, Elizabeth returned to this issue. She tried to place a positive spin on the challenge:

> it is frustrating when I don't know the answer to something but I want to help them, and I honestly have to say I don't know, let's try and figure this out, or I will get back to you. But then it always turns into a good learning experience. You know, in life not everything is going to be perfect, and not every app is perfect, but we can still use this to our best advantage.

Jack also talked about students losing work as a barrier to implementation when he was helping them use a flashcard program, A+ Pro. He said, it was "just frustrating, Pavel ... was trying to use them and he just pushed them the wrong way. I didn't know the program any better than he did, I mean we figured it out an hour before he did, but I hadn't run into the problem." Similar to Elizabeth's concern, Jack's concern was his own knowledge of the device and apps.

Human capital issues

Participants indicated that learning to use the technology represented human capital that must be invested. Jack and Elizabeth both indicated that the shifts they were making were energizing, but took extra time. Elizabeth said, "I am just really thankful for this experience [laughs] I really am, because this has revolutionized my teaching, it has made me a better teacher and it is exciting to come to school every day because I am learning too." As Jack considered the benefits he also examined the negatives, he said, "overall the net effect is positive, so yes. But if I take a moment and look at those moments inefficiency, I am frustrated by it, but that is compensated for by it, the good things, more than compensated." While willing, in both the first and second interviews, Elizabeth mentioned her invested time. She said, "it takes time to kind of front-load and make sure that everything is ready for activities for them. So, I just wish I had more hours in the day sometimes so I could do all the things I want to do with them. But every time I put the time in, it is so worth it."

Jack was concerned he did not have the knowledge to make the transition to using the technology well. Jack also discussed his learning curve as a challenge, "it [the technology] is taking up some of my bandwidth...I feel this obligation to use the technology, which I know can be valuable. I am spending more time worrying about that, which means less time thinking about the needs to the child, the content I am trying to deliver."

As Elizabeth considered advice she would give another school transitioning to using iPads, she revealed her understanding that there must be a plan for using the devices, and that teachers need to tie the devices to the curricular goals. She suggested new users be given "some training ... actually seeing student examples...of what is possible." In this research study the teachers experienced growth, and acknowledged the supports that were available to them to make the transition to using the iPads. However, the comments reveal the complexity of how different teachers will need a variety of supports such as: student exemplars; time to discover apps; and time to develop proficiency with different iPad functions and apps; as they make transitions in their teaching practice.

Leadership issues

The iPad project was originally begun through a grant from upper level administration to enhance use of educational technology. Within this broad goal it was up to a teacher, or multiple teachers, to define the outcome of the individual project. This structure promoted teacher leadership through empowering teachers; but revealed a missing school-wide vision of the role of educational technology. This tension was seen in different ways during this project. Jack explained the need for support from above, "there needs to be support from the administration... they have to be willing to back up the teacher."

In the interview with the Head of the Elementary School, he recognized his inability to provide such a vision, but was trying to support the PreK-8 Instructional Technology Coordinator and individual teachers:

> There is not a lot [of support], we are in our infancy and but for Sam and a few teachers who are enthusiastic and more that have become more enthusiastic. … Sam has expressed a great deal of frustration with me as a head because he says 'you know, I really need some leadership from above for direction for this'. And I think we have come to armistices on this, because the thing that I want Sam, who is our Tech coordinator, to understand is that 'this is me giving you support Sam; do whatever you damn well please. Don't look to me, because I am of a different generation that you are, you know. The support I am giving you is I am saying 'yes', and that is my support.' And that perhaps gives him a certain level of uncertainty as where to proceed, but that is that's, that's the only support I can give him.

As these projects shift to more sustainable practices, there will likely need to be philosophical conversations about the role of technology within the school, and a larger vision may help to move these projects from isolated pockets to a more comprehensive program.

DISCUSSION

CHALLENGES FACED

One of the largest challenges in shifting to a one-to-one iPad environment is that it can require teachers to invest a great deal of time in the effective reorganization of their practice to leverage this environment. Elizabeth and Jack both noted that shifting to this model of 1:1 iPad use required considerable time and "bandwidth" for them. Elizabeth reported her sense of a learning journey, albeit one that enriched her teaching. She recognized that she would never feel like a technology expert, but could effectively work on her pedagogy to use the iPads productively. Jack, in contrast, reported a sense of waiting and wanting to arrive at a mastery level with the technology. He reported a sense of progress to this end, but also likened himself to being an "old dog." While Elizabeth's attitude seems to give her focus and energy towards improving her craft, Jack felt exhausted, and at times overwhelmed by the changes.

Such variability in attitude is echoed in other studies where some teachers are early adopters and others more reluctant followers (Bebell & Kay, 2010). This perceptual challenge pointed to the essential role of professional development in implementing a 1:1 program. Other researchers found that pro-

fessional development positively impacts the outcomes of a 1:1 program (Drayton et al., 2010; Shapley et al., 2010).

A second challenge in shifting to a one-to-one environment is the hardware as well as software challenges. In the current case study, almost no issues related to hardware and software performance were noted, but adult participants discussed potential issues to consider with increased scale of projects. Also, a related technology challenge is variability in access to supplemental materials such as Apple TVs, interactive whiteboards, and projectors. These elements may impact the efficacy of a 1:1 program.

A third challenge in shifting to a one-to-one environment that emerged from this study is the cost involved with personal technology initiatives. For the first year of the study, a grant of 5,650.00 Swiss francs (6,317.97 US dollars) supported technology investments for this project. In the second year of this study, the school supplied 31,305 Swiss francs (35,006.01 US dollars) to support technology usage for all 35 4th grade students. This study was done at a private school where spending was controlled at the campus level. Even in this context, not everyone felt the additional money should have been spent on technology. For instance, Valentina, the ELL coordinator, discussed the expense involved in such a project. Jack expressed concerns over the long-term cost of purchasing, maintaining and upgrading the iPads. Rapid advances in technology means that quickly devices can quickly become obsolete and incompatible. These concerns are similar to those found in the Drayton et al. study (2010) of 1:1 computing in high school science classrooms where fiscal issues presented challenges to maintaining a current and operating fleet of devices.

A fourth tension arose as theme in the findings: the need for leadership. Individual teacher knowledge and skills is a huge factor in the success of a one-to-one program, highlighted by the following: "It is impossible to overstate the power of individual teachers in the success or failure of one-to-one computing" (Bebell & Kay, 2010, p. 48). However, if a school is to truly implement a 1:1 program, there must be conversations and leadership for this change. These conversations were absent from the interviews with adults at the research site. In another study of 1:1 programs the researchers stated that "Informed and consistent administrative policy has helped create the conditions necessary for the maturation of these experiments with ubiquitous computing" (Drayton et al., 2010, p. 44). Therefore, for students to receive the most benefit from a 1:1 program, it must be a systematic program led and organized by formal leaders and communicated clearly to all stakeholders. One-to-one initiatives, even within the same content area, do not emerge the same way at different schools (Drayton et al., 2010). Shapley et al. (2010) did a quantitative analysis of factors associated with Classroom Immersion in a 1:1 environment. They found a statistically significant relationship between perception of leadership and classroom immersion ($r=0.59$, $p<0.001$). These results highlight the importance of leadership for creating the conditions for personalized iPad use.

Recommendations for School Personnel

In addition to the findings, analysis, and conclusions, the researcher recommends how this small-scale case study might contribute to the work in the field with ELL students. In addition to the teachers of ELL students, the leaders within a school could also benefit from considering the following recommendations for practice as they consider and create educational environments for digital age learners. The following are recommendations for heads of school (such as principal, headmaster), ELL leaders, and technology integration leaders within a school.

Consider collaborative models of ELL instruction

The iPads provide a personalized device for students to have quick and easy access to more tools and resources, such that they can more quickly become successful in a mainstream environment. They will be able to have access to some of the "survival English" that Jack discussed in this interview, and therefore can begin benefitting from exposure to the authentic and meaningful mainstream environment. This survival English does not mean these students can be independent, it simply allows for a

different model where instead of pulling children out of the mainstream environment. This shift will have real implications for scheduling and staffing in a school with ELL students. As schools and districts refine their vision to include the iPad as a tool for student success, it is an opportunity to consider and plan for a new model of collaboration. This recommendation is supported by previous research that also documented the benefits of collaboration in teaching ELL students (Mathison & Billings, 2008; Paraiso, 2010).

Discuss philosophy of educational technology use

As schools change, and move into the 21st century, learning environments have the potential to change. Many enthusiasts of educational technology envision new ways to learning; but this vision may not be shared with all. Taking time to engage in conversations, shape policy, and establish shared practice is time well spent. As outlined in the conclusions above and in other research projects, leadership plays a significant role in shaping the lived experience of a one-to-one iPad project (McLeod & Lehmann, 2012). Leaders must invite and facilitate the difficult work of sharing vision, and building capacity and understanding for the value of this mission. This work will ultimately benefit students through the quality of implementation that occurs as a result.

A conclusion from this research is the fact that teachers, leaders, and other stakeholders need to engage in conversations about the use of iPads within the local context to come to common understanding of vision, purpose, and resource allocation of these devices. This conclusion is based on the data in the current study, and the lack of conversations about the purpose and changes of technology happening at the school. This dialogue will help to scaffold the transition from classroom-based projects to a more systematic vision and capacity to sustain this type of learning environment for students. The local variability can be great, and each institution must spend time engaging in meaningful conversations, establishing a vision, and reflecting on practice. As schools consider adoption of these devices, or other similar tablets, inviting these conversations about mission, and purpose, will help to ensure that stakeholders – students, parents, community members, teachers, IT personnel, and leaders – articulate a vision for the inclusion of such devices. This vision will be necessary to sustain the projects, and overcome potential barriers to implementation.

Support professional development

In this research study, the teachers worked with the researcher to learn about, reflect on, and grow their technology enhanced pedagogical skills. The two teachers also naturally sought their own learning to enhance the effectiveness of the iPads in their teaching and learning. As projects reach beyond individual teacher implementation, and into grade levels, schools, or even districts, leaders must allocate and plan for differentiated professional development. Just as the students in this and other studies (Manfra & Hammond, 2009; Suhr et al., 2010), teachers have different knowledge and skills about using technology to support teaching and learning. Therefore, leaders need to think about creating a plan for systematic and personalized learning for teachers. The goal should be to move each teacher along his or her continuum of learning, rather than looking to get all teachers to the same point. Ideally the professional development will be naturally embedded into professional practice, and promote growth, while holding teachers responsible for contributing to the vision of the educational experiences with the grade level, team, school, or district.

Understand home access and involve parents

The students in this research study were from affluent families, and most reported having a tablet or laptop available for use at home. Additionally, the parents of these students almost all spoke English at a functional or proficient level, and therefore were aware of the project, curriculum, and goals. The parents were informed about use of technology, new email addresses protocol, and safety features in place for students learning to use the Internet. All the students were from languages with a print basis. However, these conditions of parental affluence and basic English proficiency are not typical for

all ELL populations. Other schools considering adopting iPads will need to consider home access and parental involvement.

As teachers, schools, and districts consider adopting iPads, they will need to think about portability of devices that are school owned, and if those devices can go home with students. Other researchers have also found that home access of technology is one variable that is associated with greater academic gains in technology rich environments (Shapley et al., 2010). Legal and financial considerations of whatever model is used should be considered to ensure clarity with all groups. Schools will also need to grapple with their ability to accommodate personal devices that are brought into the school. These devices, and the issues with the IT infrastructure, should be explored prior to a wide-scale implementation. Ideally, parents, families, and the community will be involved in conversations about the vision for educational technology and the practical implementation. These conversations may begin as a result of budget implications for such a program, but should occur to ensure that the program has widespread support.

Recommendation for Researchers

One recommendation for future avenues of inquiry would be to include a larger sample of ELL educators using the shared conceptual framework to explore the individual ways new technology-enhanced pedagogy develops. For instance, Colvin and Tomayko's (2015) radar scaling of TPACK may provide a quantitative way to validate the qualitative results found in this and other studies. The radar model and profiles may also allow for quantitative analysis of how student learning data is impacted by teacher practice; and what professional development lead to pedagogical development in educators.

Conclusion

This conceptual case study was designed to illuminate the experience of one small-scale iPad implementation project. The goal was to explore promising practices for digital tools, and to conceptualize how both the teachers came to understand and enact new technology-enhanced pedagogical practices. The data revealed that this development, like many aspects of teaching, is highly personal and non-linear. The professional goals and background of each teacher informed their reflections and practice. Despite the variety in knowledge and skills development, both teachers and school leaders indicated that this model is useful for planning instruction with ELL students who can benefit from many of the technology tools available in a tablet. However, this study also illuminates some of the challenges that may be faced when implementing such a project.

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APPENDIX

Administrator, ELL, and Technology Integrator: Sample Questions

1. Can you briefly describe your job and responsibilities at the school?
2. Can you describe an ideal instructional setting for a beginning ELL student?
3. Can you describe an ideal history classroom for a beginning ELL student?
4. What are the most important pedagogical practices for working with ELL students?
5. What role do you believe technology plays in the pedagogy of working with ELL students?
6. Can you describe an appropriate balance of history content instruction to English instruction for ELL students?
7. What role should technology have in education today?

Teacher Interview: First Interview Sample Questions

1. How have you been using iPads to support students in learning history?
    a. Does the application matter? Can you give an example?
    b. Does the assignment matter? Can you give an example?
2. How have you been using iPads to support students in developing their English?
    a. Does the application matter? Can you give an example?
    b. Does the assignment matter? Can you give an example?
3. Do you observe a difference in how students are mastering history when they use the iPad?
    a. Can you give an example?
4. Do you observe a difference in how students are mastering English when they use the iPad?
    a. Can you give an example?
5. Here is a picture of the TPACK model, which stands for technology, pedagogy and content knowledge. Can you explain what this model means to you?
    a. Probe: Can you explain, or give an example of how you consider content (technology, pedagogy) when planning to use the iPads?
6. Can you share a piece of student work with me that you think highlights the TPACK model for you? Why did you choose this?
    a. How does it show content learning?
    b. How does it show quality technology use?
    c. How does it show the pedagogy of your teaching?
7. Do you feel that each part of this model, the content, the technology and the pedagogy play an equal part in planning for working with students?

Teacher Interview: Second Interview Sample Questions

1. Last time we talked you said the following about your beliefs about working with technology in social studies and using technology with ELL learning.
    a. Text of first interview here
    b. Do you still agree with this? Why/why not?
2. Part of this study is to explore how the TPACK model impacts teacher practice. Can you describe again your understanding of this model?
3. Last time we talked you had these comments on the TPACK model.
    a. Text of first interview here
    b. Do you still agree with this? Why/why not?
4. How do you think your understanding of the TPACK model has changed over this year?
5. Do you feel teachers should place equal balance on content, technology and pedagogy?

a. Is one more important? Why?
b. Is one place on this model more challenging for you? Can you explain?

Teacher Interview: Third Interview Sample Questions

1. What are the most important pedagogical practices for working with ELL students?
2. What role do you believe technology plays in the pedagogy of working with ELL students?
3. Has the way you select apps or plan activities with the iPad changed during this year? How?
4. If another school, with a population of ELL students, was considering using iPads in content area classes, what would you tell them?
    a. About the TPACK model?
    b. About push-in support or pull-out support for ELL?
    c. About planning for and selecting apps or projects?
    d. About problems they might encounter?

BIOGRAPHY

Dr Johanna Prince is the Director of Graduate Programs in Education and Program Coordinator for a collaborative Masters of Education in Instructional Technology. She regularly uses questions as the design framework for her graduate teaching, and in her work with faculty across the programs she works with. She teaches graduate courses in research and educational technology; and in all teaching focuses on how teacher practice is connected to student outcomes. She has taught in K-12 and higher education settings.