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Changing Teachers, Changing Students: Exploring iPads in Inquiry-Based Learning

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Educational contexts that support the complexity of in-service teacher learning around the purposeful use of technology are scarce. This qualitative case study describes a Literacy Enrichment Camp offered for traditionally marginalized elementary-aged children. Within camp, 5 teachers and 1 instructor prioritized their own and students' inquiry-based teaching and learning around iPads. This article shares what teachers learned about themselves and the 17 students who participated in the 3-week camp. Teachers collected data through field note observations of teacher/student interactions with iPads, teacher interviews, and teacher reflection journals. Data were analyzed through constant comparative method, revealing themes of previously unrecognized teacher-resistance to technology, and the affordances of iPads for supporting students' individual needs and promoting role reversals between teachers and students. This work demonstrates teacher change in the complex spaces of teaching and learning, contributing to an understanding of how the use of iPads can change educators' teaching, learning, and conceptions of self and students.

I watched my teaching partner, Kristin, demonstrate some of the app options available to the energetic children sitting on the floor with us. I noticed them participating, engrossed in downloading pictures of the various things they were studying, and I smiled when Aaron [all student names pseudonyms] popped up with, "Oh, yeah! Miss Susanna showed me the StopMotion app. Look what you can do with it!" These kids, who I thought were highly resistant learners, were reading, writing, speaking, listening, creating, presenting, downloading, and surfing. I smiled as I realized they did not even realize they were learning.

Denise's words demonstrate the motivational nature of iPads to engage learners in creating and pursuing learning directions of interest to them. This teacher, along with four other experienced educators and one professor, co-created a 3-week Literacy Enrichment Camp (LEC) associated with a migrant education summer school program. In this article, we describe the learning environment that we collaborated to create, the particular tensions and successes of using iPads to support student learning, and some of the things that teachers learned about themselves and about their students along the way.

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Background and Context

Educational research has not kept pace with the continuous evolution of technology and prominence of 1:1 technology in the classroom (Murray & Olcese, 2011), promoting questions about the effectiveness of technology like iPads to support student learning (Diemer, Fernandez, & Streepey, 2012). Teachers are challenged not only to keep up with technological advances, but also to incorporate them effectively into their teachings (Attard, 2013; Chou, Block, & Jesness, 2012). The current research involves the exploration of teacher and student use of iPads in an inquiry-based educational setting to contribute to the field's growing understanding at the intersections of teaching, technology, and inquiry-based learning environments.

This study took place in a collaboratively constructed Literacy Enrichment Camp, where teachers used iPads to motivate, to support, and to design learning activities as we followed children's lines of interest. We studied and articulated our own learning within a complex ecology (Deakin Crick, McCombs, Haddon, Broadfoot, & Tew, 2007) of multiple learning priorities, including technology use to support students' literacy learning and inquiry-based learning structures. These concepts often are cited as ideals in education (Borko, 2004; Darling-Hammond & Richardson, 2009; Dewey, 1934; Luna, Botelho, Fontaine, & French, 2004; Short, Harste & Burke, 1995). However, each of them represents significant shifts in thinking and

practice for teachers accustomed to more traditional schooling environments. Accordingly, despite our combined teaching experience of more than 90 years, we embarked on significant learning changes to pursue the integration of iPads in inquiry-based literacy instruction.

Literature Review

Teaching with Technology

Teachers recognize the importance of harnessing technology for purposeful educational experiences (Attard, 2013; Flewitt, Kucirkova, & Messer, 2014). Today's students have grown up in the digital age and rely on computers, video games, cell phones, and digital music players for information and entertainment (Bradford, 2005). In an era where children generally prefer technology-mediated classroom activities over traditional paper-and-pencil methods (Kucirkova, Messer, Sheehy, & Fernandez Panadero, 2014), educational professionals ought to be committed to integrating technology in thoughtful and integrated ways (Mishra & Koehler, 2006).

Many opportunities and constraints related to technology integration exist. Chou et al. (2012) identify how iPads, in particular, have the potential to promote active student engagement, project-based learning, stronger digital literacy skills, and citizenship in digital spaces. iPads promote more student-centered learning (Attard, 2013); when children have iPads in their hands, teachers cede greater levels of control and responsibility to students (Kucirkova et al., 2014). Technology can assist teachers in helping students develop higher order thinking and problem-solving skills through cross-curricular, thematic-based activities (Musselewhite, 2007). Attard (2013) found that the best activities with the iPads were those that required students to solve real-world problems that required students to use multiple apps.

Even with all of the opportunities that iPads offer to enhance the students' learning experiences, there are still many challenges to their use. Useless or ineffective apps and websites can become distractions (Chou et al., 2012) to learning progress, frustrating both teachers and students. Although iPad technology provides new and unique learning opportunities, teachers do not always know how to utilize it effectively (Riddle, 2009). Teachers believe that a lack of time and professional development are major barriers to using technology effectively for meaningful teaching and learning (Attard, 2013), but when teachers do have time to learn about technology and its uses, teachers are better able to address issues that arise in teaching with technology (Diemer et al., 2012). Beyond simply increasing technology use, teachers agree that iPad use ought to be centered around students' active learning, which requires conversations beyond "which app is best?" (Kulowiec, 2013, para.

3). Teachers oriented to these technological realities can more effectively provide technology-mediated learning experiences in their classrooms (Riddle, 2009).

Inquiry-Based Learning

We constructed our own understanding of inquiry-based learning (IBL) in this situated educational space by joining children in the process, guided by key experts such as Mills, O'Keefe, and Jennings (2004) and Short et al. (1995). Educators committed to IBL provide learning experiences that are open-ended, promoting student choice in a collaborative environment. Teachers engage students by helping them pose their own questions and guide their learning to seek answers. IBL provides opportunities to celebrate students' insights and growth, especially when teachers participate as guides and learners alongside their students (Mills et al., 2004; Mills, O'Keefe & Stephens, 1992). Given these foci, IBL is particularly geared toward engaging students in asking questions, debating ideas, making predictions, designing plans and/or experiments, collecting and analyzing data, drawing conclusions, communicating ideas and findings, asking new questions, and creating artifacts (Blumenfeld et al., 1991). Values consistent with IBL include creating a high-performance learning environment with real-life contexts and technology (Boss, 2012).

Purpose Statement and Research Question

Although iPads are increasingly popular in learning environments, it is not presently well-understood how iPads increase student learning or engagement (Diemer et al., 2012), or how teachers develop new skills required to teach effectively with iPads (Berson, Berson & Manfra, 2012). Thus, the current research study reflects a response to calls for better understanding of how teachers develop new skills in teaching with technology, especially *reluctant* teachers (Beschorner & Hutchison, 2013). Specifically, this study was designed to inquire into our own experiences and insights regarding the use of iPads for educational purposes. The question that drove our inquiry was: *What does the use of iPads in an inquiry-based educational setting reveal to teachers about themselves and their students?* This research question led us to observe what students did with iPads and to identify the benefits/drawbacks of iPads in inquiry-based tasks. Additionally, we sought to identify our own tensions and successes with using iPads, believing that as reflective teachers, we had a responsibility to pursue our own learning alongside students.

Method

Teacher Action Research

This qualitative case study was informed by ideals in teacher-based action research put forth by Cochran-Smith and Lytle (1999, 2009), Goswami,

Lewis, Rutherford, and Waff (2009), and Herr and Anderson (2005). Students' interest in iPads crystallized our research questions and allowed us to *follow* where students were highly engaged. Our question led us not only to observe and to document what we as teachers did with iPads during camp, but to observe and to ask students about their perspectives related to using iPads for learning. We also recognized the need to reflect on our own attitudes and tensions towards technology use. In further discussing our methods, we first present the context for our work with children and our own research.

Educational Context: Migrant Education Program

The present research study took place in a partnership between a private liberal arts university and a local public school district. The school district offers a Migrant Education Summer Program (MESP) that was established to provide academic enrichment for preschool to 21-year-old students who have not yet graduated from high school or earned a General Educational Development (GED). MESP was created for low-income migrant children and for students not making annual yearly progress (AYP) on Oregon's state assessment, the Oregon Assessment of Knowledge and Skills (OAKS). MESP is staffed with certified teachers, high school student interns, bilingual educational assistants, and certified teachers from Mexico, who travel to Oregon specifically to provide enrichment activities for migrant students in their home language, primarily Spanish.

MESP is funded with Title I and Title IV monies, and provides breakfast, lunches, snacks, and transportation to and from summer school. The morning academic activities consisted of structured lessons in reading, writing, and mathematics. The afternoon sessions provided extracurricular activities and cultural enrichment programs for the migrant students. In 2012, MESP enrolled approximately 200 students for their 6-week program. In 2013, 307 students were enrolled in a 5-week program, with an average attendance of 197 students. Every student in attendance received free and reduced-price lunches.

Educational Context: Literacy Enrichment Camp

Literacy Enrichment Camp took place for 2 hours in the afternoon following the daily academic portion of summer school, which took place for approximately 4 hours in the mornings. As teachers interested in creating an invitational and creative learning space, we focused on establishing inquiry as a learning priority, following children's lines of interests, and supporting student learning with iPads. Throughout the first week of camp, children worked in whole-group contexts as we got to know them and built community. During the second and

third weeks, we grouped students by similar interests with two teachers leading each group. We found that our students looked forward to coming to camp; some even arrived half an hour early each day to interact with teachers and to have additional exploration time.

The general structure of the 2-hour camp opened with 20 minutes of exploration time during which children played board games, experimented with art mediums, and interacted informally with teachers. We often gathered everyone for a brief morning meeting before splitting into inquiry groups, where teacher teams worked with students on inquiry projects. Students' inquiries were diverse, including such topics as castles and medieval times, country studies, plants/animal studies, dance/drama productions, cake-decorating and comic creations. Each camp session concluded with a time for a few students to present something that they learned or created that day. Occasionally, we built community by concluding with whole-group music and rhythm activities. Because of our commitment to an inquiry-based approach, we flexed each day within this general structure to meet students' needs.

Participants

Participants for this research had overlapping roles and responsibilities. A group of nine in-service educators taught 17 children in the LEC. Five of the in-service teachers and one professor collaboratively authored this article about the experiences of teaching and learning with iPads. We collected and analyzed data on teacher and student learning with iPads and provide further background on who we are in Table 1.

Ten girls and seven boys, 7-12 years of age, participated in camp. Children were invited to participate in LEC if they were attending MESP summer school in the mornings. Race and ethnicity information was not provided to us by families or the district, but the majority of students who attended LEC were of a low socioeconomic status with high academic need, as indicated by their invitation to participate in MESP. All names of children are pseudonyms. Because our research question focused on teacher insights into their own learning, we did not count children as participants in this research, although we did receive Institutional Review Board (IRB) and parental approval to write about children's words and work. This sample represents a critical case sampling and convenience sampling method (Onwuegbuzie & Collins 2007) of teacher and student participants within the LEC: critical case sampling because the LEC was a unique learning environment in which to study closely the phenomenon of interest and convenience sampling because teachers participated in LEC based on university course requirements.

Table 1

Teacher-Researchers Involved in this Project

Teachers	Background & Values
Kathy	I have taught primary grade elementary students for more than 30 years in a rural public school in central Oregon. I joined this research endeavor because collaborative research appealed to me. This project enabled me to do research with educators who had a passion for students and learning. My core educational value centers on the belief that all children can become life-long learners.
Denise	I have 23 years of teaching experience across first, fourth, and sixth grades in parochial schools in Florida and Oregon. I enrolled in this course to actively collaborate and learn from other professionals. I also wanted to work with a sensitive, experienced professor who empowered me to create a “better version” of myself.
Kristin	I have been a substitute teacher in various positions for the past three years. As a teacher, my hope is to ignite a passion for learning in my students like my own teachers once did for me. Every child is unique and has something of value to offer a learning community.
Vicki	Over the past 17 years, my teaching experience has encompassed Bilingual Reading Specialist positions, self-contained classrooms, and Spanish language teaching. I have been very excited to learn about what is available on the iPad and how to use it so I can use it as a resource in my classroom.
Karin	I have taught elementary students in both public and private schools across multiple grades and states for 12 years. I am passionate about children and literacy and love to excite my students for learning. I want my students to know that all of them are unique, incredible, and loved. I want to make learning fun and inspire a love for learning that will last a lifetime.
Susanna	My teaching experience over the past 13 years includes six years in international and public school elementary classrooms and seven years in university settings. I am most passionate about creating learning experiences like this one, where collaborative efforts to construct an understanding of how learning works are enthusiastically undertaken by children, teachers, and researchers.

Data Collection

Data collection methods for this qualitative case study can be broadly described as representing ethnographic fieldwork (van der Waal, 2009). Our data included formal and informal interviews with teachers and students, field-note observations of camp, and teachers’ memos/reflection journals. A combination of these methods was used to generate data about what teachers learned about themselves and their students as they observed the use of iPads in this IBL environment. We organized these data in a collaborative Google Site and Google Drive folder to support multiple researchers contributing to and writing the study.

Interviews. Teachers generated interview questions and interviewed one another during the

second week of camp, recording and transcribing interviews. These teachers then conducted a member check of their own interview transcripts at the end of camp, clarifying and elaborating on their original statements. This interview and elaboration process provided ongoing data generation and analysis of what teachers were experiencing as they taught and learned (Shagoury & Power, 2012). Teachers informally interviewed children, transcribing or taking anecdotal notes on student interviews via a collaborative Google Doc. These data were further analyzed at the end of camp to promote teacher reflection on learning related to iPads. Interview questions for teachers and students are contained in Table 2.

CHANGING TEACHERS, CHANGING STUDENTS: EXPLORING IPADS IN INQUIRY-BASED LEARNING

Table 2

Interview Questions for Teachers and Students

Interview Questions

Teachers:

- What's the biggest challenge/hurdle for you with iPads so far?
- Do you own/use an iPad...own familiarity with the devices? Have you had outside training? What's your level of comfort with them?
- What are the advantages to using iPads that you have noticed so far?
- How much reading do you do out of books and how much off devices like the iPad?
- Why do I want to go back to what is comfortable but not necessarily beneficial?
- When you first heard that we would use iPads in camp, what was your unedited thought?
- How much experience have you had with using iPads in instruction?
- Do you own/use an iPad regularly?
- What are your feelings about using iPads for educational purposes?
- What has been frustrating to you about the iPads so far?
- What has been good/exciting/fun about the iPads so far?

Students:

- What about the iPad makes learning fun for you?
- Do you think that you are becoming smarter as a result of using the iPad?
- How can we explore the iPad together so that other teachers might want to use iPads in school?
- What would you like to learn how to do on the iPad?
- Do you have any questions about the iPad or any of the apps?
- Tell me about why you are so excited about the iPad when you maybe don't even know how to use it?
- Tell me about your experience with iPads. Do you have one/use one at home? At school?
- Are you excited about using iPads? Why?
- What's your favorite thing to do with the iPad?
- How does the iPad help you learn?

Field Note Observations. All teachers collected field notes on student and teacher interactions with iPads during the study. Notes were collected in both anecdotal *kidwatching* formats (Owocki & Goodman, 2002) such as sticky-notes, photographs of student work/thinking, and observations in reflection journals. Additionally, we collected notes using a formal observation tool adapted from Hubbard and Power (1993), using the three following prompts: (a) What do I see/hear? (b) What do I think is happening? and (c) Emerging themes.

This common field note format supported our commitment to distinguishing between observation and interpretation, as teachers learned how to identify and to question their assumptions. Our field notes also supported the ongoing design of camp structure and activities, enabling us to inform our research design and direction by staying aware of what children were doing each day. Field notes lent themselves to iterative data collection and analysis (Huberman & Miles, 1994), as those teachers responsible to collect field notes reviewed them for clarity at the end of each day, added interpretive and thematic comments, then shared them via common Google Docs for comprehensive analysis at the conclusion of camp. Because teachers were learning how to conduct action research within the course, the professor took primary responsibility for field

notes across the entire 3-week camp, with teachers providing secondary field notes in Weeks 2 and 3, for a total of approximately 45 field note entries over the 3-week period.

Teacher Reflections and Research Memos.

The final element of data collection was teachers' reflections and research memos, which provided an opportunity for writing-as-thinking work (Creswell, 2012) about what teachers were noticing and working to understand. Teachers made a minimum of two reflection entries per week for a total of 36 reflection entries across all teacher participants. Research memos were a tool for both data collection and analysis because they served as an iterative reflection tool in which to *try out* statements of fact based on our data, and to construct understanding individually within a memo before sharing it with others (Glaser, 1965).

Data Analysis

Our data analysis followed two major tracks: iterative analysis (Huberman & Miles, 1994), which occurred as we taught and learned with the larger group of teachers and children, and deductive analysis through the constant comparative method (Auerbach & Silverstein, 2003; Glaser, 1965; Leech & Onwuegbuzie, 2007), which occurred within our author group at the conclusion of camp. We iteratively made sense of what was happening for teachers and children as teachers debriefed at the

end of each day's camp session. These daily 30-minute conversations were recorded as field notes but comprised a reflective space in which teachers could articulate what was happening and build significance through conversation. Data collection around field notes and reflexive journals were particularly oriented to *analysis thinking* (Creswell, 2012), because they required us to distinguish between observation and the ongoing interpretation work that informed adjustments to our teaching. We also wrote memos as part of our analysis work during this time to unpack emerging themes and to test their importance to each of us personally before sharing them with the group (Shagoury & Power, 2012). During this phase of analysis, it became clear that iPads were a significant factor in students' motivation and desire to come to camp, which confirmed our research direction. As noted by van der Waal (2009), this questioning and confirmation process turned out to be a critically important element of our qualitative research study.

Our goal in using the constant comparative method was to generate themes evident across all data sources, a method that is appropriate for any textual data (Leech & Onwuegbuzie, 2007). We began the analysis spiral (Creswell, 2012) by compiling all data into files and reading everything in the entire data corpus (Erickson, 1986). Then, with the research question in front of us, we found the first section of data representing a single idea. For example, the first few sentences of one teacher's memo was as follows:

I was thinking about how I felt when I was trying to figure out the app Toontastic when we were all together. I was frustrated and I could see how the kids weren't giving up even though it took them a lot of work to figure it out too. I was wondering if it was worth it to use the program at all, especially when I saw that there are so many things that you have to buy.

As a group, we discussed the text and decided what to call it, labeling it as a representation of "Teacher Reluctance about iPads/Buy-in." Then, we read through the remainder of the data, seeking any other pieces of data that represented the same idea. We cut and pasted those ideas into a spreadsheet with a label representing the *repeating idea* (Auerbach & Silverstein, 2003). We continued this process until all data had been reviewed for any other examples of "Teacher Reluctance" before moving to the next idea in the data, labeling it, and working through the data corpus looking for examples of it.

We determined what to label all repeating ideas as a group, and as we each read through various parts of the data corpus, we stopped to reach consensus when we had questions about a piece of data representing one or more repeating idea categories. A list of our repeating ideas from the first pass through the data is contained in Table 3.

We created a master list of repeating ideas and combined them into categories according to weight and warrant of data (Auerbach & Silverstein, 2003). We tested meaning conversationally (Shagoury & Power, 2012), working together to decide which repeating ideas belonged together in categories, and which categories hung together into articulated themes (Glaser, 1965). Within these conversations, we tested meaning through comparisons of data categories, rereading and creating memos, describing and interpreting our data, and representing it by writing about the themes (Creswell, 2012).

The responsibility and grounds for creation of codes, categories, and themes resided with us as participants (Constas, 1992) in this teacher-based research. We created the names of the repeating ideas and categories through analysis conversations after camp was concluded and did not use any qualitative software to generate these codes and categories, other than word processing and spreadsheet features in GoogleDrive. The repeating ideas were combined into several themes that were strongly represented within the data. These included teacher tensions with unfamiliar ways of teaching and learning, teacher frustrations with technology, shifts in teachers' identity as they worked with technology, noticeable role-reversals between teachers and children, and various ways that the iPad unexpectedly supported student learning, which are explicated in the next section.

Results and Discussion

We present findings for this research in accordance with our research question: *What does the use of iPads in an inquiry-based educational setting reveal to teachers about themselves and their students?* First, we discuss the challenges with technology and issues that we identified within ourselves, as we taught and learned with iPads in this unique learning environment. Then, we discuss the various role reversals that transpired among students and teachers over the course of the study. Finally, we share the new knowledge that we gained as we observed many of the benefits of children using iPads in this educational setting.

Table 3

List of Repeating Ideas
Teacher reluctance/lack of buy-in with iPads
Teacher lack of knowledge/skills/commitment to iPads
Kids are drawn to iPads/motivated by them
Stamina/lack of stamina with iPads
Choices students/teachers made with iPads
Learning styles evident with iPads
Kids teach teachers about iPads
iPads changed our assumptions/judgments about kids
Questions teachers ask (about iPads, about learning with iPads)
Collaboration with/through iPads
Active Engagement with iPads
“Leveling the playing field” for students with needs
iPad enables differentiation
Composing/Publishing/Audience
Kids teach themselves/self-driven learning
iPads preferred to reading or writing
Frustration with apps

Things We Noticed About Ourselves as Teachers

As we worked on this research, we found that it was of critical importance to be reflective about our beliefs and biases, and to be open to changes in our own thinking about technology use in education. Across field notes, teacher interviews, and reflection journals, our data revealed three recurring themes that we discuss in relation to our own learning: (a) tensions with unfamiliar ways of teaching and learning, (b) frustrations with technology, and (c) identity issues around teaching and learning with iPads. These issues serve not only as explanations of our own experience, but also describe possible barriers for other teachers who seek to incorporate technology into their teachings.

Tensions with unfamiliar ways of teaching and learning. Although those in our profession readily embrace the values of being a lifelong learner and staying committed to ongoing professional development, many teachers will admit that it is difficult to perform new and unfamiliar tasks (Demetriadis et al., 2003; Margolis & Nagel, 2006). There were many ways in which we as teachers had to examine our feelings about technology use for this camp experience, so that we could teach collaboratively, design IBL, and use iPads effectively to support student learning. We negotiated these perceptions and preferences through a great deal of meaningful conversation, observation, and reflective journaling. Further, we observed that our discomfort with the unfamiliar, including methods of inquiry and our unique camp environment, were a major part of our experience. Also, we recognized that as educators what we feel comfortable with and confident in doing often strongly determines what students experience in the classroom.

Our daily conversations, reflective journals,

and observations of what was happening with children indicated our own shifts in attitudes and the easing of tensions that, in the beginning, had many of us feeling unsure about the use of iPads. At first we had to push regularly against the notion that we should be the experts in the classroom. Because many of us were learning to use iPads and apps with which we were totally unfamiliar, we were regularly thrust into situations where we were not the experts; our students often taught us how to use the iPad. The children usually knew more than we did about particular apps or how the devices functioned, and they were less afraid of learning by experimentation.

As Vicki expressed,

I was thinking about how I felt when I was trying to figure out the app *Toontastic* when we were all together. I was frustrated and I could see how the kids weren't giving up even though it took them a lot of work to figure it out, too.

Experiences like these were tempting reasons to pull back from what was new, but it also reminded us of what we regularly ask students to do: attempt new things.

One of our first experiences with allowing students to use iPads confirmed concerns about how best to monitor content with technology use. As Susanna delineated the guidelines for using iPads on the first day of camp, one child raised her hand and asked if they could go on *YouTube*. Susanna, believing this would be a good opportunity for us to see in what children were interested, stated that they could, and all of the students became very excited. But we learned that even with our high student-teacher ratio, we could not monitor content on *YouTube*. Different teachers also had contrasting ideas of what was appropriate. Most of us were troubled with the videos that some children started

watching; therefore, after reflecting about events that first day, we chose to limit student use of iPads the next day. As one teacher expressed, “it was as if we were opening a can of worms and were not sure what to do with them, so we shoved them back into the can!” Although we experienced a profitable day of writing sans iPads, many of the students asked about whether we could use the devices. We did not let students use iPads that day, but recognized that if we were committed to following students’ interests, we needed to overcome our reticence. We adjusted our directions and groupings to ensure that children

stayed on content-appropriate sites, and began a dialogue with students about what was appropriate for camp.

Technology frustrations. We were thankful to borrow an iPad cart from the local school district with which we were working; however, the logistics of borrowing a cart dictated that we could only download and use free apps. A brief description of some free apps that we found to be useful for inquiry-based research, curation, and presentations is located in Table 4.

Table 4

Free Educational iPad apps

App	Purpose/Usefulness
MyOn	Provides licensed access to thousands of fiction and nonfiction eBooks at a variety of reading levels. Most books are audio-supported, which assisted our auditory learners.
ShowMe	Allows students to compose and to retell stories. Teachers and children used it as a written conversational tool.
Toontastic	Enables users to create their own cartoons using prefabricated templates and characters, which allowed them to manipulate characters, to record voices and sound effects, and to practice storytelling structures. This was the most popular app among children attending camp.
HaikuDeck	Provides a simple PowerPoint interface. It allows children to download pictures, videos, and music clips; to type; and to create presentations.
Corkulous	Invites users to display outlines, pictures, videos, and captions for storytelling on a virtual corkboard. Children created presentations on various topics, retold stories, and illustrated poetry.
StopMotion	Allows for quick, successive picture-taking with immediate playback. Students documented a process and created animated products of their learning.
National Geographic	Provides a research tool on a variety of topics. Accompanying knowledge quizzes allow students to check their understanding and to compete with other users from around the world.
Sushi Monster & Lobster Dive	Review and quiz mathematical knowledge, including fact families and various mathematical operations. Children enjoyed taking a “brain break” from their composing/research works to practice mathematics facts.
Educreations	Allows users to demonstrate their learning with whiteboard features, recording capabilities, and various other presentation features.
GeoQuiz	Reviews geography facts and locations, by allowing users to drag and to drop country outlines onto the globe.
BrainPop	Presents short educational videos on a variety of topics. Some videos have quizzes to help users review information. Students enjoyed watching videos and answering questions.
Your World	Allows users to explore features of different countries and understand where they belong on the map. Students used this app to gain country information.

Although we were glad to find and to use free apps, they had many drawbacks. Almost all the free apps only allowed users to reach a certain point in a program or game before requiring in-app purchases to go further. Teachers and children spent considerable time in figuring out these features and finding work-arounds when an app would not allow a student to realize his/her full vision of a project. It was frustrating to see students get excited about an app only to be disappointed when they could not take it any further because the app required payment. The logistics of iPad use caused additional frustrations, including finding headphones, dealing with frozen/slow apps, and locating and downloading apps that were appropriate for our particular students.

Identity issues and Technology. Teachers' identities were under construction in the context of using iPads for learning and teaching. One key theme in our conversation was our tension due to the fact that we were not experts with iPads, necessitating that we reacquaint ourselves with feelings of *not knowing* in the middle of our work with children. Our reflective journals indicated that some of us did not feel *sold* on the iPads, preferring more familiar ways of teaching with laptops or books. These tensions were issues that we negotiated both publically and privately, which required us to build a trusting classroom community for ourselves where we could share and debrief. Our daily conversations and observations of what was happening with children indicated our own shifts in attitude and the easing of tensions that had many of us feeling unsure about the use of iPads, as indicated by Kristin's reflection:

I grew up with technology surrounding me, and I love it! Technology provides entertainment, saves time, and provides answers to questions in an instant. Through this experience, I was surprised to learn how resistant I am to using it in educating students, however, I have seen so many people from my generation become addicted to technology and allow it to control their lives. Even with good intentions and guidelines, it is so simple for students to come across inappropriate content. I want to be able to keep my students safe and protect them from the negatives that technology can bring, which is one of the reasons I am so hesitant in allowing my students to use it.

Kristin's words demonstrate some of the internal struggles that we encountered. We were surprised to learn how our own prior experiences with technology created feelings of reluctance about using iPads with children. iPads were first released in 2010 (Kucirkova et al., 2014), a learning tool that none of us experienced as children. We reflected on

the societal and family messages that were part of our upbringing and how they shaped our beliefs about technology. For instance, did we really believe that technology would *rot children's brains and turn them off books*, as one of us jokingly expressed during a debriefing conversation? Our preconceived beliefs about technology impacted our teaching ideas. As reading teachers, we readily acknowledged that most of us were more comfortable teaching with books than with iPads. We had to identify and to reflect on these issues in order to have any hope of challenging or changing our feelings about using iPads to teach and to learn.

As already stated, most of us felt unprepared to use iPads with students, but we were compelled by students' interest in them. Most of us were novices with iPads; some of us did not want to admit it. Only two of our group owned iPads, and had used them in their personal lives, not for educational purposes. As Karin wrote, "I have had my iPad for 6 months, so it is still pretty new, and I don't have a lot of time to just play on it like I should." And even when teachers had access to iPads, playing with them to learn did not come easily. Denise's comment, "I have never used them before and I'm not a very techy person," was evidence of concern that we did not know enough or would not be able to learn quickly enough to use them effectively with children.

Transparency was required to identify the tensions and inadequacies that we felt as teachers responsible for children in both camp and our graduate-level class. We had to admit our lack of experience with technology in education and to discuss those tensions openly with our colleagues. We believed the risk was worthwhile. Too often, the tensions in teaching are glossed over or left unaddressed (Zeichner, 1991). We hope to encourage educators to take risks and to grow, especially with using technology in the classroom because technology motivates and opens doors for students.

Big changes: teachers enlightened. The process of writing this article has pointed out how significantly many of us have shifted our thinking about the benefits of iPads and our capabilities as teachers. Kathy's words illustrate how her commitment to following students' interests forced her out of her comfort zone:

My second-grade students know me as a person who is passionate about books. So in the early days of camp, my colleagues noticed the ways I was almost unconsciously trying to sway students away from using iPads to look at books for information. I remember one student in particular was very polite; she would read a few pages of whatever amazing book I handed her, but as soon as I turned

around to pull another book, she was back to the iPad. We laughed about it later; I had to acknowledge how much more comfortable I was with books. But the joke now is that I'm the teacher with the iPad cart in my second-grade classroom! I am passionate about capitalizing on my students' love for technology and I am committed to learning and growing, even as I approach the end of my teaching career.

Kathy's words demonstrate how, despite the tensions and reluctance about the use of iPads, teachers made considerable attitudinal shifts over the course of the summer experience.

Vicki stated in one of her reflections,

It has been really fun to learn some of the apps and see how to do different things with them. I was at first a little opposed to young kids using technology because I felt like it might not be as creative. I saw the kids using pictures off the Internet instead of spending time drawing their own pictures. This bothered me, but I'm feeling differently about it now.

Once teachers started observing how excited the kids were about learning on the iPads, teacher comments conveyed their enthusiasm over iPads, "One day later, and I am amazed at how much Aaron and Zoey learned today while using their iPads." Kathy noticed how engaged students were in listening to stories on the iPads:

They both were so engrossed in their stories and learning. Both of these kids have great minds, but neither of them wants to read a book or write. There's the advantage of being able to listen to information for those students who aren't as good at reading.

Near the end of camp, both teachers and students were enthusiastically engaged in completing and sharing projects on the iPads and celebrating student successes. As Susanna noted in her field notes during the final week of camp,

We had five kids want to share at the end of camp today: Maurice shared a *Corkulous* that she made about her favorite poem. Carter shared a *ToonTastic* that he created today that had about six scenes. Katie shared her *HaikuDeck* today, but worried that she won't have something more to share on Friday. Denise helped her put the words to the life cycle of tulips. Kids' enthusiasm to share is catching!

Not only did our attitudes and beliefs about iPads shift by the end of camp, but we also had more positive feelings about using iPads with students. The process of examining our data and finding the themes for writing this article has underscored both the power of iPads as a key learning tool and the necessity of teachers *leaning into the discomfort* of learning and using them.

In explaining the elements that we noticed for

ourselves as teachers, we highlighted many of the more difficult aspects of this work. Before we explain the features that we noticed about the children, we want to discuss something that we found meaningful about the power of iPads. They challenged existing schooling patterns, deep patterns that are not often examined. We saw evidence of major role reversals between the teachers and the children as we used iPads.

Role Reversals

In the following field note excerpt, Susanna noted one of the key role reversals that took place between students and teachers:

I see teachers learning right alongside kids, in the moment of need. This work of figuring out something because you have an urgent/immediate need to solve a problem or figure out the next scene of a story or teach a student something is very powerful, and it's happening multiple times a day in this setting, for both kids and teachers. Teachers are making their own *Toontastic* comics so they can experience and understand what kids are trying to do. Kids are leading us at every turn and teachers have to step out of their normal roles. It's so uncomfortable for all of us, but look at what we're learning!

The iPads played a key part in this role-reversal process; from the beginning, students were motivated to use the iPads independently whenever they had a chance. There were many teacher-directed activities in the first days of camp, but as time went on, students were fully engaged in teaching each other while teachers were sitting back more and learning from students. Students helped teachers understand the apps; Vicki, who started out feeling quite frustrated with the iPads on the first days wrote,

I am enjoying learning from the kids. They love being the expert too. I now know more of what I would do with iPads in my classroom if I could get a set. That just may be my next venture: to find a way to get iPads for my classroom.

Once the students had some time to share with other students the animated cartoons and presentations that they created on various apps, there was a snowball effect. Students pulled away from the teacher-directed activities and decided to work on an app after learning about it from another student. Early in the second week, Brandon demonstrated how he had made an animated cartoon on *Toontastic*. The next day, we noted that Carolina had moved off by herself to create her own *Toontastic* cartoon so she could teach her group on the following day. Our field notes and debriefing conversations noted shifts in the learning atmosphere at this point in camp: it became very relaxed, joyful, and productive. As time passed, there were groups of students and individuals who

were busy all over the room. The teachers were doing less directing and more sitting side-by-side with one or two students watching their work and occasioning guiding when students needed it.

Students were very excited to teach the class at the end of each day by showing other students what they had created. Many students who did not want to share at first ended up changing their minds and sharing with everyone. We also saw shifts in students' willingness to teach others. The first time we took out the iPads, the students were engrossed in using them on their own and did not take much time to help each other. Some of the children had little experience with the devices, but we noticed that when they asked other students how to use them, they were too busy to stop and to respond. As time passed, a collegial and supportive spirit emerged; as students' own confidence levels increased, they were more patient and willing to help others. Towards the end of camp, some of the students working with Kathy decided to play on the *Uno* app together. It took some time for her to figure out how to play, but Sarah and Jorge were very patient with her and showed her step-by-step what to do.

We witnessed other role reversals as students behaved differently from the beginning of camp to the end. We saw quiet students open up and students who liked to tease and to display task-avoidance behaviors became more focused learners. One example of this type of transformation was Maria, a quiet student who offered to help Carter when he became frustrated with *HaikuDeck*. It was one of the first times we noticed that she initiated conversation with any of the students in the group. Another student demonstrated on the first day that she was willing to be our self-designated class clown. Over the following weeks, we saw her become an attentive observer as other students demonstrated their works on the iPads. She was also able to participate in several choreography projects that required her cooperation with other students. Approximately halfway through camp, Susanna sat down on the floor to visit with this student and to capture what she was undertaking on video. She glanced up and said, "I'm a little busy right now." It was delightful to see her so absorbed in her work that she did not want to show-off for the camera, as per normal.

These shifts in student behavior and learning were evident as role reversals to us, because we feel certain that using iPads in an inquiry-based environment gave students not only the opportunity to teach their teachers, but also to cultivate initiative and perseverance in learning about aspects that interested them. For some of our students, being the expert built up their confidence and sparked a change in their general reluctance toward learning.

Things We Noticed About Children

The use of iPads in this inquiry-based camp

gave us an opportunity to notice things about children that we do not believe we would have seen or understood under other circumstances. iPads were key to the learning environment and enabled us to understand (a) iPads as a tool for seeing students as individual learners with unique needs, (b) iPads as a means to promoting children's engagement to learn, and (c) the role that iPads played in students' self-perceptions as learners.

Children as individual learners with unique needs. Although most teachers are swift to acknowledge the unique personality, strengths, and needs of each student, we were surprised to note that closely observing how students used iPads gave us additional insight into what students knew and needed. Karin's words illustrate how powerfully this theme emerged for her:

Change and challenge are the words that come to mind when I consider the group I worked with through camp. The one consistent theme with my group of students was action and creativity. I have never been more challenged as a teacher as my students led our learning every day. I envied the groups that worked on one theme for days, but I found that iPads made individual learning possible and actually spurred ideas for students to make additional creations. The iPad allowed my struggling readers to work privately in ways that met their individual and unique needs. Watching my very diverse group, all with various reading abilities, feel successful after creating and working on the iPad, I became excited for the opportunities that iPads made possible. I believe my students left camp feeling and believing they were smarter and more successful as learners as a result of learning with the iPad. Witnessing the growth and excitement for learning in each of my camp students has made me a firm believer in the importance of iPads in the classroom, especially as a tool for differentiation.

Karin's experience with her group is a wonderful synthesis of how we perceive that iPads in the classroom can assist a teacher in meeting the individual needs of each student. As we watched children use iPads, we were better able to see each child as a unique individual with different interests, abilities, and learning styles. These interactions often enabled us to see students in a different light. For example, we observed Aaron listening to a story on the iPad while looking around the classroom, not following the text on the screen. When a teacher checked in with him to see how much he was understanding, Aaron explained what he was learning with great accuracy. This exchange surprised us because we recognized how easy it would have been for us to perceive Aaron as off-task and not learning. The use of the iPad in this situation revealed that Aaron was an auditory learner who

was absorbing everything that was read aloud to him. This was also true for Zoey, a student who had difficulty focusing. She did not want to look through traditional books; however, she found that she enjoyed listening to a book on the iPad as she followed along. Even though the content of the book on the iPad was similar to the traditional book, Zoey became fully engaged with the iPad text because of the difference in format that met her particular needs.

Anna was a very active learner and needed things constantly to change in her learning environment. She had a difficult time making up her mind about what project she wanted to work on and had difficulty focusing on one project for more than a few minutes at a time. We perceived that she would possibly be the student who would be in *trouble* on a regular basis in a regular classroom for not staying focused or doing what was expected of her. Allowing Anna to use the iPad informed us about her need for constant change and allowed her to be engaged in learning in a way that met her specific needs. The iPad focused her attention on one thing at a time, provided a more tactile format for her learning, and gave her the freedom to switch back and forth between different apps when she needed a change. These are just a few examples of how we found the iPad to be a valuable tool that enabled us to learn more about students on an individual level in order to meet their unique learning needs.

Anna and other children in the camp were able to use the iPads to learn through the various multiple intelligences (Gardner, 2011). She participated in bodily kinesthetic and musical dance activities that were recorded on the iPad. Auditory learners used the *MyOn* app to listen to fiction and nonfiction text that were more difficult than they could read on their own. For the interactive (kinesthetic) learners, the use of iPads enabled the students to use music and interpersonal skills to interact, to move, to learn, to collaborate, to direct, and to present short stories, dance acts, and reports. For instance, we noticed that Anna, Carolina, and Lisbeth connected movement to language. Teachers used iPads to record the dances that they had choreographed so that they could share it with other students. One student who did not want to participate in the dancing was free to work by herself on creating a cartoon (verbal linguistic, visual spatial) to present to her classmates.

Each teacher group approached inquiry and guided iPad use differently in order to accommodate individual needs of students and their groups. For example, in another group taught by Vicki, students explored story structure together using ToonTastic, while Denise's and Kristin's teaching team worked on individual projects of interest. The combination of iPads and choice-based inquiry enabled us to recognize students' individual needs and to make accommodations for each student. The use of iPads

allowed for differentiated instruction based on each child's interests and needs in order to *level the playing field* and to meet students' needs.

iPads as a means of promoting children's engagement in learning. We all noticed how excited students were for screentime, and how learning did not appear to be as difficult, when children could do it with an iPad. As Denise wrote, I amazed at how much Aaron and Zoey learned today while using their iPads. They both were so engrossed in their stories and learning. Both of these kids have great minds, but they do not want to read a book or write. Listening to the information on the iPad and typing it or displaying it in a visual manner engages them in learning.

Denise's reflection demonstrates how we noticed that iPads made it easier for students to perform the literacy tasks that they might have otherwise resisted. On the first day of camp, Jorge was highly reluctant to put pencil to paper. Writing was difficult for him. Given the opportunity to write on the iPad, however, he was ready. Kathy noted in her reflection journal that Jorge wanted to use the iPad to compose his script on the retelling of "The Three Little Pigs." She gave him permission to work alone, but checked back with him because she thought he might wander off into a game app that he had previously discovered. He stayed focused on his work and, as another teacher noted, "Jorge was beaming at what he had accomplished with his script."

Student engagement has been described as how involved students are in the learning process (Axelson & Flick, 2011). According to Delisle (2012), the five C's of student engagement are: control, complexity, common bonds, choice, and caring teachers. We believe that the five C's were all in place during this camp. But as teachers turned the learning over to the students, allowing student interests to determine learning directions, iPads became an effective avenue to pursuing many different topics. Students chose to study various topics such as dance, cake decorating, Russia, and castles. Some students changed topics daily and others stayed with a topic for the entire 3 weeks. iPads gave students the power of choice and the ability to study the aspects that interested them regardless of their learning levels and skills. As Gonzalo, one of our more reluctant writers explained to us, "iPads made camp not like regular school."

From the beginning of camp, we talked about how we would *know* if children were engaged in learning, using our collective sense as experienced teachers constantly to check our hunches that students were more engaged in learning with iPads. We found that we could discern at a glance whether a child was engaged in what they were doing because of their body language. Children leaning

over a screen or collaborating on a project were engaged. Allowing our students to make choices on the iPad engaged them in learning; we started to see students *lean in* to their work everywhere. Katie, a very shy and reluctant learner told us one day, “I wanted to learn about tulips because I didn’t know much about them.” After researching about tulips, Katie created a *Haiku Deck* about tulips that she presented to the camp. She taught all of us information about bulbs and tulip growth later that week, and sat down smiling when the whole camp clapped enthusiastically for what we had learned at her direction.

With minimal direction from us, we watched as students used iPads to write poems, to create cartoons, to read, to research, to make movies, and to create books. Data from field notes consistently revealed that students were involved with their iPads, engaging in individualized and different projects. On one day, our field notes evidenced the following activities taking place: Brandon worked with play dough creating his own *Stopmotion* short video, Maurice wrote a poem and then designed a *Corkulous* to publish her writing, and Sam built a *Haiku Deck* about himself. At one point, Brandon was so involved with *Your World* that when Vicki tried to give him a few suggestions, he “was too absorbed in what he was doing to answer me,” she noted. Our students became more and more confident on the iPads leading them to connect apps and transfer learning to other areas. Overall, our students were engaged in learning activities because of the iPad.

The iPad’s role in students’ self-perceptions as learners. Students experienced enthusiasm and success with the iPads and, as a result, their self-perceptions began to change. This was most evident in the informal interviews that we conducted with children towards the end of camp. Anna told us, “I am getting smarter because of the iPad.” Jorge told us, “When I have questions, I answer them. I just went to places (on the iPad) and it just happened!” Sam said, “It [the iPad] helps me with stuff I didn’t know and some things I need help with.” We found that students’ excitement about the technology and enthusiasm about their inquiry topics made it possible for subtle shifts in their levels of confidence and self-perceptions.

As teacher observers, we noted that many of our students did not like to read or to write because they found these activities to be boring and difficult; yet, by their own choice, they readily undertook literacy work on the iPad. One day, we noticed Maria listening to a book of poetry before turning off the sound and attempting to read the book by herself. After listening to a few books by the same author, Maria made a discovery, “Authors write about things they like!”

Surprisingly, reading and writing on iPads felt much different to students than did traditional

methods. We believe that this was due in part to the fact that iPads enabled each student’s work to be private, and it allowed for teachers to modify content to enable a student to progress at his or her level, without students being classified into a specific group. According to Nomi (2009), “selective ability groups may create more unequal distributions of opportunities to learn” (p. 60). Children hold many intellectual gifts that might go unrecognized when they are ability-grouped. It was for this reason that we were purposeful about grouping children by interest and diversity of ability, so that they could teach and learn from one another. iPads supported this diversity and provided opportunities for students to explore their potential in new and interesting ways.

All students should be challenged, regardless of ability, to be sophisticated thinkers, active participants, and independent learners in an engaging learning environment (Worthy, 2010). We observed that iPads empowered struggling readers and writers by providing individualized, private accommodations. Private, one-on-one, differentiated learning was possible with iPads, creating success for all students. It is no wonder that we had students who did not want camp to end and who really believed that they were smarter as a result of the iPads. We find this outcome to be significant; children started to shift their self-perceptions as learners away from what they found difficult to what was easy.

Summary and Conclusions

From the beginning, this study was a collaborative effort to create an IBL environment, with the option of using iPads to support learning. We experienced much uncertainty about what this would look like in a camp setting—we were building it from the ground up. The voluntary nature of camp attendance for children had us wondering how we would engage them in a way that would encourage them to want to come back. The iPad cart in the corner was a major reason that many of the students wanted to be there.

What evolved during the course of camp was a transformation in our own attitudes and instructional methods as we took on the challenge of learning to use the iPads along with the students. Our initial reluctance about the use of iPads in the classroom lessened as we saw how excited the students were about learning with them. We gradually observed more benefits as the students began to take ownership of their learning, collaborating in unanticipated ways to teach their peers and teachers. For many of our students, the iPad gave them the opportunity to share their works with the class and to become *experts*. This created a dynamic that shifted more responsibility for learning to students.

We found parallels between this work and that

of Abrams and Gerber (2014), who theorized about the constellation of connections, which represents “the self-driven, independent, and collaborative connections that youth make among multi-sourced information, nuanced practices, and social feedback” (Gerber, Abrams, Onwuegbuzie, & Bengé, 2014, p. 4). We learned that in the work of incorporating technology, both teachers and students developed cross-literacy experiences and skills, as they built knowledge across multiple texts, ideas, and apps. This was possible in a less formal learning environment than traditional schooling often affords. Teachers appreciated how IBL provided opportunities for them to coach students in flexible and timely ways, as students pursued topics of interest in individual and collaborative learning contexts. And as students became more self-directive, teachers experienced increased flexibility to engage in less directing and more observing and guiding. As we determined which apps were more appropriate for educational purposes, we were able to follow students’ interests in new and different ways.

Observational field notes and reflective journals gave us the opportunity to note how the use of iPads in this inquiry-based setting revealed traits and learning styles of different students. Some students stood out as we noticed that they were using auditory and kinesthetic strengths that might not have been accommodated in a conventional classroom. Students who seemed distracted or unfocused at the beginning of camp became more focused and productive in their learning. iPads allowed us to accommodate students alongside others of varying abilities (Flewitt et al., 2014). With a variety of options from which to choose, students were able to focus on their individual interests; they were comfortable with differing abilities and able to feel successful. Similarly, in a first-grade study using iPads for literacy skills with at-risk readers, teachers found that the apps provided numerous opportunities for differentiation (Getting & Swainey 2012). These researchers also mentioned that students worked more independently and collaborated to help each other on the iPads when students did not know what to do. These findings corroborate our own experience, and we hope that more studies can be conducted to focus on the use of iPads for the specific advantages that we have mentioned in our research.

The commitment to the use of technology and IBL in this setting revealed the many advantages of using iPads. These include differentiated instruction, collaboration, choice, ownership, role reversals, and accommodation of learning styles. As teachers, we made significant shifts in our perceptions about iPad use after seeing these benefits. Many of us returned to our positions in school renewed and excited to use iPads in our classrooms.

This research and our return to our own schools leaves us with the question of how we can incorporate this technology into our curriculum in conventional classrooms without giving up some of the dynamic advantages that we observed in this unique experience. The high teacher-student ratio that we had in our camp, and the fact that we were not required to teach to specific performance standards made our setting at camp different from traditional school settings. However, being able to put ourselves into a new situation where we were learning along with children gave us new, inspiring perspectives that we have brought back to our own classrooms. Our knowledge of what we could do with the iPads is much changed by our experience, and we are ready to take on new challenges. Many of us are using iPads more and attempting to determine what is the best way to incorporate these devices in new ways.

We suggest that further studies examine the use of iPads in a variety of teaching modalities in conventional classrooms. Also, we consider the collaborative nature of our study to be a major support to our learning. Nine teachers worked together in our camp as we planned and helped each other with the apps on the iPads. We encourage teachers implementing iPads in the classroom to pursue professional development in the field while collaborating with others. Taking on the challenge of learning new technology puts many teachers in a position of uncertainty; however, incredible shifts in pedagogy can happen when teachers can work together to share their knowledge and experiences.

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