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Digitally Enhanced Classrooms: Understanding the Effect of Individualized Technology on Language Arts Instruction in Elementary Schools

by

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An undergraduate honors thesis submitted in partial fulfillment of the

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in

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Abstract: The use of technology in elementary classroom settings has been increasing every year. Many schools already included computer classes; however, recently there has been a large move towards individualized, or 1:1, technology as well. We now find certain schools have acquired tablets and laptops for each student – fully integrating modern technology with traditional instruction. However, in the effort to keep up with the surge of technology, schools may be ignoring the need for professional development and curriculum planning to support technology as a tool that enhances student learning. While working in an "Apple Distinguished" school that provided individual tablets as learning devices to fourth and fifth grade students, I observed teaching methods with technology. This research study focuses on 1:1 implementation techniques in fourth/fifth grade Language Arts and how students and teachers use these devices. As the researcher, I observed how two teachers used iPads to engage 50 fourth and fifth graders during a two-month observation period. The research data suggests that integrating 1:1 technologies, such as iPads, requires implementation guidelines, curriculum planning, and teacher professional development.

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I. INTRODUCTION

Background information: Apple's version of a touch-tablet, the iPad, came into existence in 2010, and since then has become a sensation across the board. Most recently, iPads have begun to find a home in education, taking on the innovational role computers once had. Educators around the world are being challenged to find interesting new ways to engage children, and through the "Apple Distinguished" program iPads are spreading across the globe. "Apple Distinguished Educators" or ADEs are hired to help "advise Apple on integrating technology into learning environments," and "[t]here are now more than 2,000 ADEs worldwide, from the United States to China, New Zealand to Turkey" ("Apple in Education" 1). According to the most recent statistics, at least 8 million iPads were sold to educational institutions in 2013 (Haselton 1). iPads have become an innovative way to engage students; however, some educators worry that iPads will prove to distract more than instruct students as iPads take over classrooms world-wide. Proponents have argued that children quickly adapt to iPad use, and educators must be willing to keep up in order to maintain appropriate engagement and effective learning in the classroom with the use of these tools.

Statement of Problem: The increased implementation of iPads in elementary language arts classes without proper professional development for teachers in the appropriate applications and implementation for the grade level can result in lack of student engagement and learning. In my previous work in a classroom at a private, Apple Distinguished Elementary school, it seemed as though the teacher did not know how to best utilize the applications available to her. She seemed unable to manage the children's focus and understanding of the iPads as a tool for learning instead of a game. Also, instead of explaining ideas in their own words, the children relied on the

iPads to speak for them when they looked up information. Without significant professional development, teachers may not know how to use the iPads effectively as an instructional tool.

Purpose of Study: The purpose of this study is to better understand how iPads can be effectively used to engage students within Language Arts in fourth/fifth grade classrooms in a pre-k-8 elementary school in the Pacific Northwest.

Thesis: iPads are an engaging educational tool and provide exciting new learning methods for students; however, teachers need to go through thorough professional development regarding implementation, so that they can fully understand the applications/tools available in order to correctly integrate them in instruction.

Significance of your study: Why is it important?

This study is important because iPads are a growing phenomenon in education and they need to be properly understood in order to be implemented effectively. This is important because children deserve to be getting a proper education, and teachers need to ensure children are actually learning and not simply playing with screens.

II. DEFINITIONS OF KEY TERMS:

Accelerated Reader - A reading comprehension app that provides quizzes, which evaluate student's understanding of hard-copy texts.

App - An accepted Apple abbreviation for application.

Behaviorist paradigm – The belief that learning is based on transfer of knowledge for the teacher or text to the student. The teacher uses direct instruction and tells students what they should know or do; students memorize correct answers. In this paradigm, teachers use traditional assessment methods.

ClassDojo – A classroom management app where teachers can rate focus and other customizable behaviors of students. Students can access these ratings from their accounts.

Constructivist paradigm – The belief that learning is student-centered, and the teacher takes the role of the facilitator of student learning. Teacher makes real world connections to the curriculum in order to increase student engagement. In this paradigm, students need to play an active role in constructing new (to them) knowledge.

Digital natives - Children born into an electronic world in which they immediate acclimate to receiving/acknowledging information from "electronically operated devices," which vary from televisions and gaming systems to tablets and ipods/mp3s players (Wright, Fugett&Caputa 2011).

Fluency - A bridge between a student's ability to decode words and comprehend text (as defined by Thoermer and Williams 2012)

Within fluency: **accuracy** – the ability to decode words correctly, **automaticity** - the speed or ability to read words and connected text automatically, **prosody** - refers to rhythm and tone one exhibits when reading orally (Thoermer&Williams 2012)

iPad – A tablet, or flat-screened computer sin keyboard, which responds to touch created by Apple.

Newsela – A non-fiction reading website that contains writing prompts and quizzes.

Popplet – An app that allows students to create webs of connection with images and texts boxes. Good for brainstorming and creating plot charts.

SAMR (Substitution Augmentation Modification Redefinition) Model - Developed by Dr. Ruben Puentedura, this model proposes a method of understanding levels of integration during teachers' implementation of technology in the classroom.

Semantic Knowledge - Recognizing words and realizing their function, which in turn stimulates the ability to understand the meaning of multiple words in the context of a sentence (Wright, Fugett&Caputa 2011).

Showbie – An app where teachers can assign work via PDF and students can write in, or take photos of their work and upload it to turn it in.

Technological literacy - The ability to use, manage, assess, and understand technology.

TPACK (Technological Pedagogical Content Knowledge) Framework - The intersection of technological knowledge, content knowledge, and pedagogical knowledge. This is a theoretical model not a practical guide (Hutchinson&Woodword 2014)

Technological Content Knowledge - An understanding of how technology and content are reciprocally related and involves knowledge of how one's subject matter can be changed by the application of technology (Mishra&Koehler 2006)

Technological Pedagogical Knowledge - Knowledge of various technologies and their capabilities as well as how teaching might change as a result of using various technologies (Mishra&Koehler 2006)

Pedagogical Content Knowledge - Knowing what teaching approaches fit the content and how to rearrange it for better teaching. Involves understanding of what makes concepts easy to learn and how concepts can be best represented.

Raz-Kids – A reading app that provides 300+ eBooks organized by level. Teachers can upload individual assignments, and comprehension quizzes are available after readings.

III. LITERATURE REVIEW

Statistics

Technology's prominence in schools is growing and in-demand, as outlined by *The Journal's* Report, "Students Use Smart Phones and Tablets for School, Want More" by David Nagel. This article summarizes research about technology use in classrooms conducted by means of surveying over 2300 American students in grades 4-12. The study breaks down the results into percentages. These are organized by which technologies are most commonly used by each grade grouping and then by subject matter they are used for. Concerning elementary-aged children specifically: about 68% used laptops or desktops, 30% used smart phones, and some 20-30% used tablets. Lastly 92% of students surveyed believed tablets/iPads will change the way students learn in the future, 90% thought they made learning more fun, and 82% said they help students do better in class.

Another study that gives current statistics about technology use is, "Teaching Young Readers to Navigate a Digital Story When Rules Keep Changing" by Kristin Javorky and Guy Trainin. This article goes over digital reading options in the modern world and gives statistics that "up to half of U.S. children aged 8 or younger have one or more…digital devices in their own home" (606). Fifty-five percent of adults now report owning a smartphone, 42% a tablet, and 32% an e-reader. This article also suggests that teachers need to adapt instructional practices to make sure students can navigate digital stories effectively. The study conducted was an exploratory study to identify the most common digital features of mobile reading. The most

popular interactive elements of e-books on iPhone and iPads identified were narration and things that responded to touch. Young readers need to be "encouraged to develop flexibility and persistence in the physical and mental navigation of evolving digital texts" (607).

Teaching Standards and Theoretical Models of Technology Integration

Concerning 21st century teaching standards, Helen Crompton covers ISTE standards in an article in *Learning & Leading with Technology* called "ISTE Standards for Teachers 1: Facilitate and Inspire." Crompton writes that teachers should provide students with multiple options for learning, such as face-to-face or digital and let the students choose. The article includes a chart of the standard and specific examples of teacher actions that would not support the standard, would partially support the standard, and ones that would fully supports the standard. This article confirms that teachers need to be more informed about digital education and cannot just rely on one mode of instruction.

Amy Hutchinson and Lindsay Woodward also discuss modern teaching standards and make important suggestions in their article "A Planning Cycle for Integrating Digital Technology into Literacy Instruction." This informative article devises a planning cycle for teachers in order to effectively integrate digital technology to achieve common core standards. The article references the TPACK Framework created by Mishra and Koehler in 2006 and, while noting the importance of it, also notes that TPACK is too general and "not a practical guide" for teachers (457). This research expands on the model and includes items that will allow students to "have the opportunity to learn both print-based literacy skills and digital literacy skills simultaneously" (457). The researchers note three main differences between their planning cycle and TPACK: a choice for teachers to choose a non-digital tool "if, on reflection, they discover that using a

digital tool will not make a strong contribution to their instruction or if they are unable to locate a tool that will appropriately support their learning goal," necessary reflection on the constraints of the tools they select, consideration of the ways that "the integration of digital tools will influence the classroom environment and routines," and that their cycle is "specifically aimed at helping literacy teachers consider whether their planned instruction contributes to both digital and non-digital literacy development" (458-459). They outline seven steps in what they call a "sphere of reflection," or an ongoing cycle. They go on to show how this would be implemented in a classroom. They conclude noting that "[t]his cycle also has particular relevance for professional development that supports teacher's technology integration planning and practices" and that a previous study found that "82% of surveyed literacy and language arts teachers believed that a lack of meaningful professional development was a barrier to technology integration," which is what makes having a planning cycle to point to so important (463).

Another integration framework method found that can be easily combined with TPACK is the gradual release framework as outlined in "A Framework for Using iPads to Build Early Literacy Skills" by Laura Northrop and Erin Killeen. This article argues for the use of the "gradual release of responsibility model" as defined by Duke and Pearson in 2002 as well as Pearson and Gallagher in the 1983 study in order to carefully and deliberately integrate iPads into classrooms without losing the focus of the students. Technology "integration needs to be done thoughtfully to best ensure positive learning outcomes for students" (Northrop & Killeen 532). Technology "does not automatically lead to increased student achievement" and engagement (532). Often obstacles like distracting animations or apps can arise; therefore, teachers need to fully understand each app being used as well as know how to positively "enhance curricular integration and support identified learning goals" through iPads. The article

outlines how to use the gradual release of responsibility method with iPads as well. The researchers conclude with excitement about the use of iPads in classrooms and stress the need for the technology to "be coupled with effective instruction to ensure that students are actually learning" (536).

One last notable integration model is the Substitution Augmentation Modification Redefinition Model, or SAMR, developed by Dr. Ruben Puentedura. SAMR, as described in "SAMR Model" from *Technology is Learning*. This model proposes a method of understanding levels of integration during teachers' implementation of technology in the classroom. SAMR also demonstrates "a progression that adopters of educational technology often follow as they progress through teaching and learning with technology" ("SAMR Model" 1). SAMR breaks down into each level of its acronym. Teachers going through the first level, Substitution, use the new technology as a substitute for activities that would normally take place in the class. During this stage, nothing truly changes in teaching methods as teachers do not quite understand how to use the given technology. During the next step, Augmentation, teachers use technology as "an effective tool to perform common tasks" (1). An example of Augmentation would be students taking quizzes through the presented technology instead of through a traditional form. The third level is Modification. In this stage, teachers begin to integrate parts of traditional learning with the new technology. The example given is: "Students are asked to write an essay around the theme 'And This I Believe…' An audio recording of the essay is made…the recording will be played in front of an authentic audience" (1). The final stage of the technology integration process is Redefinition, where the technology now "allows for new tasks that were previously inconceivable" (1). In this level, teachers understand and present how the technology can work to create new more engaging activities than were previously possible.

Implementation of 1:1 Devices

Liz Kolb's article "Before You Hand Out Devices, Prepare Your Young Learners" looks into the importance of *how* teachers introduce devices to students during implementation of 1:1 digital technologies. The article suggests ideas such as making paper copies to understand placement on the screens. Also, the article notes to "avoid starting with an internet-based tool so they can't easily stray" (30). The article also confirms that teachers need to employ proper tools for classroom management while using 1:1 technologies, such as turning the devices over when not in use. The closing argument of the article suggests that with proper implementation techniques, students will have an easier time effectively learning with the new technologies.

Further information on 1:1 implementation comes from an important study in *The Journal of Technology Education* called "The Evolving Classroom: A Study of Traditional and Technology-Based Instruction in a STEM Classroom." This research stems from the changing form of classroom technology integration, and notes, "technology is a useful tool but not a replacement for human interaction" (Devlin, Feldhaus & Bentrem 35). The article brings up many previous studies which prove the effectiveness of technology in keeping children engaged yet suggests further research into the matter of proper use. This fascinating study is extremely relevant to the topic at hand and introduces behaviorist and constructivist paradigms. The problem identified in the study was a "lack of focus and inability of middle school students to follow instructions at the beginning of class" (40). The researchers then proceeded to give verbal and digital instructions to the children to see which they would more easily follow. The researchers found that the video instructions were easier for the students to follow and kept them more engaged in the project. The researchers suggest expansion on this study by using various types of video instructions to properly assess benefits for the children.

In the Thoermer and Williams article, “Using Digital Texts to Promote Fluent Reading,” the researchers analyze the incorporation of digital technologies to promote literacy. The article breaks literacy into three sections: accuracy, automaticity, and prosody (see definitions). The article notes that fluent readers have a tendency to use voice inflections of various pitches and tones. Thoermer and Williams suggest using Read-Aloud models with books read from Storyline Online because exposure to different readers will help students’ fluency. They also suggest that teachers should interrupt the reading to have a discussion about background knowledge and future questions in order to facilitate fluency development. The article gives a number of ideas to try and a chart of websites featuring digital books. The article suggests, “individual manipulation of [features available on digital texts] affords students some autonomy or self-regulation in the learning process, factors that can serve to motivate and strongly influence a student’s reading success” (441). It concludes by pointing out the rise of technology “calls for educators to reconsider nontraditional means of teaching reading,” and suggests iPads as an extremely appealing option (445).

“Digital Storytelling Revisited” by Crystal Shelby-Caffey, Edwin Úbéda, and Bethany Jenkins follows the story of a traditionally trained fifth-grade teacher who is given technology to aid her classroom. The article notes, “‘Being literate no longer only involves being able to read and write. In the twenty-fisrt century the literate person must be able to download, upload, rip, burn, chat, save, blog, Skype, IM and share’” (Caffey, Úbéda&Jenkins 2014, 191; Mullen & Wedwick, 2008). The researchers show the need for strategies that effectively incorporate technologies in order to achieve “standards of what it means to be informed, literate global citizens” in regards to both print and non-print texts (191). They also state the need for students to be prepared for the technological world. In this article, the fifth-grade teacher utilized digital

storytelling methods to keep children engaged in stories. Through this digital storytelling, using both traditional and new teaching methods, children were more engaged and connected to the story. The importance of all students having access to technology they may not normally have access to was also noted: "While we do not view technology integration as a panacea for existing gaps in achievement, we strongly believe that the lack of such has the potential to amplify the achievement gap and contribute to…a generation of digital haves and have-nots; those who know and those who know not" (Caffey, Úbéda & Jenkins 2014, 197). The researchers note this in relation to the Matthew E-ffect, which is a cycle in which those with higher technological competence tend to grow in their interest and skill level, while the skill level and interest of those with low technological competence and interest further diminishes (Caffey, Úbéda & Jenkins 2014). The article concludes, "Educators have an…obligation to equip students with the requisite skills to be both consumers and producers in the ever-growing digital landscape" (Caffey, Úbéda & Jenkins 2014, 199).

"Reading Workshop 2.0: Children's Literature in the Digital Age" by Frank Serafini and Suzette Youngs, quickly examines the new challenges and perks of reading in the digital age and what that means for future reading workshops. The article notes that unlike traditional text reading, "multimodal and digitally based texts require readers to attend to visual images, design elements, and hypertextual elements in addition to written language," and because of this, instruction needs to change to support it (401). The article talks generally about digital text's ability to expand comprehension, share, analyze through different methods, and use an app called Wordle. Wordle is software that allows readers to create "word clouds" by uploading any type of written document. It displays words with the highest frequency of occurrence in larger and bolder typeface.

Applications

Regarding applications, articles such as, "Students Explain Everything Using iPads," discuss applications currently being used in classrooms. This article by Melissa Soto and Jace Hargis explore the Explain Everything app. Explain Everything is an iPad app that allows students to use voice recording, writing, and pictures to work out problems, e.g. math story problems. As far as language arts education goes, students can use this application to analyze or create a story outline and draw the plot points. The application also includes a tutorial. Explain Everything enables teachers to see how student thinking develops.

Another article that explores helpful classroom applications is "Interesting Ways to use iPads in the Classroom" by Marla Mallette and Diane Barone. This article in *The Reading Teacher* gives a list of ten useful applications for literacy in classrooms as well as an overview of what each app does. The apps mentioned include: Story Buddy, i-Prompt, iTranslate, Writer's Had, Evernote, Dragon Dictation, Online Stickies, Puppet Pals, Story Wheel, and SoundNote.

Further research on effective app use reveals itself in "Exploring the Use of the iPad for Literacy Learning" by Amy Hutchinson, Beth Beschorner, and Denise Schmidt-Crawford. In this article, the three researchers study a fourth-grade teacher's class that is using different apps to help engage students with the text. They note the need for students to be able to physically interact with texts. The stated purpose of the study was to understand the "viability of using iPads to support and enhance literacy instruction" (17). With the use of Popplet and Doodle Buddy, the apps proved extremely effective in keeping students engaged and catering to different types of interaction and methods of reaching understanding. The study shows how effective and engaging apps can be as long as teachers fully understand the applications they are using.

Research on Effectiveness of Technological Tools for Reading

When considering previous research, one would be remiss to ignore current scientific critiques as well. “Is E-Reading to Your Toddler Story Time, or Simply Screen Time,” an article from *The New York Times*, perceptively suggests, in accordance with research from the American Academy of Pediatrics, that children still need limited screen time for their health and also need to be read to regularly. In regards to the study at hand, this easily relates to proper understanding and implementation of new technological devices: people must make sure children are not overexposed. The article notes that more studies need to be done; however, recent research suggests, “reading to a child from an electronic device undercuts the dynamic that drives language development” (Quenqua 2). The study found that children 3-5 who were read to from an electronic book form had “lower reading comprehension than children whose parents used traditional books” (2). This article also notes the importance of dialogic reading, or the back-and-forth discussion of the story and its relation to the listener’s life that research has shown is key to a child’s linguistic development.

In another study “Using E-readers and Internet Resources to Support Comprehension” from the University of Tulsa, fewer differences are found between the two types of reading, but the study is conducted with older children. This study compares the utilization of literary tools and differences in reading comprehension between traditional texts and E-readers. The study looked at three females between 7 years and 8 years 11 months with standard second grade reading skills. The resources available during the paper-based study included a dictionary, a thesaurus, and the option to ask the researcher questions. The resources available during the electronic portion were the dictionary, thesaurus, and pronunciation tools offered on the iPad. Prior to testing on the e-readers, the participants were instructed on how to utilize the

technological resources for reading. The researchers concluded that "[t]he results support the hypothesis that children accessed reading support resources...more frequently while using an electronic reader. However, the results do not reflect the hypothesis that an e-reading method increases children's reading comprehension" (373).

IV. METHODOLOGY/DATA COLLECTION

This research was conducted through a qualitative, ethnographic case study. Research methods included observation of teacher instruction and student use of iPads and teacher interviews. The researcher recorded the apps used as well as the number of students who were engaged, or on-task during each section in which the iPads were used.

The interviews were semi-structured. The researcher used a set list of questions; however, the teachers were welcome to respond as they saw fit. The teacher interviews included responses to the following questions:

1. When did you first learn about using iPads in the classrooms?
2. Are you required to use the iPads a certain amount in language arts/literacy education?
3. In which subjects do you use iPads the most for instruction?
4. What are your favorite applications/qualities of iPads in regards to language arts/literacy education?
5. How do you plan when you are going to use iPads for instruction?
6. How do the iPads support student learning?
7. In general, how do students respond when you use the iPads? Does using iPads have a positive effect on their learning?
8. What kind of training did you receive, if any, on how to use iPads before you began teaching with them?
9. Currently is there regularly scheduled professional development on how to use iPads in the classroom?

The observations were natural, personal, and undisguised. The observations grew organically from this researcher's pre-existing role in the children's daily routine. The

advantages of this observation-based study are that the teachers and students actions were viewed as they occurred in the classroom, and the observer could determine what did as well as what did not occur in a more objective way than surveys can provide. The constraints of this type of study include the difficulty of interpreting observed behaviors, and the reasons for behaviors may be unclear. Interviews provide a fuller range of information than observation alone, and because of the semi-structured method, the responses can cover more information than limited-response questions. However, interviews also have limitations due to possible respondent bias and the limited number of subjects interviewed.

During the interview, I took notes on what the teachers said while also audio-recording the interview. All of the responses were kept on a password-protected computer and any names or identifying information were encoded. This research was approved as posing minimal risk. Observed educators as well as the principal of the school were given consent forms regarding observation and interview procedures, which can be viewed in Appendix IV. My role as a researcher was that of an observer, stemming from a previous internship experience. The children and teachers were used to having me in the class and often have aides observing the class.

The observation period was designed to last for about fifty total hours of observation between January and March of 2015; however, due to unforeseen circumstances, only about thirteen official hours were observed between the months of March and May of 2015. I observed classroom procedures once or twice a week during the fourth and fifth-graders literacy block.

V. RESULTS

The purpose of the teacher interviews was to determine the teachers' professional development, instructional planning and perception of the iPads' effects on student learning. The

purpose of the classroom observations was to investigate the apps used in language arts instruction and to assess the degree to which students remained on task while using the iPads.

Appendix I includes the teachers' answers to the interview questions and Appendix II summarizes the observation data**.** These tables and interview formats have been encoded for privacy reasons. The first section will contain information regarding results from the teacher interviews, and the second section will discuss what was observed in the classroom.

Analysis of teacher interviews revealed discrepancies about the kind and amount of training the teachers received. While both teachers had interacted with iPads in their previous teaching placements as well as in the process of obtaining their degree, the two teachers disagreed about the guidelines regarding iPad usage. While one teacher believed iPads were required to be used in each subject every day, the other believed the standard was simply that they were to be used when the teacher deemed fit. It appears that teacher 1 falls more in line with the constructivist paradigm, in which learning is student-centered, and teacher 2 believes in the behaviorist paradigm, where learning is a transfer of knowledge. Nevertheless, both teachers were not aware of any required regularly scheduled professional development regarding the use of iPads in the classroom.

The second interview finding was that the two teachers had very different methods of incorporation. Both teachers appeared to be in different stages of the SAMR model despite having started at the same time and both having background knowledge about iPads. Most of the instructional strategies teacher 1 used appear to be in the Modification stage. For example, teacher 1 added ClassDojo and Showbie, classroom management apps that became a part of the in the classroom routine. Her use of these apps shows her ability to modify lessons with the new technology presented to her. This teacher also had a slightly better understanding of the variety

of available tools on the iPads. For example, she mentioned in her interview how she actively looked for apps that correlated to her lesson plans, such as the math games specifically for fractions.

The instructional strategies teacher 2 used appeared to be somewhere between the Substitution and the Augmentation stage, mostly using the iPads as a substitute for what would be a traditional lesson plan. Teacher 2 rarely used iPads in her lesson plans, but when she did, she would have the children do research the same way they might if they had a laptop or encyclopedia. Teacher 2 also mentioned the use of the website Newsla, which enables students to take quizzes after reading certain stories online, which would fall in line with the Augmentation stage.

The two teachers differed in their understanding of the instructional purpose of iPads. Teacher 1 had a routine for daily iPad use and was more aware of a variety of apps she could use for instructional purposes, such as Raz-Kids and the Accelerated Reader game she had created. Teacher 1's perception of the usefulness of iPads included teaching new concepts, reviewing previous learning. Teacher 2, on the other hand, felt the benefit of the iPad was to individualize for student learning, and to give instant feedback via quiz apps.

Regarding observation periods, which are summarized in Appendix II, the usage of iPads seemed to lessen as the year progressed. Prior observations before this study began suggested that iPads were being used frequently in the classroom; however, there seemed to be a disconnect between teacher explanation and student understanding. An example of this was the use of an app (Book Creator) that looked like a PowerPoint presentation, except the children had to use full sentences on each slide. The children wanted to write bullet points instead and struggled with this task, which may point to the teacher using an improper application for the desired goal.

However, the classroom observations this spring revealed much less iPad use during the Language Arts block. iPads were only used during 5 out of the 10 official observations. When the iPads were being used during class, they were rarely being used in new ways, but rather as part of routine or an alternative to book reading. The most commonly used apps were Raz-Kids and Accelerated Reader, both of which appeared to engage the students. During iPad use, when combining the two class' totals, the children averaged 63% of the time on task. This percentage is based on the number of students using the iPad in a way deemed appropriate to the task at hand over the total number of students using their iPads. However, the 4th grade students' on task score alone would be 83%. iPad usage was always student choice during observed periods. An example of the daily observation protocol is provided in Appendix III.

Analysis of observations reveals many interesting differences in integration style and app use between the two teachers. While teacher 1 uses apps like dictionary.com to add to semantic knowledge (see definitions) in literacy learning, teacher 2's strong link to the traditional, behaviorist paradigm showed a lack of iPad usage in classes. Concerning the TPACK integration model, the observations also showed differences in each teacher's integration framework. Their technological content knowledge as well as pedagogical knowledge levels varied (likely due to a lack of regularly scheduled, technology specific professional development). Rather the two teachers were more in line with the redefinition of TPACK as provided by Amy Hutchinson and Lindsay Woodward in "A Planning Cycle for Integrating Digital Technology into Literacy Instruction." The two teachers more obviously used both "print-based literacy skills and digital literacy skills simultaneously" (457). However, it may be noted that the opportunities for print-based literacy skills appear to outweigh the opportunities for digital literacy skills.

VI. DISCUSSION

I believe in many ways my thesis was supported through this study. The children did in fact appear to be more engaged and stayed on task while using the iPads. However, the teachers did seem somewhat uneasy about fully integrating iPads. While one teacher went out of her way to learn more about what the iPad had to offer on her own, the other did not see much use in it except as a substitution tool. I believe if more professional development specifically regarding iPads was available, both teachers would be more aware of how to use iPads as a way to re-define education.

While the two teachers were aware of some good ways to use the iPads in class, the integration did not appear to always "be done thoughtfully to best ensure positive learning outcomes for students" (Northrop & Killeen 532). The results of this study appear to mimic the results of Northrop and Killeen's in that technology needs to "be coupled with effective instruction to ensure that students are actually learning" as well as "a lack of meaningful professional development" being an impediment to effective technology integration (Hutchinson & Woodward 463).

The common themes apparent through the observation period as well as the teacher interviews included a lack of systematic professional development. Other notable themes included the episodic use of the iPads**,** a general confusion about how to fully utilize iPads, and that overall, the students were undoubtedly engaged when using the iPads.

Within the parameters of Language Arts, the Accelerated Reader app proved to be an effective and engaging method of implementation. Children enjoyed the competitive nature of the Accelerated Reader race, and the program also encouraged the children to read as much as they could. However, this study was not designed to determine the impact of iPads on student learning.

VII. CONCLUSIONS

This study asserts the necessity of professional development in regards to effective implementation of iPads in the classroom. Children appeared more engaged while using iPads; however, teachers seemed to be in different stages of understanding, especially in relation to the SAMR model. As the previous observations note, the discrepancy between usage of the iPads in the Fall Quarter versus the late Spring Quarter may be due to the teachers falling back on traditional methods of teaching when they get tired. Since iPads are fairly new to the learning environment, it may take more effort to incorporate them into a new innovative lesson. This may explain the fall-out in use during the last few months of the school year.

The observation periods showed many instances where apps could have been used to engage students instead of traditional methods such as worksheets. For example, instead of having the children work on outlining text-structure on their paper worksheet, the teacher could have used an app like Popplet to create a web of connections to explain the text-structure. By using Popplet the children also could have used images instead of having to describe or draw them out. ExplainEverything would be another great choice for the Language Arts block. Teachers could use ExplainEverything during the development of paragraphs to show the children's thought process. The teachers could also go so far as to allow children to use apps such as Dragon Dictation and Evernote when they are explaining directions in order to make sure children can reference what the teachers have told them to do and how to complete the task properly. Nevertheless, ClassDojo, Raz-Kids, and Accelerated Reader all proved to be effective at keeping the students engaged.

Seeing as these twenty-first century children are digital natives, it is undeniable that educators must be able to provide effective and engaging lessons in digital fluency and technological literacy (see definitions). iPads provide an important new opportunities, but teachers must integrate them with careful consideration and extensive knowledge of the programs they choose to work with. Perhaps if the school in question implemented the framework by Laura Northrop and Erin Killeen with regular opportunities for professional development with iPads, the teachers would have more opportunities for valuable integration. Clearly education institutions need to be more active in their efforts to implement these devices in order to truly be "Distinguished" by these Apple products.

This study had many limitations, one of the main ones being time. With more time for observations and perhaps a follow-up interview with the teachers, more statistically relevant information could be gained from this type of study. This study could have also benefited from a comparison to another type of educational institution, such as a public institution. Further research would benefit from comparisons to other schools with iPads to better understand what types of professional development need to be in place.

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APPENDICES

Appendix I: Teacher Interview

Question	Teacher 1	Teacher 2
When did you first learn about using iPads in the classrooms?	Master's program	Education classes
Are you required to use the iPads a certain amount in language arts/literacy education?	No, but supposed to use them in all subjects already taught during the day	No.
In which subjects do you use iPads the most for instruction?	Reading and math	Social studies and science
What are your favorite applications/qualities of iPads in regards to language arts/literacy education?	Showbie: can upload images and PDFs and students can take notes on them.	Newsela: website where students are able to read articles and write responses.
How do you plan when you are going to use iPads for instruction?	Use some everyday to check in (like Showbie) and some depending on availability in relation to what they are working on (e.g. fractions)	Use to "spice up" less interesting lessons or for research
How do the iPads support student learning?	Everything for teaching new concepts, to reviewing concepts, to helping reinforce concepts	Instant feedback, more individualized
In general, how do students respond when you use the iPads? Does using iPads have a positive effect on their learning?	Children appear much more interested when using iPads. Yes, positive effect because more engaged when using iPads.	Yes, they seems to enjoy it, makes lessons more interesting even if it's the same thing.
What kind of training did you receive, if any, on how to use iPads before you began teaching with them?	None, but used them in old school.	Not a whole lot, was sent to tech conference with teacher 1 at beginning of school year, but no training since.
Currently is there regularly scheduled professional development on how to use iPads in the classroom?	No. Sometimes brought up during professional development days, but only if a teacher feels like sharing a new app.	No.

Appendix II: Compiled Observations

Date	Grade	%Time on Task	Lesson Goal	Apps Used	Purpose of iPad use	Student Choice
04/10	5th	75%	Reading retention, text structure	No apps used, iPads for research	Research, background knowledge	Yes
4/17	4th	60%	Create quizzes, later math reinforcement	Flashcards, ClassDojo, Thinking Blocks	Flashcards for quizzes, Dojo for checking participation grade, then math concepts	Yes
4/23	4th	N/a	Formation of introductory paragraphs	None	N/a	No
4/24	5th	0% (some children tried to use)	Writing, Reading Comprehension, Spelling	None	N/a	No
4/30	4th	N/a	Paragraph Structure	None	N/a	No
5/01	5th/4th switch halfway	N/a	Writing, Reading Comprehension	None	N/a	No
5/07	4th	N/a	Writing Conclusions	None	N/a	No
5/08	5th	100%	Reading Comp, Vocabulary	Raz-Kids, dictionary.com, Accelerated Reader (AR)	Raz-Kids and AR for stories and reading comp, dictionary.com for vocab	Yes
5/13	4th	83%	Reading Comp, Vocab	Raz-Kids, dictionary.com, Accelerated Reader (AR)	Raz-Kids and AR for stories and reading comp, dictionary.com for vocab	Yes
5/14	5th	n/a	Reading, birthday party	None	N/a	No

Appendix III: Sample Observation Protocol

Grade: ___, Friday, Date:____ Time: 12:45-2:45

Subject	Language Arts
Lesson Goal	Reading comprehension, vocabulary
Apps Used	Raz-Kids, dictionary. com, Accelerated Reader
Target for app use: If literacy, what purpose?	Books/Assigned reading by level, Reading Comprehension
Teacher Intro App Purpose; How to Use? Rules?	No introduction to Raz-Kids or Accelerated Reader, children have been using a while. Teacher briefly went over typing in words for the dictionary.com app for the vocab worksheet. Specific rules were not discussed.
Type of use: group or individual?	individual
Student choice? Multiple Options or iPad use?	The children were allowed to either read hardcopy books or approved iPad books. After about 20 minutes the children were asked to work on a group discussion worksheet about vocabulary words in the chapter of their class reading book. The worksheet was projected on the over-head and the the children were to write the answers in their notebook. For this task they are allowed to use either hard-copy dictionaries or their dictionary.com app. Afterwards it is free-choice reading until recess at 2pm from 2:10 - 2:40 spelling review and test, no ipads and mother's day crafts
Other notes	The books on Raz-Kids were organized by reading level, they can take quizzes after as well. Large variety in types of texts available, both fiction and nonfiction, which the children appear to like since it reaches out to a variety of reading types. The children worked well with the dictionary app on their ipads when using them. At one point during free-reading, a child found a galaxies app and wanted to use it for reading - the teacher was open to the idea, but after looking it over decided it was not actually an appropriate reading app. It is interesting to see that the teacher is open to the children presenting ideas for apps to be used. During free reading choice, many students also chose to read a hard-copy book for the "A.R. Stars" program, which relates to the Accelerated Reader app. The teacher has created a program where,

	when the students read certain A.R. books and pass the A.R. app's quiz with a 90% comprehension grade, they are allowed to add it to the A.R. Stars chart. The children who reach a certain amount of books by the end of the year get to have a pizza/ice cream party. The kids really seemed to like this, and a lot of them discussed what they were reading for Accelerated Reader with me. The party appeared to motivate them quite a bit. I think the teacher implemented this well.

Time Stamp	# of students engaged/total using iPads	Special notes about student activity
1:10	3/3	Raz-Kids (at 1:20, were discussing vocab w/s)
1:30	9/9	dictionary.com app
1:40	3/3	reading apps on ipads
1:50	5/5	using reading apps

Appendix IV: Consent Forms

Teacher Consent Form: Teacher Interviews

Digitally Enhanced Classrooms: Understanding the Effect of Individualized Technology on Language Arts Instruction in Elementary Schools

You are invited to participate in a research study conducted by Celine De Clercq from Portland State University for her Honors Thesis. Celine hopes to observe and understand the effects of individualized technology, specifically iPads, on instructional methods in Language Arts classes in Fourth and Fifth Grade. As the Fourth/Fifth grade teacher, you have been selected as a possible participant in this study.

If you decide to participate, Celine will ask you a list of approximately 9 questions about using iPads for instructional purposes. The answers provided will be at your discretion. Celine will take written notes as well as audio record the interviews and will keep your name and identifying information confidential. She will use a pseudonym rather than your name in her notes.

While participating in this study, it is possible that you may be uncomfortable if confidential information is disclosed. Celine will not record personal information. You may not receive any direct benefit from taking part in this study, but the study may help to increase knowledge about the use of iPads for instruction. Any information that is obtained in connection with this study and that can be linked to you or identify you will be kept confidential. Notes from the interviews will be transcribed and stored on a password-protected laptop behind locked doors at Celine's place of residence.

Your participation is voluntary. You do not have to take part in this study, and it will not affect your relationship with Portland State University. You may also withdraw from this study at any time without affecting your relationship with these institutions or with the researcher.

If you have questions or concerns about your participation in this study, contact Celine De Clercq via email or phone: 503.789.1226 or ckd2@pdx.edu. You may also contact the PSU Institutional Review Board, Office of Research Integrity, 1600 SW 4th Ave, Market Center Building Suite 620, Portland, OR 97201 (503) 725-2227 or 1 (877) 480-4400.

Your signature indicates that you have read and understand the above information and agree to take part in this study. Please keep a copy of this form for your own records each time you participate in one of the study activities.

_____ _____ _____

Signature Print Name Date

Appendix IV continued
Principal Consent Form: Classroom Observation
Digitally Enhanced Classrooms: Understanding the Effect of Individualized Technology on Language Arts Instruction in Elementary Schools

You are invited to participate in a research study conducted by Celine De Clercq from Portland State University for her Honors Thesis. Celine hopes to observe and understand the effects of individualized technology, specifically iPads, on instructional methods in Language Arts classes in Fourth and Fifth Grade. As the Principal of a school that includes iPads in classrooms, you have been selected as a possible participant in this study.

If you decide to participate, Celine will ask to observe one or more of the fourth/fifth grade classes when students are using iPads for instructional purposes. Celine will take written notes and will keep your name and identifying class information confidential. She will use a pseudonym rather than the institution's name in her notes.

While participating in this study, it is possible that you may be uncomfortable if confidential information such as a student's name or other identifying information is disclosed. Celine will not record the students' names or personal information. You may not receive any direct benefit from taking part in this study, but the study may help to increase knowledge about the use of iPads for instruction. Any information that is obtained in connection with this study and that can be linked to you or identify you will be kept confidential. Notes from the classroom observations will be transcribed and stored on a password-protected laptop behind locked doors at Celine's place of residence.

Your participation is voluntary. You do not have to take part in this study, and it will not affect your relationship with Portland State University. You may also withdraw from this study at any time without affecting your relationship with the institution or with the researcher.

If you have questions or concerns about your participation in this study, contact Celine De Clercq via email or phone: 503.789.1226 or ckd2@pdx.edu. You may also contact the PSU Institutional Review Board, Office of Research Integrity, 1600 SW 4th Ave, Market Center Building Suite 620, Portland, OR 97201 (503) 725-2227 or 1 (877) 480-4400.

Your signature indicates that you have read and understand the above information and agree to take part in this study. Please keep a copy of this form for your own records each time you participate in one of the study activities.

_____ _____ _____

Signature Print Name Date