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iPad & Paper: Teacher Perceptions of Tablet Literacy Outcomes on Middle School Students

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Teacher Perceptions of Tablet Literacy Outcomes on Middle School Students

By

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Abstract

Since the development of the first mass-produced iPad in 2010, American tablet ownership has skyrocketed both within our homes and now within K-12 public schools throughout the United States. Yet as 1:1 classroom technology has transformed from an anomaly to a mere commonplace expectation in many regions of the country in just seven years, the questions arises as to how tablet use may be impacting the overall reading and writing of our students. Through two data sets, this study uses a convenience sampling of 22 middle school teachers to analyze their perceptions on the ways in which they believe 1:1 tablet use may or may not be impacting various aspects of student literacy. All survey and interview data collected from the study's 22 teachers were analyzed using the constant comparative method to reveal emerging themes within the data that were later confirmed by additional literacy specialists. Overall, this study reveals five common trends in teachers' responses, all of which yield substantial implications on middle school literacy instruction.

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Introduction

As the time for 7th period social studies is about to expire, 13 year old Johnny Alverez cannot help but to tune out his teacher's closing message as he gazes out the sunny window, watching the wind blow a mixture of recently fallen leaves across the school's front parking lot and into the dark green pine woods across the street. Nothing but three minutes of social studies and one period of English now stands between Johnny, the 72 degree fall afternoon and a long Columbus Day weekend. With one minute now left on the clock and the class laughing at a joke made by Mr. Richards, Johnny unlocks his iPad and makes sure to digitally submit his Industrial Revolution worksheet using the Schoology App on his school-provided tablet as the red second hand swiftly pursues upright position. The bell rings, Mr. Richards wishes everyone a great weekend and Johnny pulls up his baggy cargo shorts as he dodges classmates, high-fives his friend Michael and nearly trips on an abandoned water bottle: all in his 10 foot walk directly across the hall to Mrs. Webber's 8th period English class. Yet as Johnny's white and black Nike's must travel only 10 feet across the hall, academically Johnny's brain has been forced to travel into an alternate-dimension. For as Mr. Richards inhabits the domain of a paperless classroom, Mrs. Webber would not be caught dead assigning reading or writing work to be completed on a tablet. This is the world Johnny lives in; he is but a pawn in the silent civil war over 21st century tablet-based instruction.

Topic & Research Problem

It is stories such as these of debate and controversy surrounding the literacy impact of tablets that have drawn me so close to the topic of teachers' literacy perceptions on in-school tablet use. Nonetheless, to properly frame this topic, it is first important for us to consider the brief history and current state of tablet use in American public schools. For while the idea of tablet computers have long been envisioned within science fiction movies and the popular show

Star Trek, the first semi-operational prototype of the device wasn't even invented until the year

2000 when a group of University of Illinois students and staff entered their model in an Apple

Corporation contest (Lux, 2014). Although we have certainly come a long way in these last

seventeen years, Apple amazingly did not release the first fully functional, mass-produced iPad

until the year 2010: a full decade later (Lux, 2014). In that year, tablet ownership was at only 3%

for American adults and drastically lower for adolescents (Anderson, 2015). Yet fueled by

lowering prices, increased familiarity, a technological boom and the vast emergence of

smartphones; in just five years tablet ownership skyrocketed over 1500% to then reach 45%

ownership just half a decade later in 2015 (Anderson, 2015). In the same time that tablet devices

have seen unprecedented growth in the tech market, computer ownership has remained largely

stagnant: demonstrating that tablets are simply a device of their own: providing greater

flexibility, transportation, communication and application opportunities.

Likewise, by the year 2013, some affluent schools (few and far between) began providing

widespread iPad access to students as Apple Inc. dominated the K-12 public schooling market

with a 90% stranglehold (Chandler & Tsukayama, 2014). Yet, with prices still hovering well

within the $400-$500 price range per device, nationwide classroom implementation of tablets

was simply not feasible. Nevertheless, it was just one year later in late 2014 that the average

tablet price swiftly dropped below the $300 mark for the first time (Hughes, 2014). In fact, as

average tablet prices have dropped every fiscal quarter between 2010 and the present,

administrators began to raise their brows. Intrigued by the idea of putting students in the driver's

seat of their own education and preparing them for the incoming digital standardized common

core tests and technological demands of the 21st century; districts across the country began to see

tablet purchasing as a feasible means of increasing student capital across the board (Chandler &

Tsukayama, 2014). With widening demands, increased grant opportunities, lowered prices and an industry known for providing educational discounts, the Pearson education group reported that by the end of 2014, one in six schools already had 1:1 tablet ownership for their students (Pinette, 2014). In the same year, it was reported that 66% "of elementary students and 58% of middle school students" had some form of regular tablet use either within or outside of school (Pinette, 2014).

So, as we now look around at the atmosphere for digital and specifically tablet-based instruction in school, it is hard not to notice the stark contrast to these statistics from just two years ago. Tech, media and publishing companies are now providing full e-textbooks, educational companies have developed vast branches dedicated solely to digital application-based instruction and just about every day it seems as though a new district is provided with full 1:1 iPad or Chromebook usage for their students. Just last year it is estimated that $4.7 billion was spent on IT for public education K-12 schooling and a breathtaking $522 million was spent on the purchasing of tablets and e-readers for students alone (McCandless, 2015). So, with all of this money expended on technology, do American public school teachers find there to be any change in middle school student literacy?

Rationale & Purpose

Sitting there, reading this, I have probably caught you off guard. Bombarded with all of these statistics, I can hear you saying to me "Yeah, we get it, schools are using tablets, what's the point?" Well, as anyone who has ever stepped foot within a teacher's lounge is aware, technology has always held a drastic impact on the way in which educators conduct their classrooms. Nevertheless, I believe the use of tablets presents an entirely new discussion. As demonstrated, throughout the country a mass of public schools are receiving or have already

received grants or additional school funding to purchase tablets for students within their district. However, due to the fact that tablets are so new, tablet implementation has occurred with such haste, and change in general often unnerves teachers, I have seen firsthand the extreme levels of passion both praising and bashing tablet use at the middle school level.

It is, therefore, highly interesting and imperative to see how teachers' perceptions of the impact that tablet use has on adolescent literacy is either consistent or inconsistent with current research in the field. In conducting this study I was able to see how teachers' own backgrounds and experiences may play a role in their implementation or non-implementation of tablet use for daily literacy instruction. I was also be able to spot both consistencies and inconsistencies where teachers' own experiences aligned or diverged from what researchers have studied, and thus may warrant more research to readdress these matters. In summation, feedback from this study has provided me with great insight into the ways teachers believe tablets may help, hinder, or fail to impact student reading and writing within daily literacy instruction.

Research Question

With all this considered, the guiding design of this study is aimed at addressing the following overarching question:

✓ How do teachers believe in-school tablet use is impacting middle school students' reading and writing skills?

Let us now consider some of the relevant, peer-reviewed works that exist on the topic of in-school tablet use and student literacy.

Review of Literature

Throughout the history of mankind, with varying paces, technology has always continued to move forward: firmly separating our species from the rest of the planet's family tree. Yet, few,

if any times in our history have we witnessed such rapid technological change that has so greatly

impacted our lives. Nevertheless, as we live through these changes, it is hard to take a step back

and truly consider the technological growth that is occurring right before our eyes within our

own lifetime. In just the past twenty years, TWENTY YEARS, we have witnessed the personal

computer boom, the invention of the smartphone, smart television, smart boards and just about

smart everything. Our personal lives are permeated with various LED screens, the internet and

handheld based technologies. Our classrooms are filled with laptops, tablets, HD projectors and

online classroom websites. Meanwhile, outside of school, the average citizen can't even imagine

leaving home without their phone, getting to a new place without their handheld GPS, going to a

restaurant without Googling it first, writing a paper without a 21st century word processor,

communicating without email and text or going through everyday life without the apps,

programs and digitized technology that are now so engrained within our modern existence. In

fact, it seems as though the second a new model phone, tablet, laptop, television or gaming

console is invented, it is almost simultaneously rendered obsolete.

As a result, when such unprecedented technological change occurs in such haste, it is of

the utmost difficulty to truly grasp, study, or understand the implications in real time. As

aforementioned, it was not until 2010 (just six years ago) that the first commercial model of the

iPad was introduced, and now, classroom sets of tablets and Chromebooks can be found in

nearly every city throughout the United States. Over this span, scholars and teachers within the

field of education have begun to hypothesize and study the literacy impact of texting, the best

ways to integrate technology into the classroom and now, most recently, the impact that tablets

and 1:1 technology may have on adolescent literacy outcomes. For as we find, while tablets

provide remarkable opportunities for submitting work, engaging in research and creating inspired

multimodal forms of student learning, they also bring with them extreme controversy and debate. So, here is what educational and technological scholars have discovered regarding 1:1 tablet use and student literacy.

Tablets' Impact on Reading

Overall, the vast majority of work conducted on tablets and student literacy focuses predominantly on the implementation of literacy strategies and the ways that tablets are used during literacy instruction. Nevertheless, a small group of individual researchers have conducted both qualitative and quantitative studies to observe and measure whether reading and writing on tablets results in significant changes from completing these same actions on paper. To begin, teachers' use of tablets for reading and writing instruction varies drastically from classroom to classroom (Gallagher et al., 2015). Nevertheless, regardless of these differences in implementation, studies across various age ranges and even nations have time and again shown that reading on a tablet versus paper copy results in no statistically significant differences in reading comprehension (Connell, Bayliss & Farmer, 2012; Dundar and Akcayir, 2012; Sackstein, Spark & Jenkins, 2013; Perrin, Paille & Baccino, 2014). In the same way, with the exception of a few outliers (Connell, Bayliss & Farmer, 2012; Sackstein, Spark & Jenkins, 2013) studies have also demonstrated no significant change in reading pace when reading on a tablet or paper. Likewise, a groundbreaking physical study conducted by French researchers Perrin, Paille & Baccino (2014) discovered (using a Dikablis eye-tracker) that the human body tends to lend itself to clear differences in physical head tilting and eye movement when reading on a tablet, but that these changes result in no difference in terms of reading speed or comprehension. Thus with all things considered, while the human body may demonstrate slight differences when reading on a tablet versus paper, research suggests that the human mind largely does not. Hence what is

likely more important than the physical reading speed and comprehension differences caused by an iPad's digital screen, are the skills, methods and reading selections chosen by the teacher; and, as will be discussed later, the personal preferences, motives and preconceived notions held by each individual student.

Tablets' Impact on Writing

In terms of writing, common sense would suggest that the act of physically using a pen and paper versus typing on a screen or keyboard with an internal processing system could result in drastic differences in overall student writing ability. Considering changes in multimodal literacy, just as methods of reading have evolved drastically, so too has the process of writing. Whereas writing used to be done solely with paper and pencil (or maybe even a typewriter), the addition of computers have brought with them the likes of spellcheck, grammar check, and copy / paste: amongst other new writing applications. Now, in the 21st century, tablets provide yet another means of in-school writing by using the same PC tools but a smaller screen and soft keyboard. With all of these varying means now commonly used by students and professionals alike, the question arises of whether typing on a computer with a larger screen and external keyboard may create differences from typing on a smaller tablet screen that utilizes touchscreen controls.

With these questions in mind and understanding the magnitude of these changes, researchers Davis, Orr, Kong and Lin (2015) conducted an in-depth hybrid experiment to see whether the quality of students' writing was impacted when they wrote an essay on paper, a computer, "a tablet or a tablet with an external keyboard". Using a large sample size of 831 participants across three age groups (grades 5, 10 and 11), researchers had all participants write grade-level responses selected from the Pearson *Write to Learn* essay bank using each of the

aforementioned modes of writing. With all students timed for their writing and professionally

evaluated using a grade-level standardized rubric, researchers discovered that participants

demonstrated no statistically significant difference in essay scores, essay time or specific essay

features across the board based on the mode of writing. Surprisingly, these results have also been

echoed across the world of educational research, suggesting that the true quality of writing starts

and ends with the brain, not the fingertips.

But what about the use of a stylus? Not all students write on their iPads or school

provided tablets using the touchscreen keyboard. Rather many students prefer completing digital

worksheets and assignments using an electronic pen. In the same way that typing on a computer

requires far different muscular movements and fine motor skills than normal handwriting, so too

does the process of writing on a tablet. For as Gerth et al (2016) discuss, the smoother surface of

a tablet requires the writer to adjust graphomotor skills which in many ways become instinctive

when you write on surfaces you are used to. So can these changes in hand-eye coordination and

friction impact handwriting and overall writing ability? With only one other study existing on

this specific topic (Alamargot & Morin, 2015), Gerth (2016) and his colleagues from the

University of Potsdam set out to answer these questions using a strictly scientific study;

meticulously designed with consideration of locations, warm-ups, measurement tools, aspects

being measured and data analysis technology. Using high-tech movement tracking sensors

hooked up to a Lenovo Tablet Pen and an Intuos Inking Pen respectively, researchers were able

to analyze writing velocity, duration, inversions, air-time and pen lifts. In turn, the study

confirmed previous notions that people write larger and faster on surfaces with less friction and

that children often struggle greater adapting to new writing surfaces as their writing process is

less automatic and second-nature. Nevertheless, just as participants initially struggled, they were

able to adapt to writing on a tablet in as little as 10 exercises. This once again suggests that the art of reading and writing on a tablet can come down to experience, preference and motive rather than universal changes in brain function or ability across modes of literacy.

Perceptions

Now that we have discussed what scholars and researchers believe to be the reality of the impact (or non-impact) that tablets are having on students' reading and writing ability, it is important for this study to consider whether teachers' personal views align or diverge from the limited and recent body of current work on the matter. Yet when considering the topic of teachers' perceptions on tablet-based literacy outcomes, it quickly becomes apparent that surveys and studies on the topic are few and far between: overwhelmingly localized, uninformative, non-representative and focused solely on classroom management, implementation and motivation with tablets while entirely foregoing perceived student reading and writing outcomes. Also worth noting is the clear question-leading and bias presented in many of these works and the unmistakable business motives for many of these now tech-based educational companies (that are largely fronting such studies) to rule in favor of further in-school technological increases.

In one of the few large-scale works completed on students' views on tablet instruction, researchers from Pearson, Nielson and Harris Polling Group found that the vast majority of the 2252 student participants surveyed largely supported in-school tablet use (Pinette, 2014). In fact, 90% of students believed that tablets would change the way they learn and a nearly identical 89% thought that "tablets make learning more fun." Along the same lines, the study found that 81% of grade 4-12 participants' believed that "tablets let them learn in a way that is best for them" with 79% claiming that tablets help them do better in class. In fact, interestingly enough, these statistics were even higher among lower-SES districts and minority populations including

Hispanic and African American participants': creating an intriguing conversation that will be addressed later in the discussion portion of this study. Nevertheless, less than a 50-50 split of middle school students believed that it was truly important for schools to provide 1:1 tablet use. This figure potentially suggests that in this day and age, students still view tablets as a privilege or luxury rather than as a necessary tool for learning. But what about questions regarding ease of reading? Reading speed? Reading comprehension? Writing abilities? Writing Preferences? Annotation? As is the norm in these form of works: there were none. No questions asked students whether they believed their reading or writing varied when using a tablet or paper copy, let alone inquired about specific aspects of such literacy.

Along the same lines, PBS Learning Media alongside VeraQuest Inc. completed a monumental study in 2013 regarding K-12 teachers' perceptions of classroom technology that has since been discussed in *Education Week* (PBS, 2013). In this study, a representative sample of participants mirroring the make-up of America's teaching populace were selected and incentivized to complete a survey through *uSamp* in which they could potentially receive prizes through a point system related to the number of surveys they completed. Garnering similar results to those of the aforementioned Pearson study, PBS found that teachers were also largely optimistic about in-school technology integration. 70% of teachers surveyed believed that classroom technology can "expand content, motivate students and respond to a variety of learning styles." Moreover, 69% claimed that technology helps expand their instruction and 68% desired more classroom technology (especially amongst inner-city and lower-SES schools). In fact, 58% said that they see technology as a way to expand student capitol, 73% saw tablets as a specific means to enhance student knowledge and only between 15-35% of participants' on most questions shared views indicating that they believe increases in student technology are

distracting or detrimental to learning. Yet in all the specific questions asked regarding various

PC, tablet and smartboard integration, not one question specifically asked about any given aspect

of student reading or writing. So how do teachers believe in-school tablet use impacts students

reading and writing and what factors may influence these perceptions? These questions are

largely left to be answered and will formulate the majority of the discussion throughout this

particular study.

Sociocultural Theory, Activity Theory & Behaviorism

As aforementioned, when considering students' and teachers' willingness to use tablets

and their perspectives on how tablets may impact reading and writing, we must never forget to

consider potential bias, subconscious views, preconceived notions and personal schema.   Rooted

in the works of Vygotsky, Skinner and Leont'ev, Yrjö Engeström's Activity Theory (1999) has

been applied to numerous fields including psychoanalysis, social psychology and even computer

science; despite sharing many of the same postulates as the Sociocultural Theory of Human

Learning. Often used to analyze group behavior on a macro level, when applied on an individual

level of education, activity theory considers an individual's motives, attentiveness and enjoyment

towards learning. Overall, the Activity Theory of Education takes into account an individual's

culture, extrinsic motives, rules, past experiences, objectives and societal influence: considering

the way that these factors interact to influence individuals' learning tendencies, outlooks and

outcomes.

When taking these factors into account, it is apparent that any given student's

performance on and favoritism towards using a tablet may be linked to previous views of how

they performed on such a device, whether they own a tablet at home, whether they liked the

tablet they owned, how they view their own handwriting, how their muscles feel when they

write, what their peers think, and a slew of other physical, social and psychological factors. Likewise, as any senior teacher or administrator will quickly and in a cliché manor attest, all students are different. No two students have the exact same interests, learning styles, preferences, strengths and weaknesses. Thus this same reality inevitably extends well within the use of tablets in the classroom. Regarding tablet use, students' reading and writing skills likely vary based on the individual.

Along the same lines, as students' views and attitudes likely vary, it is unrealistic to think that teachers' perceptions would not vary as well. Dissimilar trends that teachers may have observed from students within their own classroom as well as personal technological views and ownership may drastically impact overall perspectives on whether students reading or writing vary between tablet and paper. Research has backed this notion specifically pertaining to tablets as Huang, Chen and Ho (2013) discovered that by customizing screen preferences and making participants more familiar with iPad reader settings, that participants had an increased view on the devices overall worth and functionality. As they confirmed, "emotions and perceptions directly influence attitude and willingness to use tablet reading functions" (p. 606). Moreover, it is also paramount to mention the reality that tablet based learning is used for different literacy skills within different school subjects. For these reasons, I made sure to note in my data collection tools (across interviews and surveys) whether teachers owned their own tablets outside of school, what subject they teach and what their age is to see if there may be a potential correlation between these personal identifiers and perspectives on the way that tablets influence student literacy abilities. For as renowned historian Arthur Schlesinger is fabled to have said, "Science and technology revolutionize our lives, but memory, tradition and myth frame our responses."

Methodology

As aforementioned, my qualitative study titled *iPad & Paper* looks to address the largely unheeded topic of teachers' perceptions regarding the impact or non-impact that tablets may have on middle school students reading and writing abilities. In doing so, I took great consideration regarding the participants, setting, positionality, data collection methods, procedures and trustworthiness of this work: as noted below.

Participants

For this study I used a convenience sampling of faculty from the school at which I work to gain active middle school teachers with 1:1 iPad classrooms as voluntary participants. In total, 22 participants were involved in this study, as all 22 completed an open-ended survey and five were used for follow-up interviews. Of the 22 participants, eight were male and 14 were female. Moreover, the average age of my participants was 40 years old with 14.8 years of teaching experience. As it was relevant to this study, participating teachers were asked whether or not they owned an iPad at home for personal use. 20 teachers responded to this question, indicating that 55% owned such a device. The breakdown of all participating teachers' fields may be seen in the chart provided below. Finally, it is worth noting that all participants were informed of the study, have provided written consent and received no such compensation for their involvement.

Figure 1

Teacher Subject
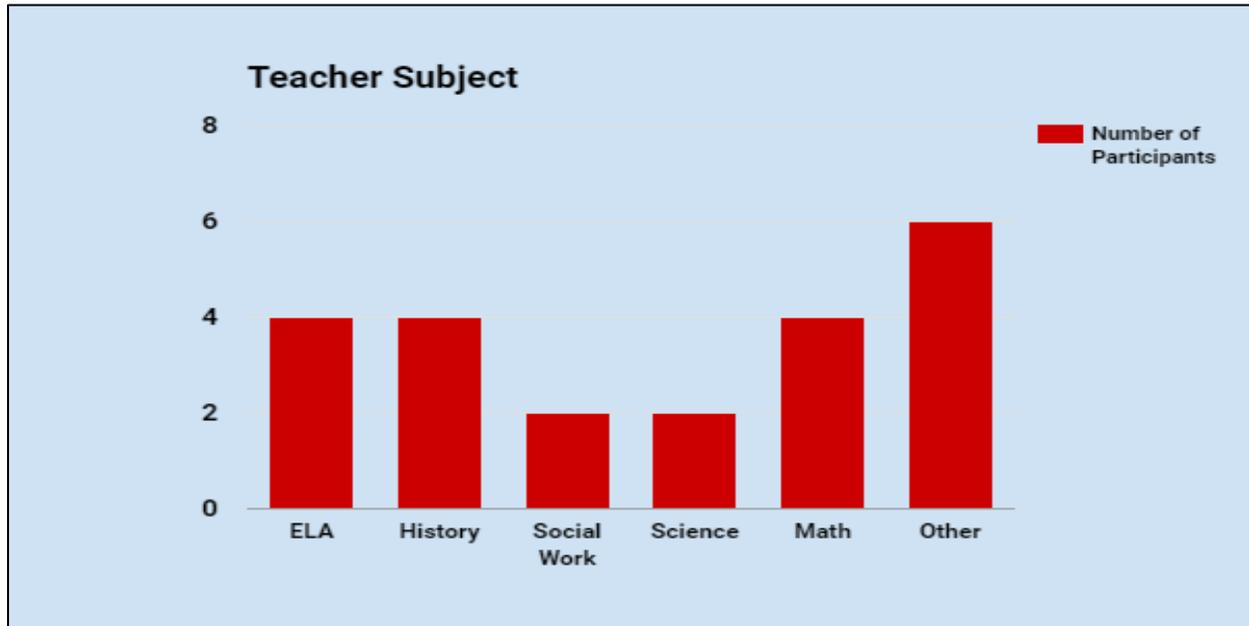
*Other: One Librarian, One Special Education Teacher, One Art Teacher, One Family and Consumer Science Teacher & Two Health Teachers

Setting

The school in which this study was conducted is an urban school in upstate New York located within a semi-suburban setting. Based on the school's relative location between a major metropolitan city and surrounding suburbs, the school contains a vast array of socio-demographic backgrounds as demonstrated by the student populace. A once fairly affluent area, this school currently has 56% of all 650 students receiving subsidized or free lunches; categorizing these students as "economically disadvantaged" by the state's board of regents. Furthermore, challenges brought on by low local income coupled with a multitude of cultural and linguistic diversity have added to additional teaching challenges in the school. Unfortunately, at the present, state test scores have determined that over one half of students within the district are below the state "proficient level" despite the efforts of great teaching and proactive interventions within the school. According to the most recent district enrollment data,

the school body is currently identified as 19% Black or African American, 16% Hispanic or Latino, 2% Asian, 57% Caucasian, and 6% multiracial. With that said, it is also worth noting that within the Caucasian category, there is a notable population of students from Eastern Europe and the Balkans. Nevertheless, despite this diversity, only 1% of all students are considered as Limited English Proficiency Students within the district.

As related to this study, the average classroom size within the school is 22 students. Likewise, the district began testing 1:1 iPad use first in the 2014-2015 school year with a select group of roughly 60 students. This number increased drastically in the 2015-2016 school year and as of 2016-2017 the school is officially 1:1 in terms of student iPad instruction.

Data Collection

For this study there are two main sources of data collection, as described below.

Open-Ended Survey:

After providing consent, all 22 participants completed a four-page, open-ended survey to state their beliefs on the ways in which tablets do or do not impact specific and broad aspects of student reading and writing compared to using paper. Likewise, in the same way that students are often granted the right to use either an iPad or paper, I provided participating teachers with the option to complete the survey digitally or on hard copy.

Semi-structured Interview:

Moreover, for the second method of data collection, five teachers participated in a 20-42 minute semi-structured interview on their perceptions of topics including students' reading, writing and annotation on tablets. All interviews were audio-recorded and transcribed for further analysis in addition to real-time field notes.

Positionality

In any study, it is of the utmost importance for the researcher to state their relationship with the participants and to be straight-forward regarding any potential bias that may exist. With that said, as aforementioned, the school selected for this study was used as a convenience sampling considering my past and present employment within the district. With all things considered, some may view this relationship as a conflict. Nevertheless, as recent research has demonstrated, the role of serving as a teacher-researcher is of the utmost importance to the field as it allows you to study educational phenomena in a more genuine context, with more familiar participants in an arena that you are most invested in. Thus, while it is true that I am already familiarized with the district and its populace and likely have subconscious schemas that I am not overtly aware of, I also have a far greater understanding of the community, student body, faculty and curriculum: providing invaluable comfortability and knowledge that will likely benefited this study immensely. Hence, as an iPad owner myself and as someone highly invested in this school and research, I have overtly acknowledged these relationships and strive for personal objectivity to the best of my ability throughout this work. It is only through objective means that true knowledge can be garnered and improvement may occur.

Trustworthiness

For these reasons, I have also used numerous and consistent measuring tools and methodologies to complete this study. To triangulate data from numerous sources, this study engages participants of multiple ages, years of teaching experience, genders and educational backgrounds in a set of open-ended, semi-structured surveys and interviews. It is only then, after participant feedback, audio-recording and field notes that I have used my expertise as a literacy specialist to break down, categorize and analyze the gathered data.

Data Analysis

As data for this study began to be received in the form of returned surveys and completed interviews, all responses were coded and analyzed using the constant comparative method of data analysis (Clark & Creswell, 2015; Shagoury & Power, 1999). In this method, all developing trends were coded, analyzed, grouped and regrouped over time as trends emerged until the most pronounced data findings were revealed. Additionally, for professional feedback, all data was analyzed by multiple literacy specialist colleagues who were not involved in this study, in order to assure that all data had been coded and grouped properly, and thus the determined findings held weight when considering both modes of data collection. Once these pronounced findings were acknowledged, I then conducted a second literature review in order to consider how findings from this study compared with work from other scholars in the field. After receiving and analyzing all 22 participating surveys as well as all five follow-up interviews, the following findings emerged regarding teacher perceptions on the impact that 1:1 tablet use has on middle school students' literacy abilities.

Finding One – No Change in Reading Speed Except for Distractions

17 of the 22 participating teachers noted that they did not believe that the mode of student reading had any cognitive impact on how quickly middle school students read despite a few outliers suggesting that either tablets or paper copies produced quicker student reading speed. As exemplified best by one of the studies participating math teachers, after being asked an interview question on whether tablets or paper copy readings created faster student reading speed, this veteran teacher responded, "No, why the hell would it?"

While these feelings were largely echoed by the vast majority of participating teachers, so was the answer to this last teacher's question: distractions. As I began to code data for this study, I became truly astonished as to how many teachers used the word "distraction" when commenting on students' reading speeds. So much so in fact, that I began to go through my two data sets and highlight every single time the word "distraction" appeared in relation to student reading. As I found, and as demonstrated in the chart below, 20 of 22, or 91% of all participating teachers used the word "distraction" within their survey responses and all five interview participants used this exact same word. Moreover, as their responses qualitatively demonstrated, teachers were concerned with the ways in which social media, real-time notifications and other non-educational tablet features and apps may distract students while reading. As a result, many teachers noted their fear that these potential distractions available on the students' 1:1 tablets helped students who were not motivated to work, to find ways of avoiding classroom readings while still appearing to be engaged. As one participating family and consumer science teacher noted:

> Paper is used for a single purpose; while a tablet is essentially a multi-tool. The lack of focus sometimes impacts reading, but can also serve to broaden students' skills and knowledge… Reading on tablets tends to suffer however, due to the always connected nature of those devices; persistent and self-perpetuating notifications distract students.

Yet, earlier in this survey, this same teacher mentioned that aside from distractions, "The size, length and complexity [of a reading] impact student reading time. As long as those variables stay the same, difference in reading speed should be negligible." Overall, this teachers responses perfectly represents the feelings of the group at large in suggesting that reading speed itself does

not or should not vary between digital and paper copy, but what may cause a variance in student reading speed is actually the existence of potential tablet-based distractions.

In conclusion, the overall results from this finding bear similar results with that of the aforementioned studies regarding the impact of tablets on student reading speed and comprehension, in that teachers predominantly believed there was cognitively no difference in student performance (Connell, Bayliss & Farmer, 2012; Dundar and Akcayir, 2012; Sackstein, Spark & Jenkins, 2013; Perrin, Paille & Baccino, 2014). Likewise, as I would later find upon my second literature review, other scholars in the field of education did however also find that students were often distracted by social media, messaging and game apps present within their school provided tablets (Hoffman, 2013 ; Kinash, Brand & Matthew, 2012; Rossing, 2012).

Figure 2
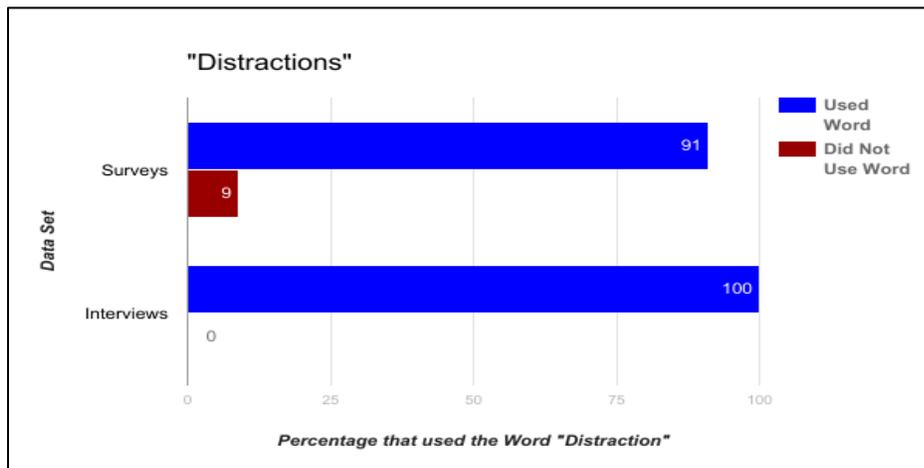
 Finding Two – The Benefits of a Keyboard

At the district in which this study was conducted, students not only have access to the touch screen keyboard available on all iPads, but also, in most classes, have access to external tablet keyboards as well. Overall, 15 of the 22 teachers surveyed believed that students' writing quality remained unchanged whether they were completing a task using a pencil and paper or their iPad. However, while many participating teachers were indifferent and two teachers felt as

though students write faster with a pencil and paper, a large portion of the teachers within this study felt as though many students could write noticeably more and write significantly faster when using a keyboard than they could when using a traditional paper approach. Yet, as proponents of this theory made sure to note, it all depends on the individual's typing ability and thus qualifiers such as "generally," "sometimes" and "depending" frequently appeared in teachers answers when asked if typing changed the length or speed of student written work. Below are a few sample responses supporting this finding:

1. "When students use a tablet and a keyboard, their writing speed generally increases" (Interview – 6th grade ELA teacher).
2. "It all depends if they have good keyboarding skills. If they are efficient typists, they'll write more, if not, they'll write less" (Survey – 6-8th grade math teacher).
3. "Keyboards can often be quicker, but it really depends on the student" (Survey – school social worker).

Finding Three – Editing on Tablets

The finding that was even more pronounced than teachers' belief that many students wrote significantly faster with a keyboard, was the overwhelming view that tablets helped students edit and revise work far easier than pencil and paper due to word processing abilities to erase, copy, paste, spell-check and grammar-check. As one interviewee boldly asked me, "when is the last time you had to write and revise a full essay on paper?" Needless to say, this question caused me to stop in my tracks. In fact, the topic of word processers and computer editing features arose time and again on participants' survey responses and interview transcripts. Below are samples of teacher responses that support this finding.

1. "I think students are more likely to write more and edit using technology. On a computer, it is easier to make corrections, add sentences and take out what doesn't make sense. The same goes for Notability on iPads" (Survey- 6-8th grade ELA teacher).

2. "Perhaps the one big difference is that when the students do type their work they are more likely to revise the work since it is easier to go back into a typed response and make changes than it is to have to erase and rewrite them by hand" (Survey- 8th grade social studies teacher).

3. "Spelling and grammar checks that are available make it much easier for students to edit and add detail" (Interview – 7th & 8th grade ELA teacher).

4. "Making revisions on a tablet is a simple swipe rather than getting eraser marks all over your desk or having to cross out pen" (Survey – 6-8th grade math teacher).

Thus to summarize this finding, the majority of participating teachers believed that student typing speed, while varied, often has the ability to be quicker than writing with pencil. Moreover, while teachers found initial essay quality to be relatively unchanged, they found that the art of editing and revising is easier for students when using a tablet word processor rather than old-school erasing and re-writing. While in reality some students may write much faster when using a keyboard, these results do in fact clash with the previously discussed 831 participant writing study conducted by Davis, Orr, Kong and Lin (2015) that found no change in average student writing speed, quality or length. Hence, this is another finding that will be discussed further within the implications section of this work.

Finding Four – It All Depends On the Student

Anyone who has completed a degree in teacher certification has heard the same good old cliché more times than they can feasibly count: "Every student is different." While I am sure the voice of one of your most memorable professors is now ringing in your head, science and research suggests that this age old proverb is in fact true. While students may bear many similarities in their abilities and learning styles, no two students are the same, and this is largely because no two people, especially no two adolescents are the same. As I described in detail within the body of my literature review, the most renowned social theorists in the field of education have produced endless works describing the ways in which our life experiences, perceptions and attitudes can drastically impact our actual, tangible abilities on most tasks. So, in hindsight, when providing 22 teachers (with an average of 14.8 years of in class experience) with an outlet for their voice, I truly shouldn't be surprised that most teachers let me know, "It all depends on the student." As this study found, like any topic regarding education, students' preferences, reading abilities, writing abilities and annotation tendencies using a tablet versus paper varied drastically from student to student! As my participants attest, different students show different strengths and weaknesses depending on whether they are using a tablet or paper copy. If students are good at typing, teachers found they wrote faster and longer. If students don't like typing, teachers found they wrote slower, shortage passages. Similarly, participating teachers believed that some students read quicker on tablets while others read slower. Student to student, it all depends on their experience with technology and their personal abilities. But don't take it from me; let us look at what many of the teachers had to say.

1. "I think this all depends on the student and their learning strengths. Some students prefer not to fumble around with paper or paper text. For others, the tactile sensation of manipulating the page allows them to stay engaged better. In the same way, the use of

customization may help some, but distract others" (Survey – 7th grade special education teacher).

2. "Some students prefer to read and write with paper and some prefer to use their device. I think it is our job to help them find an approach that works best for each student while exposing them to a number of assignments using both [tablet and paper] to prepare them" (Interview – 8th grade social studies teacher).

3. "I don't believe that there is a right or wrong option for all students. This is something I believe the students need to learn to do to be successful in many future fields, but at the middle level they need to be given the option so that they can see which works best for them, not what the teacher wants them to use" (Survey – 7th grade social studies).

Finally, while these samples of dialogue appropriately voice teachers' beliefs that all students are different and must use what methods work best for them while becoming use to all of the options, it brings up the discussion of student choice and the future of 21st century literacy. For as renowned authors including Troy Hicks (2013) and Sue Lockwood Summers (2005) suggest, we must not only prepare students for changes in content, but also changes in the crafting of literacy. Implementing diverse forms of multimodal text within daily instruction and assessment can help make learning more relevant for students while providing ample outlets to acquire and demonstrate knowledge. In reality, the world of communication outside of our schools is changing, and therefore it is time that we address and prepare students for these changes within our classrooms. Handwriting will always be a required skill, but it also appears that digital writing is here to stay. So isn't it time to note these changes, prepare students to craft and analyze different forms of writing and allow for choice?

Finding Five – Get that Stylus Out of Here

As discussed earlier in this work, two recently conducted and meticulously designed studies by Alamargot & Morin (2015) and Gerth (2016), have demonstrated the ways in which the reduced friction surface of a tablet can create added graphomotor challenges for the writer. With less friction (when writing on a tablet), one must adjust their pen lifts, writing velocity, air time and overall hand-eye coordination to match the less familiar writing surface. As a result, both studies noted that while the writer can adjust to the surface of a tablet, initial use of a tablet pens results in larger and faster writing that is less automatic for the student.

Nevertheless, in other findings of this study there were inconsistencies between teachers' perceptions and noted student outcomes from other research works. So did the participating teachers of this study agree: undoubtedly!

With the exception of using a stylus or finger to add in-source annotations, teachers overwhelmingly spoke out against the use of tablet writing without a keyboard. With consistent and numerous mentions of sloppy writing, added grammatical errors, unclear abbreviations, illegible text, inconsistent writing size and slower writing than either typing or a paper writing; all but three teachers in this study spoke out against the challenges of using a stylus or finger to write on tablet. In fact, participant responses on stylus and finger writing elicited the most capitalized responses and frequently the most passionate. Included below are samples of participants' views on the matter according to interview and survey data.

1. "I HATE when students write with a stylus and ESPECIALLY with their fingers. It goes against everything they've learned since kindergarten - the proper way to

hold a pencil, the necessity of writing neatly, etc…" (Survey- 6-8th grade math

teacher).

2. "I find that students who already write poorly produce virtually illegible work

when using their finger and tablet" (Interview – 7th grade special education

teacher).

3. "It is TERRIBLE – part of it is how long it takes for them to try and part is just a

lack of fine motor skills in teens" (Survey- 7th & 8th grade ELA teacher).

4. "Even as a teacher, I find it difficult to write on the iPad" (Interview- 6-8th grade

math teacher).

So, should the use of writing with one's finger or a stylus be banned in school altogether?

This is yet another topic I consider within the implication section of this work.

Discussion

Over just the past few years, throughout much of the United States, 1:1 tablet use in the

classroom has shifted from an extreme rarity, to a near commonplace phenomena. With such a

swift pace of tablet growth and educational implementation, this study has demonstrated the

pronounced need for relevant research to match this stride. Moreover, while it is important to

understand the cognitive changes that may result between learning on a tablet versus using

traditional methods of schooling, it is also important to take into account the assertions of our

nation's highly qualified teachers that witness observable changes in student literacy on a daily

basis. For these reasons, this study set out to qualitatively analyze and listen to the voices of a

diverse group of middle school teachers from one particular district, spanning a large range of

content areas, years of experience and personal technological ownership. Through triangulated

data including open-ended surveys and semi-structured interviews, data were collected and then

coded using the constant comparative method and screened by additional literacy specialists to

reveal key findings regarding teacher perceptions on 1:1 tablet instruction. In summation, this

study set out to answer the following overarching question:

- ✓ How do teachers believe in-school tablet use is impacting middle school students'
  reading and writing skills?

As the concluding data demonstrated within the prior section of this work, four key

findings from this study emerged to help address this central question. Broken down in simplest

terms, these findings are as follows.

1. Teachers believed that there was no cognitive difference in student reading speed
   or comprehension between reading on a tablet versus using a digital copy.
   Teachers did however overwhelming feel as though distractions from tablet use
   could nevertheless create artificial differences in student reading speed and
   comprehension.
2. Teachers believed that the use of a keyboard for longer writing assignments made
   students more likely to edit their work: as they felt editing and revising are easier
   for students on tablets rather than on paper.
3. Teachers believed that all students are unique in the way they respond to and
   benefit from either paper copy work or tablet-based literacy instruction.

4. Teachers believed that students' writing legibility was diminished greatly when using a tablet pen versus a traditional pen and paper approach.

Hence with these notable teacher perceptions in mind and many more documented statements, it is now important for us to consider the major conclusions produced by this work as well as the implications these findings may have on daily literacy instruction at the middle school level.

Conclusions

As the findings from this study reveal, there are still many areas in which the majority of teachers are either in agreement or dispute over the impact that tablet based literacy instruction may be having on middle school students' respective reading and writing performance. Nevertheless, the polarization on the majority of these topics has proven to be far less extreme than originally presumed. Below are the largest conclusions from this study based on areas of teacher agreement.

All Teachers and Students Respond Differently to Tablet Instruction

If we are to believe the findings of this study, then we must consider that all students respond differently to tablet and paper instruction. If this evidence is indeed true, laws of probability would suggest that varying classes may have dissimilar numbers of students that either excel or struggle with specific aspects of literacy either on tablets or paper copy. Hence, teachers who instruct these different classes would, even objectively, note different observations regarding student literacy performance. Yet, even when considering this notion, we must understand, as the literature review discussed, that even when teachers attempt to be objective, it is inevitable that their life experiences shape the way they perceive the world around them:

including events within their classroom. With different schemas and underlying perceptions on tablet based instruction, specific outcomes are likely perceived through different lenses from teacher to teacher. So, while it may be considered an ambiguous and unappealing conclusion, the reality is, that while over time more teachers may agree on the results of this subject matter, likelihood is that many teachers will always have different perspectives on this topic. This is exactly why this given topic needs more qualitative and quantitative research as technological growth within our nation's classrooms continues to increase.

Addressing a Need for Professional Development

Yet, while some teachers may always continue to dispute the impact of tablet based literacy outcomes on adolescents, there are a few matters that we can likely all agree on. The first is that increased professional development focused specifically on technology based instruction can greatly improve the ease of this digital age transition and likely improve the field of education while providing better implementation of these oh so expensive classroom devices. Regardless of the side of the debate that teachers were on throughout this study, I found that teachers of all walks felt comfortable in telling me that they believed additional professional development could create better use for tablets in school. Through professional development, teachers could gain a better understanding how to successfully teach with tablets, classroom manage and provide greater choice.

Allowing Only Education-Based Applications on School Devices

Finally, the conclusion must also be made that schools would likely benefit if they allowed or programmed school tablets to only hold education based applications. Through such programming, teachers would likely face less classroom management issues with tablet

instruction as students would have less "distractions" to fixate on: as was discussed in great detail within the first finding of this study. Optimistically, with time, such an administrative move could even create a paradigm shift in the way that students view tablets in school. Once viewed by some as a fun technological device that holds the power of social media communication and games; many more students may start to view school tablets as strictly an educational tool. If nothing else, it is hard to see how this administrative move would be detrimental to tablet-based school instruction.

Implications

So, with all these findings and conclusions in consideration, how does what we have learned from this study impact the way we should go about our everyday instruction as teachers? While all teachers and students are different, the recommendations offered in implications to follow may very well benefit classrooms of all backgrounds.

Tablet Use Creates New Classroom Management Challenges for Teachers

As we have learned, while tablets may offer innumerous uses within the classroom, they unfortunately also can provide innumerous distractions for our students. So, as many districts have yet to ban social media and gaming applications on school devices, the onus may lie on teachers to find effective means for reigning in non-educational tablet use during regular instructional time. Different teachers may go about combatting this task in various ways, but here are a few quick suggestions.

For one, set expectations early and often. Just as we are with all other aspects of our instruction, we must model and explicitly state what we expect out of our students. This holds true for tablet instruction as well. Create a code of conduct, model proper tablet use and

administer consistent consequences for improper behavior. Through these clear expectations, whether students abide by these rules or not, at least they will know what is expected of them when reading or writing on a tablet.

Second, if you can't beat em' join em'. Tablets are entering our classrooms. Like it or hate it, it is certainly the truth as demonstrated by the astounding statistics provided within the introduction of this work. So, if we know tablets will be in our classrooms, as teachers, we must learn for ourselves or through professional development the best ways to teach with them while limiting student distractions. As a teacher, if you are better with the technology than the students, then the ball is in your court. A plethora of new applications now exist such as Casper Focus that allows teachers to lock students' tablets into only teacher-chosen apps during class time. Using these apps, if you can't trust that your students will stay on task while using tablets for reading and writing on their own, to a degree, you can administratively ensure it.

Teachers Must Provide Choice While Preparing Students for New Literacy

As a number of renowned critical multiliteracy scholars of the 21st century have demonstrated, we are currently living within one of the fastest vicissitudes in terms of literacy that our world has ever seen (Bull & Anstey, 2007; Hicks, 2013; Larson & Marsh, 2015; Stevens & Bean, 2007). The definition of, and requirements for determining what it means to be a literate citizen have been malleable and ever-changing since our nation's founding. So, while during the Civil War one may have been deemed literate simply by signing his or her name and writing a few simple sentences; in today's world it is becoming increasingly more difficult to communicate successfully with the world around us without keen knowledge of social media systems, word processors, e-text, text messaging, email and the plethora of other multimodal

forms of communication that now permeate our everyday existence. Day to day, the modes of reading and writing that our students are engaging in are far different than what was even thought possible merely a decade ago. Thus as these changes continue, so too will the needs of our literacy instruction.

In this day and age, it is not sufficient enough to simply teach without incorporating digital web texts, audio texts, video texts and dare I say it, even social media considering the diverse works that our students now consume. For, as modes of literacy outside of our classrooms continue to change, so to must our in-school instruction so that we may prepare students to be successful readers and writers in the 21st century. We must now teach students how to navigate, craft and analyze these new and growing forms of literacy so that may communicate successfully, evaluate quality work, determine fact from fiction, identify biases, pick up on subtext, define hidden agendas, locate quality sources and simply function as knowledgeable members of our modern society.

Moreover, in instructing with these diverse modes of literacy through both paper and digital copy, we can provide options to our students. These options may help play to students strengths while improving upon their literacy weaknesses. Through choice and differentiations of texts, our students may even become more engaged as they learn.

If the findings of this study and the age old adage hold true, all students are indeed different and thus learn in different ways. Due to this reality, we must let students learn through the means that they most prefer and succeed with, but not ignore those with which they struggle. We must allow for options, but know that the current generation of students will be expected to master both digital and traditional reading and writing within the near future, if not already.

When to Use Handwriting, A Keyboard or a Stylus

As is the case with most things in life, there is a time and place for everything. This saying holds true when we consider the implications for writing, as drawn from the findings of this study.

As aforementioned, the time has come when students need a great deal of exposure practicing both traditional and digital writing. Students need handwriting proficiency. Students need e-text proficiency. However, there is a right time for everything. For one, when possible on written responses, teachers should provide the option for students to respond either via tablet or personal handwriting so that students may demonstrate their learned knowledge in the most comfortable way possible. Nevertheless, there are times when students need explicit instruction and practice using specifically either digital writing or handwritten response. This is why instructional differentiation is so important.

Likewise, when following the results of this study, it is suggested that one such time when students should be allowed to use tablets is during longer writing assignments. For, in the direction the world is moving, there will be very few times in which adolescents of this generation will actually have to write a handwritten essay, handwritten research paper, handwritten work report or handwritten communique in the real world outside of school: not to mention, even school testing is pushing in the digital direction. Thus, while having some long handwritten responses is good practice and certainly won't hurt he class, for the most part, during longer writing portions, students should be allotted the opportunity to use a keyboard and word processing system. For as we all know, it simply is easier to edit a lengthy work using a word processer, where spell-check, grammar-check, copy, cut, paste and erase are just a simple

click away. There is only so much competition that eraser smudges, paper rips and white-out can handle.

But now, what about the stylus? Do we just throw it away? No. While both physiological research and this qualitative study have demonstrated, it is indeed very likely that tablet pen writing produces sloppier, less consistent, less legible handwriting. Yet, this doesn't mean that this mode of writing has no purpose. Rather, teachers must pick and choose when they have students use these different writing skills. Does it make sense for students to write an entire essay with a tablet pen; no. Does it make sense for teachers to have students write long, open-ended responses using a tablet pen on a digital worksheet; no. However, can tablet pens be used for notes, in-text highlighting, text annotation and a number of other uses to benefit student learning; absolutely. As teachers, we should master all of these different writing options, practice them, understand their strengths and weaknesses and then tailor our instruction to help students decide when it is logical to use each respective form of writing.

Limitations

While this study used a research supported design and was forthright in its methodology and triangulation, it is still of the utmost importance to consider the ways in which this study was limited. So, to begin, the first evident limitation of this study lies in the sample size of its participants. For while the 22 teachers involved in this study did in fact represent a diverse range of ages, subjects, genders, years of experience and personal technological ownership; there were still only 22 participants total, all stemming from the same school in Western New York. It is feasible, that even if the beliefs and perceptions of the teachers involved in this study are accurate, that teachers from different schools in different regions of the country may witness

entirely dissimilar student behaviors and literacy outcomes. For these reasons, a larger sample size of participants, including multiple schools in different states and population densities may be desirable for similar future works.

Lastly, are the limitations in this study's data collection. While teacher interviews and surveys did in fact yield great qualitative feedback, follow-up observations would have been beneficial in that they could have potentially helped add to and evaluate teacher perceptions on student literacy outcomes. This data would have also added greater triangulation and reliability to this studies overall design.

Suggestions for Further Research

Finally, when considering the work and findings of this study, it has been revealed that a great deal of research must still be conducted on the topic of tablet-based student literacy outcomes. Cognitively and physiologically, scientific studies must continue to analyze whether students in fact read or write differently when using a tablet versus paper copy. Meanwhile, as a field, we must continue to analyze the ways that teachers and students themselves feel as though tablet reading and writing may be consistent with or dissimilar from traditional paper literacy.

Lastly are the topics of motivation, engagement and personalization. These topics, while having already received slightly more attention from the research community, must still be considered further. Can tablets motivate students to produce higher quality work? Can tablets be personalized to meet the specific needs of particular students with disabilities? How do socio-economic status and personal demographics play a role in this equation? These are all questions that must be considered with greater detail, as answers to these questions could assuredly change the way we think about classroom instruction and could potentially foster better research-based

instruction that could lead to improved student learning outcomes across the board. These are the

reasons, I penned this study. These are the reasons we continue to engage in educational

research. These are the ways we improve the field of education.

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