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The Internet Search Strategies of Successful College Students

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Abstract

Finding credible information online is an important 21st century literacy skill, yet many young people struggle with online information-seeking. In this article, we analyze a transcript of a focus group conversation with college students in a Science Communication course at an elite university in the United States. We asked the students to discuss what they had been taught in secondary schools about searching the Internet for information as well as what they actually did when looking for information online. Using discourse analysis, we analyzed the transcript and identified six "rules" the students used for finding information online, rules that were quite different from the ones they had been taught formally in schools. We conclude with recommendations for teaching Internet searching in more nuanced ways in order to prepare all students for an information-dense future.

Keywords: Internet search; digital literacy; digital skills; discourse analysis

In the fall of 2013, we conducted a focus group in a Science Communication course at a highly selective university in the United States. Our goal was to understand how the students in this class—all of them extremely accomplished by school standards—thought about looking for and assessing information online, especially information about science. Most of these college students had grown up in the age of the Internet and had obviously learned to navigate the information-seeking requirements of school. We hoped our conversation with them could inform our work with secondary students and their teachers.

For several years prior to this focus group, we had been concerned by what we saw in the secondary classrooms where we worked as researchers and professional development providers. In some contexts, students had trouble getting access to the Internet during the school day: the number of computers was limited and/or so many websites were blocked that research was difficult. Even in schools where access was not a problem, both students and their teachers had difficulty talking about and finding credible information online. Many teachers and students fell back on simplistic rules to judge credibility: don't use Wikipedia, for example, or always go to dot edu websites (see Kohnen, in press). Stymied by these rules and without knowledge of other credible sources of information, we witnessed students struggling to satisfy their information-seeking needs.

Our goal in the focus group was to unearth the actual Internet search habits of these successful college students and to compare their online search strategies to what they had been taught in secondary school and to what we had observed in secondary classrooms. The disparities were striking.

Using discourse analysis (Gee, 2005), in this paper we will examine how the students and researcher co-constructed rules for searching the Internet that were more nuanced or in direct contrast to the rules they remembered being taught in school. We conclude with implications for teaching information-seeking as a complex and critical literacy skill.

Literature Review

As of 2015, the Pew Research Center reported that 84% of U.S. adults use the Internet; the rate is 95% for college graduates. The Internet has become society's collective memory (Sparrow, Liu, & Wegner, 2011), yet the advantage of having information available through nearly constant access to the Internet is negated if individuals cannot efficiently sift through and make use of that information. The sheer quantity of available of information has led to a "division of cognitive labor" (Thomm & Bromme, 2012) "requiring everybody to rely on specialized experts and their expertise" (p. 207). However, seeking, accessing, and understanding credible sources of information online presents challenges; even young people, often considered "digital natives," are not uniformly skilled Internet users (Boyd, 2014; Eynon & Geniets, 2016; Stanford History Education Group, 2016). Individuals often access multiple, sometimes conflicting, sources of information online in an attempt to solve a problem or learn about a topic; those with limited prior knowledge may not even recognize the contradictions in the information they read (Braten, Stromso, & Salmeron, 2011), even though "multiple document comprehension" is considered a "prerequisite of digital literacy" (Goldman & Scardamalia, 2013, p. 255).

Therefore, it is no surprise that finding and evaluating information has been identified as a 21st Century work skill. As the Partnership for 21st Century Learning states:

Today we live in a technology and media-suffused environment with: 1) access to an

abundance of information, 2) rapid changes in technology tools, and 3) the ability to

collaborate and make individual contributions on an unprecedented scale. To be effective

in the 21st century, citizens and workers must be able to create, evaluate, and effectively

utilize information, media, and technology.

Despite this goal, students at all age levels have been shown to have particular difficulty

navigating the Internet landscape (Brand-Gruwel, Wopereis, & Walraven, 2009; MaKinster,

Beghetto, & Plucker, 2002; Walraven, Brand-Gruwel, & Boshuizen, 2008), even those who

express confidence in their ability to do so. Students report using the Internet regularly as a

source of information, including for academic assignments, because it is deemed "easy" to use

(Barker & Julien, 2012). However, students struggle to assess the credibility and accuracy of

online information (Brem, Russell, & Weems, 2001; Goldman & Scardamalia, 2013) and often

make judgments about how relevant a source is based on how easy it is to access (Heinström,

2006) or how often a key word appears (Holman, 2011). Even college students, who tell

researchers that credibility is an important factor in online research, privilege easy-to-find

sources over credible ones (Rieh & Hilligoss, 2008). This is perhaps the most challenging for

non-experts, including students, when they navigate rapidly changing Science, Technology,

Engineering, and Mathematics (STEM) fields (Aikenhead, Orpowood, & Fensham, 2011;

Bromme, 2005; Bromme, Kienhues, & Porsch, 2009; Seethaler, 2009).

When students are asked to judge the credibility of sources, they often engage in "source

evaluation" rather than "text evaluation" (Thomm & Bromme, 2012), making credibility

judgments based on such factors as domain name and web design rather than the content of the

source or the relevance of the information to the task at hand (Barker and Julien, 2012;

Eysenbach, 2008; Holman, 2011; Warnick, 2004). Students show little awareness of the

difference between search engines and databases and the different search strategies that each

requires (Holman, 2011); young people describe themselves as developing their own search

strategies through trial and error (Head & Eisenberg, 2009). Once they find source, their reading

habits have been described by the University College of London's CIBER project as "horizontal

information seeking" or skimming quickly and moving on, often clicking hyperlinks along the

way: "this horizontal seeking does not always involve a systematic approach to searching for

information; rather students almost accidentally come across information and use what they

immediately find" (Holman, 2011, p. 20).

Student search strategies may be due in part to the way schools have approached

research in general and the Internet in particular. Goldman and Scardamalia (2013) found that

most school assignments require students to operate in "belief mode" (tasks where previous

research is something to be learned) rather than "knowledge creation" (tasks where previous

research is something to be built upon). To complete "belief mode" tasks, students may only

need to find the "correct" information, regardless of source; in contrast, knowledge creation tasks

require the "constructive use of authoritative sources" (p. 264) as part of building new

knowledge. Yet understanding which sources may be "authoritative" is a challenge for students

when their access to the Internet is limited. In a 2012 Pew survey of U.S. Advanced Placement

and National Writing Project teachers, 97% of teachers surveyed worked in an environment

where Internet filters were in place (Purcell et al., 2012). For "digitally excluded" youth, access

outside of schools is also problematic (Eynon & Geniets, 2016).

In summary, secondary schools are quite different from the "real world" of searching for

information, a world with no filters and where information sought is often needed for building

knowledge or making decisions. As students leave secondary schools and move into college and

careers, they are often ill-prepared for the information-seeking challenges that await. Despite this

lack of preparation, many students do figure out how to meet their information-seeking needs in

college. In this focus group, we sought to understand how.

Methods

Data Source and Context

This analysis is based on an excerpt of a focus group discussion with 14 students at a

U.S. university on the topic of Internet searching in general and source evaluation in particular.

The university is regarded as one of the most academically rigorous in the U.S., regularly

appearing on "top ten" lists (e.g., *U.S. News & World Report's* National University rankings) and

having one of the lowest acceptance rates for undergraduate admissions. The focus group was

conducted in the fall of 2013; students were all enrolled in a Science Communication course for

the purpose of fulfilling a humanities requirement (most, though not all, students were majoring

in a STEM field). The focus group was facilitated by Wendy Saul, whom the students did not

know prior to the classroom meeting.

Data Analysis

The recording was transcribed by a third-party service. Once the transcription was

complete, we listened to the audio and corrected basic content errors in the transcript. The full

recording was 66 minutes long; the first 5 minutes included introductory remarks by Saul

followed by warm up conversations of pairs of students. At approximately the 7-minute mark,

Saul asked the group to share their thinking with her. The next 23 minutes form the basis of this

paper and include back and forth exchanges with Saul about Internet searching, rules of

credibility taught by schools, and sources of science information. At the 35-minute mark, the

discussion turned to concepts of writing, good writing, and writing assignments, which are

outside the scope of this paper.

We chose to use discourse analysis (Gee, 2005) in order to understand how meaning was

constructed collaboratively by Saul and the students in this conversation. We began by dividing

the transcript into 454 "idealized" lines (Gee, 2005), lines with one new piece of information.

This allowed us to create stanzas according to topic (see Table 1).

Following Gee's (2005) method of discourse analysis, we next asked the following

questions of the transcript: "what identity or identities is this piece of language being used to

enact?" "what conversations are relevant to understanding this language?" and "how does

intertextuality work in the text?" The students were invited to enact the identity of successful

students, "insiders" to a world Saul wanted to understand. Throughout the discussion, the

students took up this identity, revealing Internet search strategies and habits that often ran

counter to what they had been taught. In this way, the discussion was a "counter-conversation" to

the conversations about credibility that we had observed in the secondary schools. The

discussion was highly intertextual, assuming shared knowledge of the Internet and various

sources, including JSTOR, Wikipedia, Google, blogs.

Table 1
Transcript Macrostructure

Stanza/line numbers	Topic	Representative Excerpt	Summary
I. 1-79	Parents	"I grew up with parents who studied physics in college"	3 vignettes from 3 different students about childhood
II. 80-160	Books and Credibility	"that's just what's in a printed textbook, not with journals online"	Errors in textbooks; changes in textbook content over time; teacher/school preference for books over online sources
III. 161-292	Wikipedia	"Wiki will give me the basic intro"	Longest stanza in the transcript; co-constructed by several students, the professor, and Saul; various times

			Wikipedia is used contrasted with teacher/school rules about Wikipedia
IV. 293-413	Dot coms	"there's information that you can only find on dot com sites"	Dot com information as reliable; the use of multiple sources to corroborate information; teacher preferences for unambiguous rules; bias in all sources
V. 414-454	Blogs	"most fields have at least a core group of respected bloggers who might be professors"	"Good" blogs; blogs written by graduate students

Other than the "Parents" stanza, each of the four stanzas in the transcript consisted of the students and Saul co-constructing ideas about credibility. In each case, the students grappled with a "rule" about credibility that is taught (or implied) in schools. After rereading the transcript several times, we began to see a trend in the discussion. Someone (either a student or Saul) introduced a rule of Internet searching, students commented about the rule and offered their own experiences as examples or counterexamples, and the students generated their own, often quite different, rule. To analyze this pattern, we created a "rules" table (see excerpt, Table 2). The conversation was organic and, as such, didn't follow the pattern exactly, but creating the table was useful to see the contrast between the rules students had been taught and the students' own rules of online searching and credibility. Within the table, contributions made by Saul are italicized.

In the remainder of this paper, we will explore the rules that Saul and students co-constructed under each of these topics.

Table 2
Rules of the Internet Excerpt

Stanza	Outsider rule	Student commentary	Student behavior	Student-created rule
II. Books	"If you see a typo or you see an error in the	"If you don't know it well enough to find an error in their	"We found a lot of errors in one of the company's books and we joked that there might have been	Checking information is important for both books and online

	information" (90-91)	information, then you wouldn't really know" (93-94)	just as many errors in the bio book that this company made, but we would have never known because we didn't have the means to check that book" (121-123)	sources (both are likely to be flawed), but most information cannot be verified by novices. Checking information is only useful in verifying the accuracy of "equation-based" information
IV. dot coms	*"so you've got this rule in schools, 'don't use any dot coms'"* (293)	"one of the reasons that it's just so pervasive is simply because it's unambiguous" (347)	"I was doing a project last year on primarily on rare earth elements, so we had to look at a lot of mining programs. We also looked at a lot of environmental sites that were opposed to those mining programs, a lot of government sites that were talking about, like, regulations" (361-364)	"every single site was biased, they were all biased in different ways. If we'd had a dot com rule, that would have completely destroyed it. It wouldn't have been able to work. We would have been missing that voice in the debate" (377-380)

Findings and Discussion

In her introductory remarks, Saul explained that she had worked for decades in underserved elementary and secondary schools, trying to "level the playing field." In order to support these students, she wanted to understand how the focus group students had learned to access information (particularly science information) and judge the credibility of what they found.

Saul's introductory remarks positioned the students as "experts" and throughout the discussion she made comments that privileged the students' age, knowledge, and school experiences. Her comments encouraged the students to see themselves as shaping her understanding of what it is like to seek and find information online. The students appeared willing to embrace this role. Although not every member of the class participated equally, many

participants offered their ideas and much of the conversation included challenges to what they had been taught. In some instances (discussed below) the students appeared cognizant of the classroom professor's presence and qualified their comments, but mostly they seemed to be thinking through their actual search strategies.

After describing the purpose of the research and allowing the students time to talk in pairs, Saul began with the broad question, "Who are you and how did you get to be good at what you're good at and why are you bad at what you're bad at?" (2-4). Probably because of Saul's early comments about the importance of conversations about science and credibility in the home (comments not included in this transcript), the students began the discussion with stories about childhood. The three students who participated in the first stanza ("Parents") offered three different portraits of parent-child interactions around science information outside of school settings. In all three cases, science information was a part of life outside of school, though sometimes the interaction was child initiated and sometimes parent driven. These childhood experiences were portrayed as precursors to concepts about credibility that were learned in school. The students identified themselves as people who interact frequently and comfortably with scientific information and who have done so from a young age. The third student to participate concluded her story with, "I also went to like really good schools, so we definitely did have actual lessons in 'this is a credible source, this is not a credible source,' but that came later" (81-83), giving Saul an opportunity to turn the conversation to school and school practices around credibility.

The Role of Print Sources

The first cluster of comments about school practices, most occurring in the "Books" stanza, appeared to challenge the notion that print sources are superior to online sources. The "rule" students were discussing was stated or implied several times:

- "Teachers in middle and high school would sometimes say, 'Hey, you can only use one Internet source on this project,' or they would say, 'Don't use any Internet sources because nothing is trustworthy on the Internet'" (148-151)

- "It was expected that books were sort of a higher standard" (159)

- "I had a similar experience where we weren't really encouraged to use Internet sources very often" (279)

Different students characterized this concept differently. The student who first brought up the idea of books was actually talking about a different school-based credibility strategy: "If you see a typo or you see an error in their information, that's not a credible source" (90-92). Although this "rule" was taught to him in the context of online research, the student described the process of finding errors in his physics textbook (a print source) and how this caused him to question his biology textbook too. The problem with the rule, he stated, was that it was "based on confidence" (95) and on an ability to double-check the presented information. In the case of biology, the student said, "you can't actually go and do the experiments they did to reach these conclusions. You have to take their word for it" (101-102).

On the surface, the student was not making a comment about privileging print sources but instead was commenting on the limitations of a different, common school rule: "check for errors." If you can't actually check, the student pointed out, then the rule is useless. Science teachers know this, of course, and most expect their students to rely on the textbook for answers, a problematic expectation for this student who found errors in his textbook.

What was interesting to us was the fact that the student took this "online" rule and applied it to a print resource. When the student first made his comment about error checking, Saul assumed he was talking about online research and asked a follow up question. The student replied, "I don't know much about sites" (113) and then explained the errors he found in the textbook and his subsequent doubt. For this student, a rule about credibility was one that could apply to both online and print sources. His comments treated the two kinds of sources equally, negating the need for rules that would only apply in an online environment. Students, especially those who have been using the Internet from a young age, may not consider the divide between online and print resources to be as vast as some of their teachers do.

The importance of age and experience online was also brought up by the only non-traditional student in the class. At age 48, she described herself as having a "dual set of experiences" with the concepts of credibility and research (125): "the first time through, credibility meant primary sources…and coming back recently and hearing discussions about credibility, about whether or not it's okay to use Wikipedia and that you go through government sites or dot edu…it's elusive" (130, 132-134, 142). She supported her conclusion that credibility is "elusive" with a description of reading a biology textbook. She owned two biology textbooks; one was 30 years older than the other. She described the two texts as having "different facts and different truths…and that's just what's in a printed textbook, not with journals online" (138, 141).

For this student, one with a "dual set of experiences" around research, the division between print and online research was more complicated. Unlike the first participant in this section, she did not naturally apply rules about credibility created for the Internet to print sources. She was much more aware of the perceived differences in types of sources and

wondered out loud about the utility of such divisions. The fact that scientific information

changes should not have surprised anyone in this class; as students taking a class on science

communication, they would be well aware of the rapid pace of scientific research and the

purpose of science to refine and revise previous conclusions. What worried this student appeared

to be the *perception* of differences in the kinds of sources. If a printed textbook—a source that

students were not regularly encouraged to question—could have incorrect "truths," she

suggested, then of course the credibility of online sources would be challenging. Her conclusion

appeared to be that a simple set of rules (she enumerated rules against Wikipedia and privileging

government and education sources) was insufficient.

Other participants who commented about print or online sources were more direct in their

explication of the "rule" they had been taught. The idea that teachers believed "nothing is

trustworthy on the Internet" (151) was an overstatement, the student who said this later admitted,

but many students agreed that "books were sort of this higher standard" (139) according to their

high school and middle school teachers. These students characterized this rule as outdated. In

fact, one student commented, "as soon as you get to middle school, I mean, books, you pretty

much don't use them at all for sources anymore" (276-277).

The students collectively concluded that print sources may be presented as more credible

than online sources, but they were not as useful as online sources for a variety of reasons (some

of which are discussed below). In addition, print sources had their own problems—they were

quickly outdated and were also subject to the same kinds of errors as Internet sources. For these

reasons, students rarely used print sources for their research in or out of school. The students did

not interrogate the rule further nor did they discuss the reasons teachers might consider books a

"higher standard." The concepts of editorial oversight and peer review were not discussed, and

no one mentioned the complicating factor of sources that are available both in print and online.

Student conclusions:

- All sources, online and print, may contain errors. Online sources are preferable to

  print sources because they are less likely to be out of date and are simply easier to

  access. (see Table 3 for all the student-created rules from this discussion).

- Checking for typos and errors is an inefficient strategy unless you really know the

  content well.

Wikipedia

The discussion of Wikipedia was the longest section of the excerpt, involving several

students, the professor, and Saul. The first time Wikipedia was brought up in the conversation

was when the non-traditional student listed "Wikipedia doesn't count as a source" in her

enumeration of the "new" rules she encountered when she returned to school. Wikipedia was

next mentioned when the students were discussing how much the rules have changed in their

memories. The student who next introduced Wikipedia struggled to articulate his point, perhaps

anticipating an argument from his professor or Saul:

> I think that recently, that's really changed. Even Wikipedia, there are, I think, I see
>
> [Professor] is, because Wikipedia doesn't count as a source. Well, I mean, I think that's
>
> probably a really good practice, but it turns out—or my impression is that within, for
>
> example, algorithms in computer science, Wikipedia is actually a really, really, really
>
> great source and in fact, I actually know of a class, a graduate algorithms class here at
>
> [university] where the final assignment is you can either solve an open problem or you
>
> can update a Wikipedia article. (161-168)

The student's hesitations within his speech indicated that this was a topic he was treating carefully, conscious of the fact that his professor, who was in the room, had forbidden the students to use Wikipedia as a source of information in their writing. In discussing how credibility ideas have changed recently, the student presented Wikipedia as an extreme example—"even Wikipedia." Despite the fact that the professor didn't allow Wikipedia (which the student claimed to believe is "really good practice"), this student considered Wikipedia a "really, really, really great source of information" on specific topics.

In his comments, this student put together tangentially related ideas. The professor's position on Wikipedia was that it was not acceptable to *cite as a source* in an assignment for the science communication class (the professor clarified this position later in the discussion). To counter this rule, the student claimed that students in graduate level classes were allowed to *contribute to Wikipedia as authors* for their final exams. Because students are allowed to contribute to Wikipedia, the student claimed that Wikipedia is a "really, really, really great source of information" on topics like computer science and algorithms. This may be a reasonable conclusion. Although the student did not fully explicate his argument, the fact that the algorithms entries on Wikipedia are being updated by graduate level students from the university does suggest that Wikipedia is a reasonable source of some information. The student also appeared to be identifying more as an author of Wikipedia articles than as a consumer of information. Consumers might be able to be fooled by inaccurate information on Wikipedia, but this student was not one of them.

Rather than directly challenge the professor's ban on Wikipedia, this student added nuance: Wikipedia could be a good source for computer science information and still not be acceptable for science communication papers. Another student added a layer to the Wikipedia

discussion, stating, "for Wikipedia, I feel it's a lot more reliable for scientific content than for political content because people just have opposing views, whereas scientific content is just very straightforward. It's either true or not" (190-193). Once again, Wikipedia was presented as good for some things but not for all. In light of previous comments about scientific "facts" changing over time, the statement that science is "either true or not" initially seems contradictory. However, the previous participant established the idea that Wikipedia's scientific information was being monitored and updated by qualified readers; the idea that errors were being ferreted out and outdated information was being replaced seemed to be accepted by these students. This student also introduced the idea of author motive. "Political content," he suggested, was subject to bias and manipulation whereas "scientific content" was not.

Other students embraced Wikipedia for the following reasons: it is readable, broad yet concise, searchable, efficient, and predictable. After explaining that scientific content was "straightforward," the student said that Wikipedia was useful when you just wanted to "learn something new about the topic, where you can read the intro on Wiki and then, once you get that, you know what other things to search for" (194-196). A second student built on this comment, applying it to homework problems: "Wiki will give me the basic intro. If I go over to econ, it'll give me which equations I would need to use" (226-227). In these scenarios, Wikipedia was very much like the paper encyclopedias it replaced—for these students, Wikipedia provided a basic overview of a topic in condensed, readable form. When faced with the sheer quantity of information on any topic online, students gravitated toward this resource. One student admitted that in high school he was told to "Use JSTOR" or databases, not Wikipedia, but "I still find myself looking at other articles that cite the JSTOR articles [on Wikipedia] just because it's a lot easier to read" (201, 203-204).

Another advantage of Wikipedia is that it was searchable. One student described doing biochemistry homework and coming across unfamiliar terms: "when I encounter a term that I don't know…I look it up on Wikipedia and it'll just say, 'This is a marker for whatever or something like that' and then, I basically just trust it" (245, 247-250). A second student elaborated: "There's no other dictionary to look such things up in" (254). The students were aware that Wikipedia was frowned upon as a source, but in their academic lives it was quite useful. They suggested that at times they used Wikipedia to figure out "what other things to search for" (196)—in other words, Wikipedia could be a place to find search terms or links to primary or secondary source documents—but other times they simply "trust it" to provide the information they need. Without Wikipedia, the students suggested that it would be much more difficult to find basic overviews of information and definitions of terms that were highly specialized, such as cell markers or reagents. They felt confident that Wikipedia would *not* be incorrect, even though they understood (and had been told repeatedly) that it *could* be incorrect.

Furthermore, the students saw Wikipedia as the one, single resource that contains information on virtually every topic they needed, in a predictable and searchable format. Compared to paper encyclopedias, Wikipedia had numerous advantages, as one student stated: "paper encyclopedias are limited by the fact that you can't search them easily and you have to know exactly what you're looking for and it's usually out of date and that's a huge disadvantage" (283-287). At various points in the discussion, the students used "Google" and "Wikipedia" interchangeably and described how they often started searching for information by typing a query into Google and then accessing the Wikipedia entry from the search results. The use of Google as an entry point to Wikipedia added to Wikipedia's searchability. Once they accessed

Wikipedia pages, the students appreciated the "template" that Wikipedia entries adhered to, adding to Wikipedia's efficiency.

Student conclusion:

- Wikipedia is a useful, efficient, and readable resource for an overview of a topic and for looking up specific factual pieces of mathematical or scientific information.

Credibility by Domain Name

Early in the discussion, the non-traditional student mentioned that she had been taught to look at a website's url and privilege information from government and education websites. Later, Saul also described hearing teachers tell their students "don't use any dot coms" (294) when writing school reports. This kind of school rule—evaluate a website based on a domain name and give preference to ".gov" and ".edu" sites—was universally rejected by students in this class.

The first student to address this explained, "there's very reliable people, there are a lot of people who put up reliable information online" (299-300) and that those who refused to look at information on dot com websites were "just limiting your own sources" (302). This comment is the opposite of what teachers and professors usually teach—that the Internet is filled with *un*reliable people and *un*reliable information. At this point in the discussion, the students had already talked about the process of updating Wikipedia pages and the importance of timely information; collaboratively, the students depicted the Internet as a place full of mostly good, reliable people and mostly good, timely information, rather than teeming with malicious authors and misinformation (note that this conversation took place before the "fake news" phenomenon; see Carson, 2017 for an overview).

Several other students saw the "no dot com" rule as very "schoolish," a rule that exists in school, for school purposes, but has little utility beyond school and questionable utility within it.

One student thought the ban on dot coms was pervasive because it was "unambiguous" and

therefore easy for teachers to teach and enforce (346):

> I don't think it's necessarily a good rule, but then again the teacher doesn't want to have
>
> to say something like, 'Oh, yes, you can use—dot com sources are bad but there's this
>
> exception, this exception.' It's just easier to say, 'Don't use dot com sources' (351-354)

This student did not challenge teacher's need for "easy" rules and seemed to accept that an easy

rule might be better than the messiness of ambiguity, but another student rejected this concept,

calling "the dot com restriction" a "crutch of sorts" that deprived children the opportunity to

learn to evaluate information and think for themselves (402). According to this student,

unambiguous rules could have negative consequences for students (despite their usefulness for

teachers).

Another student thought that the "no dot com" rule, when coupled with the ban on

Wikipedia, was simply unreasonable. In explaining his process for writing papers, he said:

> I would first look at Wikipedia to get, 'Oh, I can write this first paragraph about this
>
> topic, thinking about this,' and so on. So to get the main ideas and from there I can search
>
> specific topics and sort of reaffirm that information on different sites. But the thing with
>
> dot coms is that you're reaffirming information on Wikipedia to see which sites you can
>
> source, which sites you can cite for that topic. That's just, you—there might have been a
>
> perfect site that had a lot of information you wanted, but you would have to skip it and
>
> find a different one that was a dot edu or something. (305-316)

In this passage, it is unclear whether or not the student agreed with the need to "reaffirm"

information on Wikipedia by looking on other sites (the word "reaffirm" suggests that he rarely,

if ever, found a contradiction between Wikipedia information and information found elsewhere,

but he didn't clarify whether or not he thought that checking multiple sources was sound

research practice or simply necessary to get around school bans on Wikipedia). However, it is

clear the student felt a ban on dot com websites would have made writing a paper too difficult.

According to a show of hands during the discussion, all students used Wikipedia to find

information. Yet their comments revealed that they accepted that Wikipedia shouldn't be cited in

papers. Wikipedia, they understood, was not a primary source and therefore the information

found in Wikipedia could (and perhaps even should) be cross-checked with other resources.

Although they didn't always verify Wikipedia's information elsewhere, they seemed to have an

understanding of how to do so and were willing to for school papers and research (but not in

situations where their sources did not need to be cited, such as completing problem sets in an

Economics class). However, they did not accept the ban on dot coms as resources for papers. The

student above appeared to think this ban simply made the process too long (if you already found

the information on Wikipedia *and* on a dot com site, why bother finding it in a third place?).

Another student stated that dot coms shouldn't be banned outright, but it was reasonable to be

required to verify information found on dot coms (even if you verified that information on

another dot com). Unlike many of her classmates, she claimed that her high school was "very

eager to get us using the Internet a lot" (326). In middle school, she had credibility classes "so

we weren't citing Wikipedia as a source or stuff like that" but she saw these classes as "very

basic" (341, 342) She therefore developed her own "rule of thumb": "I would look up something

and then look it up again and oftentimes look it up again and if I could find matching information

from three sources, sometimes two, I would usually say, 'Okay'" (330-336).

In this instance, the process of finding multiple sources was for verification. She wanted

to find "matching information"—the same thing—a few different times before accepting it. She

appeared to hold a skeptical stance toward information on the Internet (a stance teachers and

journalists would probably agree with), but not a didactic one. She also suggested that verifying

information—finding the same thing in a few different places—was itself enough to give that

information credibility, regardless of where these places are. Although she did not describe the

assignments that prompted this double-checking, the fact that she described looking for

"matching information" leads us to suspect the assignments were either asking for a single data

point or answer that might vary slightly from source to source (e.g., worldwide, how many adults

are illiterate?) or perhaps for an opinion or a recommendation (e.g., what is the best way to

prevent the spread of the flu?).

These kinds of assignments—ones with simple answers or requests for

opinions/recommendations on fairly straightforward topics—are, unfortunately, the most

common assignments students complete in schools (Goldman & Scardamalia, 2013) and for

these, the previous student's process of verifying information was probably sufficient. A ban on

dot coms for these assignments would present a barrier merely in terms of efficiency, as the

earlier student pointed out. Completing these assignments could occur without the use of dot

coms, but there's no compelling reason to do so. The next student, though, described a very

different kind of assignment and a different reason for needing both dot coms and multiple

sources.

She began by pointing out that in certain situation "there's information that you can only

find on dot com sites" (360). Unlike Wikipedia, which by definition is a tertiary source, some dot

com sites are themselves primary sources. The student described an interdisciplinary freshmen

seminar where she and her group were asked to complete a project on rare earth minerals. In

order to do so, they had to look at "a lot of mining programs. We also looked at a lot of

environmental sites that were often opposed to those mining programs, a lot of government sites

that were talking about, like, regulations" (362-363). This array of sources, including dot gov,

dot org, dot com, and dot edu, was what made this project so valuable, the student claimed. Each

source was "biased in different ways," regardless of the domain name, and a ban on all the

commercial websites would have meant the students "would have been missing an important

voice in the debate" (378, 380).

This student's description of the class project presented it as an assignment that required

students to read and understand an issue from the perspective of experts and stakeholders before

offering their own recommendations. As the student stated, many organizations and individuals

had perspectives on the issue; if the students were not allowed to use a source based only on the

domain name (rather than on the website itself), an entire category of sources (some of them

primary sources with information that was not available elsewhere) would have been forbidden.

Her comments suggested that in complex policy debates, the "voices" of different experts and

stakeholders speak in different places on the web: some "voices" are those of the government,

some are those of scientists, some are environmentalists, some are mining workers, some are

mining companies. A source might present the perspective of one group or another (and, as a

result, have a bias) while still containing factually accurate information, the student claimed. In

this instance, a decision or recommendation can't be made without considering all these

perspectives. For a careful reader, attuned to issues of perspective and bias, consulting multiple

sources of information serves to do more than verify information. Information from one or two

sites is not enough to get the whole picture.

Student conclusions:

- Regardless of domain name, all sources online have a bias and may or may not include credible information.

- Verifying information using multiple sources is a better way to ensure credibility than relying on the domain name.

- If you want to understand an issue from multiple perspectives, you must consult multiple sources. Commercial sources (e.g., dot coms) may include the perspective of experts or stakeholders that cannot be found anywhere else.

The Expert Blogger

Near the end of the transcript excerpt, Saul asked the students about their use of blogs, a question she said was important to her to understand. The question was a loaded one: "Do any of you use blogs if you really want to get hard-core information?" (414), implying through the use of "really" and "hard-core" that blogs might not be the best sources of scientific information. The length of the stanza (only 40 lines, compared to 131 for the Wikipedia stanza and 120 for dot coms) suggests that blogs were not a topic that the students had much to say about, yet they did mention a few situations where they found blogs to be useful resources.

One student described the role of blogs as similar to the role of Wikipedia: "I will often use blogs as a starting point, especially if I'm trying to find out sort of about…a lot of little things about a field" (417-418). Blogs provide an overview, he claimed, and could be trusted because "most fields have at least a core group of respected bloggers who might be professors" (419-420). Other students also found professors' blogs credible and described how professors often linked to each other's blogs. However, another student admitted that he rarely looked at the credentials of a blog's author: "If it has information that I need, that's nice and if it confirms Wikipedia then I sort of trust it, I guess" (434-435). Another student talked reading neuroscience

blogs even though she wasn't "into neuroscience" (442) as a field of study. These blogs, she

said, were written by graduate students and were intended "for the general public" (445). In

terms of credibility, she said: "they also link to other studies that have been done so you can go

look at that study, read the abstract. If the blog represents the abstract fairly well you can feel

that it's probably credible" (451-453).

In this short stanza the students once again complicated what might seem like a

straightforward rule: don't use blogs as sources for papers. There are different kinds of "blogs,"

the students' comments revealed, and "respected bloggers" might be credible sources, depending

on your information-seeking needs. If necessary, careful readers could check the credibility of

blogs by verifying the author's credentials or utilizing the links to primary sources, although the

students did not usually do either.

Student conclusion:

- Blogs written by scientists are useful for providing a general overview of a topic or

  for entertainment.

Table 3
Summary of Student-Created Rules

"School" Rule	Student Rule
Books are more credible than web sources	All sources, online and print, may contain errors. Online sources are preferable to print sources because they are less likely to be out of date and are simply easier to access
Check for errors to check the credibility of a web source	Checking for typos and errors is an inefficient strategy unless you really know the content well.
Don't use Wikipedia	Wikipedia is a useful, efficient, and readable resource for an overview of a topic and for looking up specific factual pieces of mathematical or scientific information.
Don't use dot com's	Regardless of domain name, all sources online have a bias and may or may not include credible information.
	Verifying information using multiple sources is a better way to ensure credibility than relying on the domain name.
	If you want to understand an issue from multiple perspectives, you must

	consult multiple sources. Commercial sources (e.g., dot coms) may include the perspective of experts or stakeholders that cannot be found anywhere else.
Don't trust blogs	Blogs written by scientists are useful for providing a general overview of a topic or for entertainment.

Conclusions

This research confirms the findings of several previous studies. Students in the focus group described looking for sources that were easy to read and access rather than those that had been declared "credible" by their teachers (Barker & Julien, 2012; Heinström, 2006; Rieh & Hilligoss, 2002). They also created their own "rules" of Internet searching, mostly through trial and error (Head & Eisenberg, 2009). The assignments they described from school mostly could be considered "belief mode" assignments rather than "knowledge creation mode" (Goldman & Scardamalia, 2013). This study adds to the research base by examining *how and why* students adapt the search strategies they are taught in order to succeed at information-seeking tasks in and out of school.

Why did they engage in these strategies rather than using what they had been taught? First, and perhaps most obviously, they did so *because their strategies worked*. Regardless of whether or not these strategies represent the optimal way to search the Internet, according to the students, these strategies allowed them to succeed at school. If we wish students to take other approaches to information seeking on the Internet, we must look first at the tasks students are given.

However, we also point out a second fact about this list. The students' strategies *are more nuanced than strategies handed out by schools*. Researchers like Thomm and Bromme (2012) worry that students only engage in "source" evaluation rather than text evaluation as they judge credibility, but students are often encouraged to do exactly this by the Internet rules they are

handed. The typical "school rules" that the students and Saul discussed appear to be an attempt at making something very messy and context-dependent unambiguous. These attempts included banning/restricting an entire medium (Internet resources), a particular website (Wikipedia), a domain name (dot coms), or a genre (blogs). Underlying some of these restrictions is a tendency for school rules to privilege traditional publishing (which includes editors and/or peer review) over crowd-sourced or open-access information. In creating unambiguous rules, schools also present the false notion that the Internet is static, ignoring the rapidly changing nature of the information landscape. For example, as scientists update Wikipedia pages or create their own blogs to share research, they alter the way scientific information gets to the public. Unambiguous rules about the credibility of a single source or category of sources can't account for this.

In the student-created rules, there is an attention to the information-seeker's purpose that is absent from school rules. Students identified the following purposes for their online research:

- Completing problem-set homework: the information is factual, generally accepted (and unlikely to be inaccurate), but could be difficult to read and access. Doesn't tend to involve controversial topics.

- Completing paper/project homework: information from a variety of sources is required. Source/bias evaluation may be necessary. Topics may be controversial.

- Satisfying curiosity: the information needs to be readable and enjoyable. No single question needs to be answered or task completed.

In each of these scenarios, the students' search strategies also appeared to be guided by four underlying questions: how badly did they want the information? How important was accurate information? How likely was the information they found to be correct? What (if any) external rules had been imposed on their sources? In completing most of their problem-set homework, the

students usually wanted to know the information badly and wanted it to be correct. However, they did not believe that the information they found would be incorrect. Their search strategies were then focused exclusively on *finding information that they could read and understand* rather than evaluating information. On the other hand, as they described projects from high school, they described a lack of investment in the topics (they didn't want to know the information all that badly) but a set of rules that required them to avoid certain sources, usually Wikipedia. In these cases, their search strategies were focused on *completing the task quickly while following the rules*. They first went to Wikipedia to understand the topic and outline their project and then utilized the links to find sources they could cite in their paper without losing points.

Very few projects were described where the students badly wanted to find information that they worried might be incorrect. In these cases, most notably the "rare earth elements" project described by a single student, the search strategies involved *reading widely from all perspectives on a topic*. In this case, the student had to find several sources and understand not only the content of the information but also the perspective.

Teaching students to look for and evaluate information online is a complex task. We conclude this paper with questions we believe are worth further research:

- Where do accessible sources of expertise, especially scientific expertise, actually exist online? How do the "rules" that schools teach address this shifting landscape?

- How can we teach students about the various kinds of searches they will engage in and the strategies that might be best suited to each, in the face of all this changing?

- How can teachers and schools create authentic tasks that invite students into this conversation rather than artificial tasks that oversimplify searching and encourage students to follow our "rules" simply for the sake of following them?

We believe answering these questions will be important to preparing all students for the literacy

demands of the 21st century.

References

Aikenhead, G. S., Orpwood, G., & Fensham, P. (2011). Scientific literacy for a knowledge

society. In C. Linder, L. Östman, D. A. Roberts, P. –O. Wickman, G. Erickson, & A.

MacKinnon (Eds.), *Exploring the landscape of scientific literacy* (pp. 28-44). New York,

NY: Routledge/Taylor and Francis Group.

Barker, S., & Julien, H. (2012). Reading for evidence. In S. Norris (Ed.), *Reading for evidence*

and interpreting visualizations in mathematics and science education (pp. 19-40).

Rotterdam, the Netherlands: Sense Publishers.

Boyd, D. (2014). *It's complicated: The social lives of networked teens.* Yale: Yale University

Press.

Brand-Gruwel, S., Wopereis, I., & Walraven, A. (2009). A descriptive model of information

problem solving while using Internet. *Computers & Education*, *53*(4), 1207-1217.

Braten, I., Stromso, H. I., & Salmeron, L. (2011). Trust and mistrust when students read multiple

information sources about climate change. *Learning and Instruction, 21*(2), 180-192.

Brem, S. K., Russell, J., & Weems, L. (2001). Science on the Web: Student evaluations of

scientific arguments. *Discourse Processes*, *32*(2-3), 191-213.

Bromme, R. (2005). Thinking and knowing about knowledge. In *Activity and Sign* (pp. 191-201).

Springer US.

Bromme, R., Kienhues, D., & Porsch, T. (2010). Who knows what and who can we believe?

Epistemological beliefs are beliefs about knowledge (mostly) attained from others. In L.

D. Bendixen & F. C. Feucht (Eds.), *Personal epistemology in the classroom: Theory,*

research, and implications for practice (pp. 163-193). Cambridge, England: Cambridge

University Press.

Carson, J. (2017). What is fake news? Its origins and how it grew in 2016. *The Telegraph.*

Retrieved from www.telegraph.co.uk

Enynon, R., & Geniets, A. (2016). The digital skills paradox: How do digitally excluded youth

develop skills to use the Internet? *Learning, Media and Technology, 41*(3), 463-479. doi:

10.1080/17439884.2014.2002845

Eysenbach, G. (2008). Medicine 2.0: social networking, collaboration, participation,

apomediation, and openness. *Journal of Medical Internet Research*, *10*(3).

Gee, J.P. (2005). *An introduction to discourse analysis: Theory and method.* New York, NY:

Routledge.

Goldman, S.R., & Scardamalia, M. (2013). Managing, understanding, applying, and creating

knowledge in the information age: Next-generation challenges and opportunities.

Cognition and Instruction, 31(2), 255-269.

Head, A. J., & Eisenberg, M. B. (2009). How college students seek information in the digital

age. *The Information School, University of Washington*.

Heinström, J. (2006). Broad exploration or precise specificity: Two basic information seeking

patterns among students. *Journal of the American Society for Information Science and

Technology*, *57*(11), 1440-1450.

Hilligoss, B., & Rieh, S. Y. (2008). Developing a unifying framework of credibility assessment:

Construct, heuristics, and interaction in context. *Information Processing & Management*,

44(4), 1467-1484.

Holman, L. (2011). Millennial students' mental models of search: Implications for academic

librarians and database developers. *The Journal of Academic Librarianship, 37*(1), 19-27.

Kohnen, A.M. (in press). "All I know is what's on the Internet": Teaching online research as a

    critical literacy skill. *English Journal.*

MaKinster, J. G., Beghetto, R. A., & Plucker, J. A. (2002). Why can't I find Newton's third law?

    Case studies of students' use of the web as a science resource. *Journal of Science*

    Education and Technology, *11*(2), 155-172.

Partnership for 21st Century Learning. http://www.p21.org

Purcell, K., Rainie, L., Heaps, A., Buchanan, J., Friedrich, L., Jacklin, A., …Zickuhr, K. (2012).

    How teens do research in the digital world. Pew Research Center. Available at:

    http://www.pewInternet.org/2012/11/01/how-teens-do-research-in-the-digital-world/

Seethaler, S. (2009). *Lies, damned lies, and science: How to sort through the noise around*

    global warming, the latest health claims, and other scientific controversies. Upper Saddle

    River, NJ: FT Press Science.

Sparrow, B., Liu, J., & Wegner, D. (2011). Google effects on memory: Cognitive consequences

    of having information at our fingertips. *Science, 333*(6043), 776-778.

Stanford History Education Group. (2016). *Evaluating information: The cornerstone of civic*

    online reasoning. Palo Alto, CA: The Stanford History Education Group with support

    from the Robert P. McCormick Foundation.

Thomm, E., & Bromme, R. (2012). "It should at least seem scientific!" Textual features of

    "scientificness" and their impact on lay assessments of online information. *Science*

    Education, 96(2), 187-211.

Walraven, A., Brand-Gruwel, S., & Boshuizen, H. A. (2009). How students evaluate information

    and sources when searching the World Wide Web for information. *Computers &*

    Education, *52*(1), 234-246.

Warnick, B. (2004). Online ethos source credibility in an "authorless" environment. *American*

Behavioral Scientist, *48*(2), 256-265.

It's Hard to Wait: Effortful Control and Story Understanding in Adult-supported E-book Reading Across the Early Years

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Abstract

As technology in various forms is permeating more and more of everyday life, it is important to consider what we know about child development, social interaction, and literacy development as they relate to a child's experience with technology. Caregivers, researchers, and educators are faced with the complex task of determining the quality of an e-book in terms of potential educational value, appropriateness, and suitability for individual children as well as the possibility for adult supports, or the ways in which the adult can verbally or gesturally support the child's engagement with and understanding of digital text. This cross-sectional case study situates and analyzes the e-book reading experience of young children in the context of a supportive adult interaction. The study examines two children's experiences during a shared e-book reading with a parent in order to describe aspects of development, including effortful control, and the role of the caregiver/child interaction as they impact the literacy experience.

Keywords: *emergent literacy, e-book, iPad, preschooler, toddler, effortful control, navigation, text understanding*

This is a study of adult-child shared e-book reading. E-books represent one form of media many children experience from an early age; the percentage of six-year olds who report having read an e-book has grown from 28% to 61% from 2010 to 2014 (Scholastic, 2015). Importantly, 72.5% of parents surveyed by Vaala and Takeuchi (2012) indicated that they engage in co-reading e-books with their children, aged two through six years. A large portion of the parents who do not co-read e-books with their children reported that "reading books with child on an e-reader is too difficult" as the reason for not co-reading in an electronic format.

Part of the "difficulty" reported by parents in the Vaala and Takeuchi study likely has to do with the perception that the hotspots and embedded animations in the illustrations, the games, and videos distracts the child from reading, or, that the activity of sharing/reading a book on screen with active characters and animation does not align with their vision of a "bedtime story," a common context in which parent-child co-reading occurs. Another part of the difficulty likely has to do with the interaction of the child's development across a range of variables, and the design of the e-book itself. A young child exploring a printed book is free, often, to explore the book by touching and holding and sometimes even tasting the book. He can turn the pages by himself, and attend to parts of the text/illustration as his attention or interest moves. Conversely, when exploring an e-book the parent often controls the device and the page turns may only be accessible to the child after the narration has been read in full, or once he has pressed a hotspot or two. The result of this is that the young child often has to wait for the e-book's contingent programming to allow for his desired action. And waiting is hard for young children.

Fred Rogers was a pioneer in media for young children and their families. He effectively applied theories of child development to the design and delivery of his television programming, printed media for parents and children, and within his musical compositions. Executive function,

particularly related to the development of a child's effortful control, represents one area Fred

Rogers sought to help adults and children understand. In one of his episodes of *Mister Rogers'*

Neighborhood, Fred used the Daniel Striped Tiger puppet to model some strategies to think

about waiting when it is difficult. Daniel Tiger sang the lyrics for "It's Hard to Wait" (The

Neighborhood Archive, n.d., see Figure 1, below) as a tool/strategy to help him get through the

challenge of waiting for his friend to help him.

I think it's very, very, very hard to wait

Especially when you're waiting

For something very nice

I think it's very, very, very hard to wait

Figure 1. Lyrics for "It's Hard to Wait" (Fred Rogers Company, 1982)

While waiting for a friend's help and waiting to turn a page or to explore an e-book are different

contexts, the waiting process and the emotions the child feels because of the necessity of the wait

could arguably be very similar. For many children it simply *is* "very very hard to wait," no

matter the context.

The effortful control required to wait during e-book reading is related to multiple

variables, both external and internal to the child reader. In this study, the identified external

variables are those related to the content for e-book reading (i.e., the digital media and features

of its design) and the context in which the e-book reading experiences are carried out (i.e., the

social interaction), particularly the kinds of supports for effortful control offered by the parent.

The variables internal to the child include a range of age-related developmental capacities—fine

motor development, social and emotional development, language development, emergent and

early reading behaviors. In addition, the child's own temperament is a factor in effortful control

(Eisenberg, 2012). This exploratory study examined the (1) nuances of waiting in an e-book

reading context related to these external and internal variables, (2) cognitive (i.e., textual

understanding) outcomes of the e-book reading experiences, and (3) adult supports for the child's

engagement with the activity and understanding of the text with one toddler and one preschooler.

Theoretical Frame and Literature Base

Research involving adults co-viewing e-books with young children is rooted in the

perspective that social interaction plays a critical role in (a) child development and (b) mediating

the text for children. In other words, this study approaches the exploration of e-books from a

sociocultural framework (Vygotsky, 1978, 1986). Using Vygotsky's sociocultural theory (1978)

as a framework, the social interaction in e-book reading experiences is both essential and a focus

as a point of learning. In sharing the e-book experience, the child has the opportunity to engage

in reciprocity, back and forth exchange, with the adult in both the physical manipulative aspects

of reading the e-book as well as in verbal language exchange. Additionally, there is shared

meaning (Stern, 2000) created within the shared experience, as adult and child are sharing

attention and intention through the activity. There is emotional support involved when the child

is able to manage navigating the functions of the e-book with increasing independence through

scaffolding and gradual release on the part of the adult with managing these tasks. The role of the

adult in the interaction involves being sensitive toward the child's drive for autonomy and

initiative (Erikson, 1963) and managing the level of frustration they might experience based

upon the child's personal temperament, psychology, and context.

In this frame, textual understanding is socially, culturally, and historically situated and is

contingent upon language-based social interactions. Because the participants in this particular

study are so young, the theoretical underpinnings of an emergent literacy perspective (Teale &

Sulzby, 1986; Whitehurst & Lonigan, 2001) are particularly salient as well. These theories

suggest that formal reading and writing skills emerge from birth and are acquired gradually over

time through repeated exposures to, interactions with, and production of text. Moreover, theories

of emergent literacy suggest that there is a general sequence in the appearance of foundational

skills (e.g., phonological awareness, phonics, print awareness) and other more broadly

conceptualized constructs (e.g., vocabulary, syntax), but that not all children follow that

sequence in lock-step patterns (Teale, Paciga, & Hoffman, 2010); learning is something different

for each child, and requires a plan that meets each child's needs in the physical, social,

emotional, cognitive, and linguistic domains of development. In the paragraphs that follow, we

outline some relevant literature that we believe may affect the child's e-book co-reading

experiences.

Developmental capacities related to shared e-book reading

The shared e-book reading experience can be viewed through Rogoff's (2003) concept of

guided participation in sociocultural activity. Guided participation involves social partners

sharing an experience (e-book reading) to bridge perspectives using culturally available tools (in

this case language and technology). There is mutual structuring between participants in the

activity to facilitate engagement (p. 285). The two basic processes of guided participation

involve mutual understanding of ideas and efforts and the adjustment of the participants to

maintain engagement in the task, which in the shared e-book experience makes the presence of

the caregiver essential in scaffolding the experience related to the child's developmental

capacities.

The facilitation of the caregiver during the shared e-book reading is contingent in some

ways upon the individual child and the caregiver-child relationship. Temperament is the style in

which a child interacts with the world and the people in it. Temperament is thought to be

biologically based, early appearing (usually stabilized by around four months of age) and unique

to each child (Sturm, 2004). Two dimensions of temperament that are frequently identified are

reactivity (emotional and attentional) and self-regulatory capacities. The goodness of fit between

the caregiver and child in terms of temperament can affect the quality of interactions and the

capacity of the caregiver and child to engage in co-regulation required for a shared book

experience (Carlson, Feng, and Harwood, 2004). For the child who is more highly reactive and

has difficulty with regulation, the caregiver may struggle to remain regulated, and sustain

engagement in the experience. For the highly inhibited child, the caregiver may have to more

regularly prompt and encourage the child to react.

A child's brain undergoes rapid development during the first five years of life. The

"thinking part" of the brain, the cortex, is the least developed at birth, but as a result of childhood

experiences undergoes synaptic exuberance during the first few years as connections between

neurons are rapidly created. During the preschool years executive function improves in areas

such as planning, memory, and effortful control (Eliot, 1999) "Effortful control pertains to the

ability to willfully or voluntarily inhibit, activate, or change (modulate) attention and behavior,

as well as executive functioning tasks of planning, detecting errors, and integrating information

relevant to selecting behavior" (Eisenberg, et al., 2011, p.263). The wait time involved in the e-

book reading experience involves both inhibitory control as well as activational control in that

children need to control the impulse to tap repeatedly on the screen while waiting, and also

activate certain behaviors when the wait-time is over.

Cognitively, children two through five years of age rapidly develop knowledge about

language and print across a range of content areas that are often tied to the child's interests

(Johnson, et al., 2004). Study of children in naturalistic environments in which they interact with print and language have resulted developmental trajectories that are fairly consistently observed at specific age ranges (e.g., Ferreiro & Teberosky, 1982; Teale & Sulzby, 1986). Because of the consistency in these trajectories, the trajectories are often presented as benchmarks against which educators, parents, physicians evaluate the pace of cognitive development.

A common method to determine a child's understandings of narrative text is to solicit an "emergent reading" of a favorite storybook (Sulzby, 1985) by asking the child to "read me this story." A book qualifies as a favorite storybook after a child has heard it read aloud to them several times, usually by a parent, teacher, or care provider. As the child emergently reads a favorite storybook, the adult can often infer the child's understanding of (1) oral and written language structures, (2) narrative elements of character, setting, plot (i.e., problem/solution), dialogue, and (3) awareness of the function of print.

In their studies of emergent readings in the early years Sulzby (1985) and Teale and Sulzby (1986) identified children at different age ranges included varying evidence of language understanding (i.e., story-like language vs. oral conversation/spoken language) and attention to print in their emergent readings of favorite storybooks (see Figure 2). Sulzby (1985) found that two-year-old children produce dependent reading (i.e., relying on adult to facilitate the reading). Three- and four-year-olds generally produce emergent readings that can be picture-governed, form an oral-story, or contain a story with written-like language. Most children at the end of Kindergarten (five- and six-year-olds) produce emergent readings that are governed by print.

Print awareness, or the child's understanding that (a) print carries meaning; (b) images represent objects and action; (c) that letters comprise words and words comprise sentences, is typically fully developed by the time the child is six years of age (Clay, 2006). When children

have less print awareness, they are less likely to produce a print-governed emergent reading of a favorite storybook (see Figure 2).

Regarding the e-book format, specifically, we know that a child's general story comprehension is often better when reading traditional books compared to e-books (e.g., Krcmar & Cingel, 2015; Parish-Morris, et al., 2013), but we also know that intentionally designed e-books can positively impact the child's capacity to make meaning from the text (e.g., Korat & Segal-Drori, 2016). In other words, a child's understanding of electronic text is, in part, related to the design of the media itself and the ways in which its design impacts the child-adult interaction.
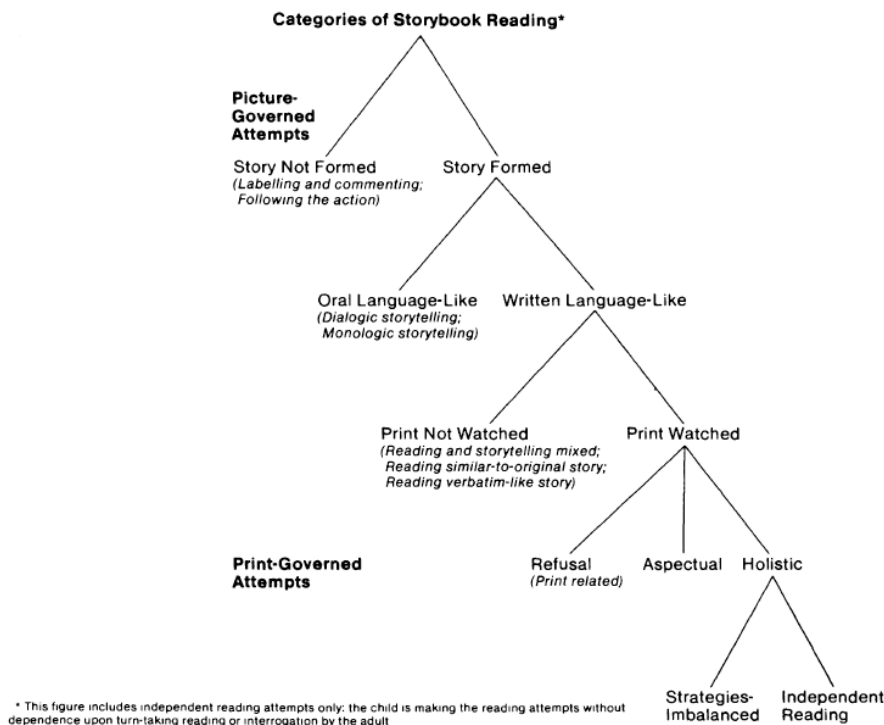

Figure 2. Classification scheme of emergent reading of favorite storybooks (Sulzby, 1985[1])

Figure 2 (Sulzby, 1985) is reprinted with permission from the International Reading Association.

How can an adult support children's early reading experiences?

There is a long history of research on printed text that can inform the ways we, as a field of scholars, teachers, and parents, are developing our understandings of digital reading. These histories surely correlate, but analog processes for making sense of digital text do not necessarily match the processes for action and comprehension in digital media (e.g., Leu, Kinzer, Coiro, & Cammack, 2004).

We know, for example, that joint visual attention to an object from an adult sustains an infant's attention to that object (Yu & Smith, 2016). We know that reading aloud to children is an effective means to facilitate vocabulary development (Blachowicz & Fisher, 2007), and to learn about their world. We know that kids who do not have access to books to read in their homes and communities are less frequent readers (e.g., Neuman, 1996; 1999), and we also know that less frequent readers are less successful students (Mol & Bus, 2011). These profiled differences persist from the early years through to the 4th grade (e.g., Juel, 1988) and beyond.

The rich history of the study of reading aloud to young children clearly identifies the following methods for effective reading outcomes: (1) dialogic reading; (2) repeated reading; and (3) interactive reading. Joint attention between the adult and the child is held in common across all three of these methods. Dialogic reading is an approach in which the adult poses the child with distancing questions. Through these questioning approaches, the adult prompts the child to say something about the book. The adult evaluates the child's response, expands on the child's responses by rephrasing and adding on to it, and then the adult repeats the prompt to make sure the child has learned from the expansion. Dialogic reading approaches have demonstrated efficacy in supporting the child's comprehension and expanding the child's language related to

the story (Arnold & Whitehurst, 1994). These results are observable in intervention research

(e.g., Wasik & Bond, 2001), across languages (e.g., Niklas & Schneider, 2015) and with diverse

populations (e.g., Crain-Thoreson & Dale, 1999).

Repeated readings of the same text represent a second research-supported means to

improve reading outcomes. Morrow (1988) investigated the use of repeated one-on-one readings

to preschoolers by comparing the number and quality of children's responses to story readings

between three groups: those who listened to a different book each week for 10 weeks, those who

listened to three different books three times each, or the control group who participated in

traditional reading readiness activities. Morrow found that the one-on-one story readings

increased the number and complexity of questions and comments made by the children in both

experimental groups as compared to the group reading readiness activities, but those with

repeated readings made more interpretive responses and more responses focused on print and

story structure. Many subsequent studies have incorporated repeated readings as a vocabulary

and comprehension support (e.g. Brabham & Lynch-Brown, 2002; Justice, 2002;

Schwanenflugel, et al., 2005), and repeated readings have since become a commonly recognized

component of read aloud instruction for young children (McGee & Schickedanz, 2007).

While repetition is beneficial, there is also evidence suggesting that interactive reading

(Hoffman, 2011) contributes additional benefits, beyond those observed in simply repeating the

read aloud, to children's meaning making capacities. In an interactive read aloud, the adult

solicits responses from the children and invites them to recreate and even analyze the story with

the adult reader during the read aloud experience. Adults support vocabulary understanding

through gestures, pointing to parts of illustrations, comparing and contrasting, providing

definitions, or acting out/animating words (McGee & Schickedanz, 2007). Children demonstrate

engagement through oral responses to text and the adult's prompts, emotional responses as documented by facial expression and gestures, and dramatization of the story as it is read aloud (e.g., Sipe 2002).

We know that there are more and less effective supports for maintaining student engagement and attention in the read aloud as well. For example, Paciga (2009) and Paciga and colleagues (2015) documented that the pacing and duration of the read aloud and discussion could predict student engagement levels. We also know that children become more frequently engaged in higher-level discussion of text when there is space for dialogue and discussion (e.g., Collins, 2013). There is also a documented history that demonstrates how print referencing strategies, or the techniques that can be used during storybook reading to draw children's attention to the meaning and function of print using either nonverbal or verbal cues (Justice & Ezell, 2004), can facilitate children's engagement with the printed text as it is highlighted and tracked by the adult.

What e-book features might impact the child's experience?

Despite a long history of proven methods of supporting understanding and engagement in reading printed books, there is significantly less evidence about how adults support understanding and engagement in adult-child co-reading of e-books. E-reading observations demonstrated that parents used fewer distancing prompts during e-reading than parents with traditional reading (Parish-Morris, et al., 2013) and also documented that when there are hotspots in the e-books a battle over behavior begins. In this battle, a parent's behavior management talk typically replaces dialogic interactions. This phenomenon becomes particularly salient when parents are working against the child's desire to engage with and control the interactive features of the e-book's design (Parish-Morris, et al., 2013). Research has also documented that the

design of the e-book itself can impact the ways in which the adult supports for emergent literacy

can change, becoming more frequent, when the parent/adult supports are designed into the e-

book media (Rees, Rvachew, & Aparna, 2015; Rvachew, et. al., 2015). With respect to print

tracking features contained in e-books, it is an obvious leap to assume that the print tracking

embedded in many e-books functions similarly to the adult pointing during a read aloud, and

therefore, impacts the child's print awareness. Research by Moody and colleagues (2014) found

that children exposed to e-books with adult print-referencing supports outperformed peers

without the additional print-referencing support from the e-book and adult interaction.

In their study of the impact of device type on the child's behavioral engagement in digital

reading experiences, Roskos, Burstein and You (2012) determined that the child's level of

behavioral regulation impacts their engagement in teacher-led e-book reading experiences.

Moreover, they determined that the device type is related to the child's level of engagement in

the e-reading task. Roskos and colleagues hypothesized that the degree of control the child

experiences as the device changes is directly related to the observed changes in children's level

of engagement, particularly the looking, touching and gesturing forms of engagement; smaller

screen sizes found in the iPod touch encouraged more control and ownership of the action within

the text and, therefore, yielded more touches and gestures.

Marsh (2013) and Merchant (2015) corroborate Roskos, Burstein and You's (2012)

findings. In their observations of toddlers, both Marsh and Merchant found children exhibited a

range of movements when utilizing iPads—stabilizing movements, control movements, deictic

movements. Stabilizing movements were those directed at ensuring the device (iPad) was not

switching orientation. Control movements were those in which the goal was to engage with an

interactive feature on screen. Deictic movements were pointing or gestures toward a portion of

the screen. Deictic movements often led into control movements in both Marsh's and Merchant's studies.

From the extant research with interactive e-books and young children on desktop computers and iPads we have learned much that can help us think about how children navigate these interactive texts with control movements and considerations of the media's design—how design impacts the child's navigation and, likely, their meaning making. For example, Hirsh-Pasek and colleagues (2015, p.12) suggest that contingent interactions, or clicks that are required to move the action of the story forward, contribute in positive ways to story understanding:

> The contingent interactions that apps afford are perhaps the most basic element of
>
> engagement with a touch screen. When each touch or swipe is met with an
>
> immediate response, children feel in control, maintain their focus, and continue
>
> the interaction. This sort of responsiveness is a core element of user-interface
>
> design in the field of human-computer interaction (Nielsen, 1993/2014). It is also
>
> a growing subject of investigation among researchers interested in educational
>
> media (Lauricella, Pempek, Barr, & Calvert, 2010). For example, experimental
>
> manipulations that required children to use a computer to move the story of Dora
>
> the Explorer forward at preselected points were linked to children's increased
>
> understanding of story content (Calvert, Strong, Jacobs, & Conger, 2007) (p.12).

Although this is true of the programming and design end, we know from research in emergent reading behaviors that our youngest children seek out ways to jump through the e-book (i.e., quickly paging through and not following a linear path through the text). Similar book browsing behaviors are also observed in infants with printed board books. In e-reading contexts, a child utilizes a home, or menu feature, within the e-book application to facilitate these actions,

when the design of the application offers such an option. Other times, children utilize the home

button on the device to initiate a change of direction in the activity (Marsh, 2013; Merchant,

2015). In addition to moves toward home and beyond the edges of the e-book with the home

button on the iPad, children are also observed activating hotspots with haptic touches on screen.

Research Questions

Research through the US Department of Education's Ready to Learn initiative (Cohen et

al., 2011) found, "children's initial reaction to touch screen devices is characterized by

fascination and immediate engagement, and is shaped by: child's developmental level, previous

experience with touch screen devices, and the App interface design and game/play" (p.5). The

research reviewed here clearly indicates that the child's developmental level is a factor in their e-

book experience and is an important consideration in design, but what about the role of social

interaction with a caregiver during the experience? Given the research reviewed above and the

sociocultural theory framework (Vygotsky, 1978), we sought to determine the following:

- How does the parent support her children in developmentally appropriate ways during a
  shared e-book reading experience?

- What differences in the interaction could be attributable to each child's developmental
  differences?

Method

This exploration employed a cross-sectional case study framework (Borman, Clarke,

Cotner & Lee, 2006) for examining an adult's use of supports for young children's

understanding of a familiar e-book. The cross-sectional design is useful to examine different

groups of people who differ in the variable of interest but share other characteristics, such as

socioeconomic status, educational background, and ethnicity. The groups are observed

separately, but during the same point in time. The researcher does not manipulate any of the

variables in an experimental fashion, and, thus, cannot draw conclusions of causality. This

design is commonly used to study development across spans of age groups. In this case, the

researcher examines e-reading behaviors in parent-child dyads.

Participants

The study participants were siblings from an upper-middle class SES. The first

participant was a male, 54 months old, Charlie. The second was a female, 30 months old, Annie.

Each child was read to every night and was immersed in language and literacy. The family had

an iPad and two iPhones and the children and parents often sat and played app-based games,

watched videos, and read stories on the devices. These screen-time experiences were typically

co-viewing, or joint engagement, experiences (Takeuchi & Stevens, 2011) in which the

children's and adults' attention and conversation were centered jointly on the on-screen media.

Children and the adult were typically situated in close proximity to the same screen. The

researcher was also the children's parent, but the children were aware their interactions were

being recorded "for mommy's work."

Materials

To investigate how the adult's supports differed across the two children, each child

engaged in three different e-book reading experiences with the same text. The text chosen for the

study was an iPad application titled *The Three Little Pigs: A 3-D Fairy Tale* (Nosy Crow, 2011).

It is an award-winning (Children's Technology Review, 2011) interactive version of the

traditional fairy tale told in part by text at the bottom of the screen, but in part by conversation

presented in speech balloons that appear when the reader touches a hotspot (an area of the screen

that, when touched or selected, presents some audible or visible new action on screen). Children

can "blow into the microphone to blow down the pig's houses, tilt the device to see more of the scene, zoom in to reveal hidden details, and tap the screen to trigger hundreds of funny interactive surprises" (Nosy Crow, 2011). Marsh (2013) classified this particular app as commendable in their consideration of scaffolding and consistency in the child's finger-hand actions within the story.

Procedure

Each child experienced three individual (i.e., one adult to one child) e-book reading experiences, or exposures, with the same text with the parent as a facilitator and co-reader. The story was read in its entirety each time. Each child experienced the same supports for navigation, comprehension, vocabulary and prompting during the first two readings of the e-book.

Each exposure was video recorded and then transcribed for data analysis. In the first exposure, the adult selected the "Read by Myself" mode. During this exposure, the adult controlled the page turns and hotspots and thought aloud about her navigational moves (e.g., "Oh, look at that blue dot [pointing to a hotspot]. I'm going to press it to see what happens."). The adult read aloud supporting each child's vocabulary and comprehension as recommended for a first reading in McGee and Schickedanz's article (2007) on repeated interactive read alouds (i.e., introducing the book, supporting specific vocabulary understanding, modeling analytic thinking to support and strengthen comprehension, and post-reading discussion). The "Read and Play" mode was explored during the second exposure. In this mode, the narrative on-screen text is read aloud, but the hotspots are optional (i.e., the child may advance the pages without clicking on any hotspots). For this exposure, the adult continued to support the same vocabulary and modeled analytic thinking to support comprehension. The adult prompted the child to touch the screen to activate selected hotspots and to turn the pages. In the third exposure, the child was

permitted to select the mode for the book-reading experience. The adult integrated a

predetermined guided reconstruction for this reading (McGee & Schickedanz, 2007) with

prompts for vocabulary and comprehension that are commonly applied in dialogic reading

(Arnold & Whitehurst, 1994). Questions like, "What is happening here?" or "What will happen

next?" or "Why did she say that?" were employed to assess the child's story understanding and

questions like "Who likes to eat straw?" were used to assess language/vocabulary understanding

during the reading experience. Immediately following this third exposure, the parent opened the

e-book to one scene and solicited an emergent reading for that page.

High teaching focus. Because of the parent/researcher's attention to vocabulary and

comprehension across all three exposures, it can be said that the approach embodied a high

teaching focus in her interactions with the two child participants. This approach was relevant

because of the findings documented by Fender, Reichert, Robb and Wartella (2010). This

research team observed parents and their infant children co-viewing educational DVDs and

examined the language learning outcomes of the children. Their observations indicated that there

were three main groups of parents identifiable by the differences in the ways they supported the

infant's vocabulary learning. The group of interest to the present study was labeled the High

Teaching Focus parents. These parents "presented the greatest variety of words highlighted in the

DVD, were most likely to label or describe what was on screen, and had the least amount of non-

DVD related talk. Children of High Teaching Focus parents had the highest degree of

engagement with the DVD. These children also said the greatest number and variety of target

words and were most likely to say new words during the co-viewing session" (p.613). Below is a

snippet from the e-reading experiences from the current study that illustrates the high teaching

focus (see bold and italic font) and contextualizes some of the social interaction surrounding the

e-reading/listening events (A is Annie, K is Katie [the parent/researcher], B is the e-book

narration).

A: She make it. [A starts pressing on pig again and swings finger around in a circle,

accidentally pressing the back icon, so the page starts over/reloads]. (4:48)

B: The second little pig found a piece of land and she built herself a house made of

sticks. [A pressing 9 times and slowly dragging finger sideways across screen.]

K: [leaning in quietly and holding her arm] Press it one time like this. [A gets it after 3

hard presses.]

B: That's a good start.

K: One time. [K points to pig. A activates next action successfully after 2 taps.] Good

girl.

B: La, la, la. I'll have this ready soon.

K: *She's almost done, isn't she?* [A taps 3 times quickly on pig.] One more. Press it one

time. There you go! *Good! Oh, look, she's got a ramp and some railings (pointing*

to illustration). And a roof. A roof that's arched (traces arch with finger). [A taps

on the house 8 times rapidly.] Press on her. See what she has to say now. She's done.

[A is unsuccessful in one try and gives up. K presses it for her.]

Analysis and Results

The first step of data analysis involved coding the transcripts of the videos of each child's

3rd exposure to the e-book. While there were differences in the length of each child's e-book

experience—Annie's experience was lengthier than Charlie's (20:21 and 13:01, respectively)—

the transcripts both included the entirety of the e-book interactions from start to end. To explore

the verbal interactions and the kinds of support the adult provided each child, we applied the

coding method used by Krcmar & Cingal:

> Verbal comments themselves were coded as one of six verbal categories
>
> (Haden, et al., 1996): evaluative comments (e.g.,''This bunny is so cute.''),
>
> questions (e.g.,''Do you know how to turn the page?''), directives (e.g.,''Go
>
> ahead, turn the page.''), correctives (e.g.,''Don't touch the scissors!''),
>
> affirmations (e.g.,''That's right! An owl!''), and answers to direct questions
>
> from the child (e.g.,''It's a farm.''). The comment type could further be
>
> identified by reference type; that is, comments referred to the actual story
>
> line and book content (e.g.,''The bunny likes his new friend''), to the book
>
> format (e.g.,''Don't touch the iPad'' or "Press there to turn the page"), or to
>
> the environment (e.g.,''Please don't climb on me''). Thus, each comment
>
> made by a parent was coded as one of 18 comment types: one of six types of
>
> verbal categories, and then one of three reference types. (2014, 271-272).

Codes for verbal interaction were determined at the phrase level, meaning an entire phrase was

coded into one of the 18 categories. Narration of the story (i.e., reading the text) was not coded,

but oral reconstructions were included in the coding, often falling into the questions-content and

answers-content categories.

Second, we examined the videos and tallied for each of the kinds of movements Marsh

(2013) and Merchant (2015) observed in their studies of toddlers and e-books: stabilizing (e.g.,

managing and balancing the iPad; adjusting screen orientation), control (e.g., finger swipes or

taps to turn pages, finger clicks to activate hotspots), and deictic (e.g., pointing to a part of the e-

book on screen) movements. Tables 1 and 2 outline the frequencies (i.e., raw number) of each

verbal interaction and movement for each child throughout the entire e-reading experience. The

parent's interactions for each child are included parenthetically in each cell. Note that the

children's deictic movements were not tallied in Table 2 because the majority of the deictic

movements (i.e., pointing gestures) turned into control movements. In this row, the number of

deictic movements tell the number of times the parent pointed (without activating) to a part of

the screen, usually to help the child identify a hotspot he or she could press, or as accompanying

a prompt or question for text understanding.

Table 1. Frequency of verbal interactions in e-book reading experiences*

Type	Annie (30 months)			Charlie (54 months)		
	Content	Format	Environment	Content	Format	Environment
Evaluative comments	10 (13)	0 (1)	0 (0)	5 (2)	0 (0)	0 (0)
Questions	0 (35)	0 (1)	1 (0)	2 (43)	0 (1)	0 (0)
Directives	3 (9)	3 (22)	1 (1)	3 (4)	1 (6)	0 (0)
Correctives	0 (6)	1 (4)	1 (1)	1 (2)	1 (0)	0 (0)
Affirmations	0 (11)	0 (10)	0 (0)	2 (27)	0 (4)	0 (0)
Answers	21 (0)	0 (0)	0 (0)	45 (2)	0 (0)	0 (0)
* The parent's verbal interactions are included parenthetically in each cell.						

Table 2. Frequency of movements in e-book reading experiences*

Movement	Annie (30 months)	Charlie (54 months)
Stabilizing	0 (0)	0 (0)
Control	68 (56)	46 (3)
Deictic	XX (21)	XX (5)
	* The parent's movements are included parenthetically in each cell.	

Third, we conducted a more in-depth analysis of the control movements by counting the number of attempts it took each child to trigger the actions on screen. As part of this analysis, we attended to the ways in which the adult responded earlier and later in each child's e-reading experience. The early designation was determined by dividing the total elapsed time for e-reading experience in each case into thirds. Early was the first third of the total elapsed time. For Annie's reading, the "early" part consisted of 6:46 of run time on the video (see Table 3). For Charlie's reading, the "early" part consisted of 5:19 of run time on the video (see Table 4). Note that Table 3 is not an exhaustive account of all of Annie's attempted control movements during this sample. There were too many to include the full list of movements. Table 3 includes approximately 75% of all of her attempts with a stratified sample from page turn movements and hotspot control movements. Table 4, on the other hand, is entirely exhaustive, representing all of Charlie's attempted control movements early in the e-reading experience.

Table 3. Annie's control movements early in e-reading experience and contingent parent response

type of control movement	elapsed time	# attempts	attempt success	parent response
hotspot	0:34	9	no	no help
page turn	0:49	1	yes	no help
hotspot	2:31	1	yes	no help
page turn	2:37	1	yes	pointed to arrow
hotspot	2:40	9	no	pointed to correct spot
hotspot	3:08	6	no	controls for the child
hotspot	4:06	7	no	no help
hotspot	4:31	5	no	joint physical control
hotspot	4:49	9	no	models "press one time"
page turn	6:04	no attempt	no	point + "press here"
hotspot	6:25	no attempt	no	point + "press here"
hotspot	6:28	6	no	"wait for it to go"
hotspot	6:35	8	no	controls for the child

In addition to these more technical analyses related to the child's navigation and

interaction with the e-book, we also examined each child's informal understandings of story

vocabulary, plot, and social and emotional reactions to the story. Each child's emergent reading

of one scene of the e-book served as proxies for comparing and validating each child's story

understanding to the larger scope of other children within the same age groups (i.e., compared to

emergent reading ratings of same-aged participants in de Jong & Bus, 2004; Sulzby, 1985).

These results are presented and discussed later in the paper.

Table 4. Charlie's control movements early in e-reading experience and contingent parent response

type of control movement	elapsed time	# attempts	attempt success	parent response
page turn	0:20	1	yes	no help
hotspot	1:16	1	yes	no help
page turn	1:53	1	yes	no help
hotspot	2:28	3	yes	no help
page turn	2:32	1	yes	no help
page turn	3:20	3	no	held back hand
page turn	3:38	1	yes	no help
hotspot	4:14	2	yes	no help
page turn	4:30	1	yes	no help
page turn	4:47	3	yes	no help

Verbal Interactions

Affirmations for Charlie were largely content (i.e., text understanding) related whereas affirmations for Annie focused more on navigating the text format (i.e., prompts to turn page, press here or there, etc.). Below is an example of the parent and Annie's interaction in one of the "I'll huff and puff and blow your house down scenes." Note Annie's gaze remained fixed on the screen throughout entire the interaction displayed below—she never looked up from the screen. Katie did not attempt to make eye contact with Annie because the child was seated in front of the

adult with the screen in front of the child. Katie's hand touched Annie's shoulder at the first

exchange.

K: **See it's not time yet. You still have to wait**. **The microphone's not there (pointing**

to area on screen where microphone appears). We'll have to turn the page.

B: I just want to say hello. He's very big and very bad. Isn't he? [K taps pig again]. Leave

us alone.

K: **Turn the page now** and then we get to huff and puff. [A does so.] (11:30)

B: So the wolf huffed

A: (makes blowing noises) /ffff/, /fff/

B: and he puffed

A: (makes blowing noises) /ffff/, /fff/

B: and he blew the house down.

K: **Ready? See the microphone? (K points at the microphone on screen.) Blow.**

A & B: (make blowing noises) /ffff/

K: Blow!

A & B: (make blowing noises) /ffff/

K: Good! **One more. Blow!** Good!

A & B: (make blowing noises) /ffff/, /fff/

K: Oh no [K turns page in e-book (11:54)]. Do you remember where they're going now?

[A taps continuously on the page to make pigs run faster]

B: The pigs went squealing off to their brother's house with the wolf racing after them.

[A still tapping with no success to make the pig speak.] He's getting closer. [K

presses van/wolf.] Mmm. You look good enough to eat. [K presses pig.] He's going

to catch up.

K: Oh. **Turn the page.** Hurry! [A does so.] You've got it. (12:27)

B: The wolf knocked at the door of the third little pig. [A taps three times in sync with the

wolf's knocking.] Little pig, little pig, may I come in?

A: No!

B: Not by the hair of my chinny, chin, chin.

A: Chinny, chin, chin (looking at K).

K: Chinny, chin, chin.

In the above sample, you see just how much verbal scaffolding Annie required to wait for

the microphone interactive to become enabled and then subsequent prompting to interact, or

blow (these verbal prompts are in bold font). In the next 30 seconds, Annie attempted to abandon

the e-reading activity, choosing to get up and walk away. In that one scene Annie required 5

prompts to wait (i.e., inhibit behavior) or to navigate the text format (i.e., activate behavior).

Annie's gaze only moved from the screen to the parent when she got up and tried to walk away

from the e-reading experience. In the same interactive sequence for Charlie, he only required

prompting twice, demonstrating the differences in each child's ability to navigate the e-book

format and the differences in verbal scaffolding required to co-regulate each child's engagement

in the activity. His gaze moved from the screen to the parent more frequently, usually occurring

when the parent posed a comprehension/discussion question.

K: What do you think? He might eat the pigs… [C turns page (5:08)] What happens here?

"the wolf…" [C knocks his hand on floor]. He knocked. And what did he say? Do

you remember what he says? "Little pig, little pig let me in." And the pig says?

C: Not by the hair… [then C advances the page before he finishes narrating (5:28)]

K: (finishing C's statement)… of my chinny, chin, chin. And so the wolf huffed [C taps

blowing hotspot], and he puffed [C taps blowing hotspot] and…" What did he do?

C: (looks up at K)…he blew the house down.

K: That's right. Help him. **Touch and blow**.

C: [Taps one time] (blows) /fffff/

K: (laughing) **One more time!**

C: [Taps one time] (blows) /fffff/

K: What do you think that pig was thinking when he ran away?

C: [Taps to turn the page (5:56)] He's scared. (looks up at K)

K: Yeah.

C: He's going to his sister house.

K: Yep. " The little pig ran squealing to his sister's house with the wolf racing after him."

C: Why is that car there?

K: Well. I don't know. Do you think that wolf, um, thinks he's faster in a car?

C: Uh-huh.

Another observation about the verbal interactions (Table 1) relates to the parent's use of

affirmations. There is a noticeable difference in the focus of Affirmation reference type. The

parent's affirmations referenced the content less frequently, and the format more frequently, in

Annie's experience than in Charlie's.

A final observation from the data presented in Table 1 is that Annie's verbalizations

focused more on the environment than Charlie's did. All three of the times Annie spoke about

the environment were instances in which she got up and walked away from the e-book and iPad,

focusing on other things in the immediate environment. A deeper discussion of this follows in the next section.

Movements

The lack of observed stabilizing movements in Table 2 could be attributed to the positioning of the iPad—resting on the hardwood floor, with the child either sitting or laying in front of the screen, or with the child sometimes sitting on the parent's lap. This contextual factor reduced the possibility of the children turning the screen rotation when holding the iPad on their laps. As a result of this, and perhaps the parent/researcher's moves to maintain the children's engagement in the story, neither child engaged in pressing the iPad's "home" button to exit out of the e-book.

From Tables 2, 3, and 4, above, it becomes clear that (1) Annie engaged in many more of the hotspot interactive features of the e-book than Charlie, and (2) Annie was much less successful in her control movements than Charlie. As a result, you see the parent/researcher assisting Annie much more than you see her assisting Charlie. The types of help and assistance ranged from outright modeling (parent controlled the action for the child), verbal prompts (i.e., "press there," "turn the page now") to physical prompts (i.e., holding the child's finger to press jointly with the child).

With Annie, it was obvious that many of her unsuccessful attempts early were because she was not able, or did not wish, to wait until after the narrative text was read aloud on the page (despite that context being provided in reading 1 and 2 of the e-book earlier in the week); she was attempting to tap through to the interaction, despite reminders that she had to wait for the text to be narrated before she could interact with the characters in the story. Because of this, there were many unsuccessful actions, and the parent elected to provide assistance with a

mixture of verbal (i.e., "now press here"), deictic (i.e., pointing) or physical prompts (i.e., jointly tapping). After these prompts, we observed Annie experiencing some independent successes resultant from the parental supports for navigation and interaction. At the 6:43 mark, Annie quickly tapped the illustration three times, before anything started going on screen. With big arm movements, Annie raised her hand up above head and came down hard onto the screen. Her brow furrowed and eyes looked toward her parent at this point. She said, "You do it," and walked away from the screen.

Also, the parent engaged in significantly fewer control movements early in Annie's e-reading experience compared to later, while there was little difference observed in parent control movements in Charlie's early and late e-reading experiences. In Annie's early reading experiences, she attempted 24 hotspot interactives with touch. Of those, nine were met with short, repetitive touches (see Table 3, number of attempts). We argue that these unsuccessful attempts resulted in frustration and attempt to abandon the e-reading experience all together. Frustration point number one occurred at 6:47 into the e-reading interaction:

K: Whoops. You started it [the page] over. You crashed it.

B: The third little pig decided to build a house made of bricks. He worked hard and his house took a long time to build.

A: Press it. [Starts to stand up and walk away 6:47]

K: You want me to press it? Nope leave the camera alone.

B: Oof! These bricks are really heavy!

A: You do it. [K presses to advance action and comments.] Boom. [K presses to advance action and comments.] Boom.

B: I'm going to need some more cement. [K presses.]

K: Here comes the roof! Yeah!

B: That was hard work. But it's a great house. [A presses pig 5 times quickly and then it

goes.]

After this indication of frustration with navigation the parent stepped in and offered

unsolicited assistance to Annie's navigation much more frequently, reducing the number of

hotspot and page turn clicks initiated by the child. In this support, the parent/researcher's

objective was to maintain Annie's interest through the interaction, operating on theory evolved

from dissertation study that navigational challenges/difficulties can interfere with child's

engagement in the e-reading experience.

With Charlie, the number of attempts he made prior to successful actions was fewer. As a

result, the parent did not elect to provide supports as frequently as she did to Annie. When the

parent did provide Charlie a navigational support early on, it was a control move in which the

parent requested him to wait for the programming to catch up.

Text understanding

Despite the differences in each child's navigation through the e-book format, and the

parent/researcher's differing supports, both children exhibited age-appropriate text

understandings as evidenced by (1) solicited emergent readings of one page of the text, and (2)

observations of their expressive engagement within the reading experience.

Emergent readings. When we analyzed Annie's emergent reading of the text where the

wolf came to blow down the second pig's house, we determined that the language aligned to

Sulzby's "Story Not Formed" classification from her study of emergent readings of familiar

storybooks (1985). This classification is similar to the emergent readings constructed by the

majority of two-year-old children in Sulzby's study (see Figure 2). Charlie's emergent reading

demonstrated language structures that wavered between "Oral and Written-Like Story" classifications, similar to the majority of four-year-old children observed in Sulzby's study (see Figure 2).

   Plot. With respect to the children's understandings of the plot, we noted that Annie made several successful predictions about the next events in the story, demonstrated empathy for characters, produced emotional responses to overall mood of the story (i.e., she put her hands to her face when the wolf was chasing the pigs and during the fire scene in the 3rd pig's house). Moreover, we observed Annie engaged in dialogue with the characters in the story (i.e., talking back, Sipe, 2002) by directly responding to the characters' questions (e.g., B: do you like my plant? A: yes.). In all, Annie reported she enjoyed most when she got to blow the house down.

   Charlie also made many successful predictions about the next events in story. In addition, he also demonstrated some higher level thinking when he questioned the rationale for character's motivations and when he began to explore author/illustrator purpose. In contrast to Annie's identification of a favorite part of the story, Charlie reported he enjoyed most when the pigs caused harm to the wolf.

   Despite this evidence of plot understanding, both children showed some misunderstandings, with Annie sharing many more misunderstandings than her older brother, Charlie. For example, Annie says they are going to a party (we think because pig says that in 1st scene of e-book; and example of one misleading hostpot in the book). At another point in the story, Annie was observed blowing down houses at times unaligned to the actual narration in e-book. When discussing the characters' state of emotions, Annie says the fire is making the pig scared, when it's actually the wolf coming down the chimney causing the pigs' fear. Finally, Annie thought that the wolf's tail in the chimney was a squirrel. This misunderstanding relates,

likely, to her less developed sense of character permanence in the plot. Charlie's

misunderstandings, on the other hand, were solely related to definitions of particular words used

in the story.

Language and vocabulary understanding. Both children demonstrated understanding

of various vocabulary words presented in the story. We attempted to capture whether each child

understood the meaning of targeted words—*straw, sleepy, cement*, *angry, scared,* and *boil*—and

utilized the transcript and gestures in the video recordings to assess language understanding.

Results of this analysis show Annie demonstrated less depth of knowledge than Charlie for many

of the words targeted in the 3rd reading, and also exhibited incorrect understandings more

frequently than her older brother. Metaphorical meanings (e.g., why is smoke coming out of the

wolf's ears?) were difficult for Annie, although she was able to correctly infer the wolf felt angry

because he says "grr, ahh." Charlie's understanding of word meaning was more complex: he

correctly identified synonyms and functions of key targeted vocabulary when prompted.

Discussion

The case offers insights into the interaction between normative developmental

differences, individual child differences, and caregiver response with differential supports as it

relates to the e-reading experience. The differences observed between the two children could be

attributed to their different developmental levels and possibly also to individual differences, and

the parent/researcher responded with different supports to each child.

Developmentally at age two, children typically are both asserting autonomy and

independence and also in need of comfort and reassurance from a caregiver (Lieberman, 1995).

At age four children typically are focused more on their growing competence in planning and

accomplishing tasks and their drive for initiative reflects this interest (Erikson,1963)

Additionally, the physical ability to precisely navigate the page-turns and hot spots within the e-book are much more accessible at age four than at age two. The children in this study reflect these normative developmental traits, in that Annie at 30 months is interested in attempting to navigate the e-book autonomously, but also seeks the safety and comfort of her caregiver when the task becomes frustrating or taxing on her capacity for attention. The focus of the interaction frequently centered on the navigation as this was a more frequent point of frustration for her. Her verbalizations focused on the environment were aimed at eliciting support from her parent (see Table 1). Charlie at 54 months is both more able to attend and more interested in his ideas about his understanding of the story being validated as he is exhibiting initiative in his thinking about the story.

Similar to the findings of Kim and Anderson (2008), the role of the adult is different when interacting with a younger child compared to the role the adult takes on with an older child. This is likely because the self-regulatory and cognitive capacities at each age are quite different, among other developmental markers. "Providing the experiences, supports, and encouragement that enable children to take over and self regulate in one area of functioning after another is one of the most critical elements of good caregiving" (Shonkoff & Phillips, 2000, p. 121). With the two year old, the adult engages in much more of a co-regulatory role due to attention and emotional regulation skills that are still developing. For the four year old child, these regulatory capacities, while still developing, are much improved, and the adult functions in a different way, offering support and redirection when necessary, but allowing the child to have more responsibility over their own self-regulation. This improvement in inhibitory or effortful control is due in large part to the developing brain (Shonkoff & Phillips, 2000).

Also involved in the variation between any two children are individual differences. The differences in each child's temperament, for example, creates both differences in style and ability to self-regulate, as well as prompts different responses from adults in the environment (Sturm, 2004; Carlson, et al., 2004). For example, we believe that the higher number of affirmations related to content for Charlie (see Table 1) may reflect a temperamental difference—the need for a lot more external validation. Thus, individual differences also prompted differential response on the part of the parent/research.

Effortful control typically improves noticeably during a child's third year and individual differences in the development of effortful control can be related to temperament and heredity, but also can be "associated with the quality of mother-child interactions" (Eisenberg, 2012, p17). An attuned caregiver who offers scaffolding for both inhibiting and activating behaviors as the context and interaction requires is supporting development of this important self-regulatory function, and gradually releases responsibility for effortful control to the child as they are developmentally ready. The parent/researcher in this case offered unsolicited support for navigation for both inhibiting and activating behaviors when it became apparent that the frustration resulting from waiting (for example, waiting for the e-book read all the text before hotspots were activated, or to accurately tap the correct spot to turn the page) was prompting Annie to walk away from the e-book. For young children it is very, very hard to wait, but with a responsive adult offering supports children develop this important self-regulatory capacity.

Limitations and Future Directions

As e-book media on iPads and touch screen tables are historically juvenile, this research is largely exploratory and descriptive in nature and is not without limitations. The first is that each child chose to use different modes of interaction on their third, and final reading of the text.

In doing so, the planned comparison of verbal interactions and control movements were less valid than they would have been had both children chosen the "read to me" mode. Also, while the parent is held constant across the two dyads observed here, the children differed in age, temperament, and gender. Because of the children's differences in these, we know that our comparative conclusions will not generalize to all 30 month and 54 month children. Our analysis makes comparison across age to begin to explore the relationship between the child's development, parental support, and the child's literacy development.

A second limitation was that the parent (the first author of the study) was also the researcher and is knowledgeable in early language and literacy development with a specialization in e-books. A less knowledgeable parent could have delivered different types of supports. It is probable that different supports would have yielded very different behaviors and that different results could have been observed in other social or cultural contexts. Parent-child interactions are driven by goals for development that are shaped by the cultural context, thus the e-book reading event (i.e., where and how the parent and children sat with the iPad/e-book; the gestural interactions that were effective for communicating from parent to child and child to parent; the appropriateness of the selected story) may look very different in international contexts. A knowledgeable parent who spoke the same language as the text was read, with a background in literature and teaching established the context for communication in this case. While each parent-child dyad and context will bring unique differences to an e-book reading interaction, this case provides insights into the complex interplay of children's overall development, language and literacy development, effortful control, and temperament with responsive support on the part of the parent as they influence the e-reading experience. The role of the parent in adjusting the type

of support offered based upon developmental and individual differences seem to be a salient

factor in sustaining a cognitively and socially positive e-book reading experience

Like other research, this study, with a small sample size, has demonstrated that e-book

reading can be a highly engaging and enjoyable learning experience for both the adult and child

(Labbo, 2009; Smith, 2001). The scaffolds an adult uses to support a two-year-old child's story

understanding differ from the scaffolds used to support a four-year-old child's understanding.

This may be a function of the children's differences in print awareness, emergent reading skills,

facility with technology, or some combination thereof. Society is becoming increasingly

digitized, and adults can use digital media like e-books to introduce young children to this ever-

expanding part of our culture (Roskos & Brueck, 2009). But, e-books function in different ways

from printed texts and therefore children can learn new and important skills and literacies that

are absent from interactions with printed texts.

It is important that we, as literacy researchers, parents, and educators, begin to deepen our

understanding of how to support young children's understanding of the electronic and interactive

media we share with them with development in mind. The issue is an important one, especially

because these media have become more prevalent in today's society—it is becoming ever

important that e-book developers creating interactive media for young children consider the

range of development present in the targeted audience as well as the role of caregiver/child

interaction as part of the design. Recognizing that different strategies are needed to support

children of different ages and considering child development are critical as we continue to

understand how these media intersect with the learning and teaching that are part of human

interaction.

Acknowledgement

References

Arnold, D.S., & Whitehurst, G.J. (1994). Accelerating language development through picture

book reading: A summary of dialogic reading and its effects. In D.K. Dickinson (Ed.),

Bridges to literacy: Approaches to supporting child and family literacy (pp. 103-128).

Cambridge, MA: Blackwell.

Borman, K M., Clarke, C., Cotner, B., & Lee, R. (2006). Cross-case analysis. In J.L. Green, G.

Camilli & P.B. Elmore (Eds.), *Handbook of Complementary Methods in Education

Research* (pp. 123-140). Mahaw, NJ: American Education Research Association.

Blachowicz, C.& Fisher, P.J. (2007). *Best Practices in Vocabulary Instruction*. New York, NY,

US: Guilford Press.

Brabham, E., & Lynch-Brown, C. (2002). Effects of teachers' reading-aloud styles on vocabulary

acquisition and comprehension of students in the early elementary grades. *Journal of

Educational Psychology, 94*(3), 465-473. http://dx.doi.org/10.1037/0022-0663.94.3.465

Calvert, S.L., Strong, B., & Gallagher, L. (2005). Control as an engagement feature for young

children's attention to, and learning of, computer content. *American Behavioral Scientist,

48*, 578–589. https://doi.org/10.1177/0002764204271507

Carlson, V.J., Feng, X., & Harwood, R. (2004). The "Ideal Baby": A look at the intersection of

temperament and culture. *Zero to Three*, 24(4), 22-28.

Clay, M. (2006). *An observation survey of early literacy achievement, 3ʳᵈ ed.* New York, NY: Heinemann.

Cohen, M., Hadley, M., & Frank, M. (2011). *Young children, apps & iPad*. New York, NY: Michael Cohen Group LLC. Available http://sociallyspeakingllc.com/my-mission-for-socially/free-pdfs/a_study_of_young_children.pdf

Collins, M.F. (2013). Sagacious, sophisticated, and sedulous: The importance of discussion 50-cent words with preschoolers. *Teaching Young Children, 6(*4). Available http://www.naeyc.org/yc/files/yc/file/201211/YCCollins.pdf

Crain-Thoreson, C., & Dale, P.S. (1999). Enhancing linguistic performance: parents and teachers as book reading partners for children with language delays. *Topics in Early Childhood Special Education, 19*(1), 28-39. https://doi.org/10.1177/027112149901900103

Eisenberg, N., Smith, C.L., & Spinrad, T.L. (2011). Effortful control: Relations with emotion regulation, adjustment, and socialization in childhood. *Handbook of self-regulation: Research, theory, and applications*, 263-283.

Eisenberg, N. (2012). Temperamental effortful control (self-regulation). Encyclopedia on early childhood development. Quebec, Canada: Centre of Excellence for Early Childhood Development (CEECD) and the Strategic Knowledge Cluster on Early Child Development (SKC-ECD).

Erikson, E.H. (1963). *Childhood and society*. New York: Norton.

Eliot, L. (1999). *What's going on in there? How the brain and mind develop in the first five years of life*. New York: Bantam.

Fender, J.G., Reichert, R.A., Robb, M. & Wartella, E. (2010). Parent teaching focus and

toddlers' learning from an infant DVD. Infant and Child Development, 19, 613-327.

http://doi.org/10.1002/icd.71

Ferreiro, E., & Teberosky, A. (1982). *Literacy before schooling*. Exeter, NH: Heinemann.

Haden, C.A., Reese, E., &Fivush, R. (1996). Mothers' extratextual comments during storybook

reading: Stylistic differences over time and across texts. *Discourse Processes*, 21, 135–169.

http://doi.org/10.1080/01638539609544953

Hoffman, J. L. (2011). Coconstructing meaning: Interactive literary discussions in kindergarten

read-alouds. *The Reading Teacher, 65*(3), 183-194. https://doi.org/10.1002/TRTR.01025

Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first

through fourth grade. *Journal of Educational Psychology, 80*(4), 437-447.

http://dx.doi.org/10.1037/0022-0663.80.4.437

Justice, L. M. (2002). Word exposure conditions and preschoolers' novel word learning during

shared storybook reading. *Reading Psychology, 23*(2), 87-106.

http://dx.doi.org/10.1080/027027102760351016

Justice, L. M., & Ezell, H. K. (2004). Print referencing: An emergent literacy enhancement

strategy and its clinical applications. *Language, Speech, and Hearing Services in Schools,

35*(2), 185-193. http://doi.org/10.1044/0161-1461

Kim, J. E., & Anderson, J. (2008). Mother-child shared reading with print and digital texts.

Journal of Early Childhood Literacy, 8(2), 213-245.

http://doi.org/10.1177/1468798408091855

Korat, O., & Segal-Drori, O. (2016). *E-book and printed book reading in different contexts as emergent literacy facilitator*. Early Education and Development, *27*(4), 532-550. http://dx.doi.org/10.1080/10409289.2016.1095613

Krcmar, M., & Cingel, D. P. (2014). Parent–Child Joint Reading in Traditional and Electronic Formats. Media Psychology, 17(3), 262–281. http://doi.org/10.1080/15213269.2013.840243

Labbo, L. D. (2009). "Let's do the computer story again, Nana": A case study of how a 2-year-old and his grandmother shared thinking spaces during multiple shared readings of an electronic story. In A. G. Bus & S. B. Neuman (Eds.), *Multimedia and literacy development* (pp. 196-210). New York: Routledge.

Lauricella, A. R., Pempek, T. A., Barr, R., & Calvert, S. L. (2010). Contingent computer interactions for young children's object retrieval success. *Journal of Applied Developmental Psychology, 31*, 362–369. http://dx.doi.org/10.1016/j.appdev.2010.06.002

Leu, D. L., Kinzer, C. K., Coiro, J. L., & Cammack, D. W. (2004). Toward a theory of new literacies emerging from the Internet and other information and communication technologies. In R. B. Ruddell & N. J. Unrau (Eds.), *Theoretical models and processes of reading* (5th ed., pp. 1570–1613). Newark, DE: International Reading Association.

Lieberman, A. F. (1995). *The emotional life of the toddler* (pp. 6-54, 123-147). New York: Free

Marsh, J. (2013). "How do UK children use e-books?" Retrieved from https://www.youtube.com/watch?v=v6mYbUON3OQ

Merchant, G. (2015). Keep taking the tablets: iPads, story apps, and early literacy. *The Australian Journal of Language and Literacy*, *38*(1), 3–11.

Mol, S. E., & Bus, A. G. (2011). To read or not to read: A meta-analysis of print exposure from

infancy to early adulthood. *Psychological Bulletin, 137*(2), 267-296.

http://doi.org/10.1037/a0021890

Moody, A. K., Skibbe, L., Parker, M., et al. (2014). Use of electronic storybooks to promote

print awareness in preschoolers who are living in poverty. *Journal of Literacy and

Technology*, *15*(3), 2–27. Available

http://www.literacyandtechnology.org/uploads/1/3/6/8/136889/jlt_v15_3.pdf

Morrow, L. M. (1988). Young children's responses to one-to-one story readings in school

settings. *Reading Research Quarterly, 23*(1), 89-107.

McGee, L.M., & Schickedanz, J.A. (2007). Repeated interactive read-alouds in preschool and

kindergarten. *Reading Teacher, 60*(8), 742-751.http://doi.org/10.1598/RT.60.8.4

Neuman, S.B. (1996). Children engaging in storybook reading: The influence of access to print

resources, opportunity, and parental interaction. *Early Childhood Research Quarterly,

11*(4), 495-513. http://dx.doi.org/10.1016/S0885-2006(96)90019-8

Neuman, S.B. (1999). Books make a difference: A study of access to literacy. *Reading Research

Quarterly, 34*(3), 286-311. http://doi.org/10.1598/RRQ.34.3.3

Nielsen, J. (1993/2014). Response times: The 3 important limits. Retrieved from

http://www.nngroup.com/articles/response-times-3-important-limits/

Niklas, F. & Schneider, W. (2015). With a little help: Improving Kindergarten children's

vocabulary by enhancing the home literacy environment. *Reading & Writing,* 28(4), 491-

508, http://doi.org/10.1007/s11145-014-9534-z

Paciga, K.A., Lisy, J.G. & Teale, W.H. (2009). Examining student engagement in preschool read

alouds. In Leander, K., Rowe, D.W., Dickinson, D.K., Hundley, M. Jimenez, R.T., & Risko,

V.J. (Eds.) *58th yearbook of the National Reading Conference* (pp. 330-347). Oak Creek, WI: National Reading Conference.

Paciga, K.A., Lisy, J.G., Teale, W.H. & Hoffman, J.L. (2015). Student engagement in classroom read alouds: Considering seating and timing. *Illinois Reading Council Journal, 43*(3), 7-14.

Parish-Morris, J., Mahajan, N., Hirsh-Pasek, K., Golinkoff, R.M., & Collins, M.F. (2013). Once upon a time: parent–child dialogue and storybook reading in the electronic era. *Mind, Brain, and Education*, *7*(3), 200–211. http://doi.org/ 10.1111/mbe.12028

Rees, K., Rvachew, S., & Nadig, A. (2015, June). *Story-related discourse by parent-child dyads*. Presented at the Digital Literacy for Preschoolers: Maximizing the Benefits of eBooks, McGill University, Montreal, Canada. Retrieved from https://digitalmediaprojectforchildren.files.wordpress.com/2015/07/rees-diglitmcgill-slide-upload.pdf

Rvachew, S., Rees, K., Nadig, A., Carolan, E., & Christie, E. (2015, June). *School based shared readng with iReadWith Books improves emergent literacy skills*. Presented at the Digital Literacy for Preschoolers: Maximizing the Benefits of eBooks, McGill University, Montreal, Canada. Retrieved from https://digitalmediaprojectforchildren.files.wordpress.com/2015/08/rvachew-diglitmcgill-slide-upload.pdf

Rogoff, B. (2003).*The cultural nature of human development*. New York: Oxford University Press.

Roskos, K. (2013). The eBook goes to school: Shared book reading 3.0. In S. B. Neuman & L. Gambrel (Eds.), *Quality reading instruction in the age of Common Core Standards* (pp. 190–203). Newark, DE: International Reading Association.

Roskos, K., & Brueck, J. (2009). The eBook as a learning object in an online world. In A. Bus & S. Neuman (Eds.), *Multimedia and literacy development* (pp. 77-88). New York: Routeledge.

Roskos, K., Burstein, K., & You, B. (2012). A typology for observing children's engagement with ebooks at preschool. *Journal of Interactive Online Learning*, *11*(2), 47–66. Available http://www.ncolr.org/jiol/issues/pdf/11.2.1.pdf

Scholastic. (2015). *Kids & family reading report, 5th Edition*. New York, NY: Scholastic, Inc. & YouGov. Retrieved from http://www.scholastic.com/readingreport/Scholastic-KidsAndFamilyReadingReport-5thEdition.pdf

Schwanenflugel, P.J., Hamilton, C.E., Bradley, B.A., et al., (2005). *Classroom practices for vocabulary enhancement in prekindergarten: Lessons From PAVEd for Success*. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

Sipe, L.R. (2002). Talking back and taking over: Young children's expressive engagement during storybook read-alouds. *The Reading Teacher, 55*(45), 467-483.

Shonkoff, J.P., & Phillips, D.A. (2000). *From neurons to neighborhoods: The science of early child development*. Washington, D.C.: National Academy Press.

Smeets, D., & Bus, A.G. (2012). Interactive electronic storybooks for kindergartners to promote vocabulary growth. *Journal of Experimental Child Psychology*, *112*(1), 36–55. http://dx.doi.org/10.1016/j.jecp.2011.12.003

Smith, C.R. (2001). Click and turn the page: An exploration of multiple storybook literacy. *Reading Research Quarterly, 36*(2), 152-183. http://doi.org/10.1598/RRQ.36.2.3

Stern, D.N. (2000). *The interpersonal world of the infant*. New York: Basic Books.

Sturm, L. (2004). Temperament in early childhood: A primer for the perplexed. *Zero to Three,*

24(4), 4-11.

Sulzby, E. (1985). Children's emergent reading of favorite storybooks: A developmental study.

Reading Research Quarterly, 20(4), 458-481.

Takeuchi, L., & Stevens, R. (2011). *The new coviewing: Designing learning through joint media*

engagement. New York, NY: Joan Ganz Coooney Center at Sesame Street. Available at

http://www.joanganzcooneycenter.org/publication/the-new-coviewing-designing-for-

learning-through-joint-media-engagement/

Teale, W.H., Paciga, K.A. & Hoffman, J.L (2010). What it takes in early schooling to have

adolescents who are skilled and eager readers and writers. In K. Hall, U. Goswami, C.

Harrison, S. Ellis & J. Soler (Eds.), *Interdisciplinary perspectives on learning to read:*

Culture, cognition and pedagogy (pp. 151-163)*.*

Teale, W.H., & Sulzby, E. (Eds.). (1986). *Emergent literacy: Writing and reading* (2nd ed.)*.*

Norwood, NJ: Ablex Publishing.

Vaala, S., & Takeuchi, L. (2012). *Co-reading with children on iPads: Parents' perceptions and*

practices. New York: Joan Ganz Cooney Center at Sesame Street. Available at

http://www.joanganzcooneycenter.org/wp-

content/uploads/2012/11/jgcc_ereader_parentsurvey_quickreport.pdf

Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes*.

Cambridge: Harvard University Press.

Vygotsky, L.S. (1986). *Thought and language* (A. Kozulin, Trans.). Cambridge, MA: MIT Press.

Whitehurst, G.J., & Lonigan, C.J. (2001). Emergent literacy: Development from pre-readers to

readers. In D.K. Dickinson & S.B. Neuman (Eds.), *Handbook for research on early literacy*

(pp. 11-29). New York, NY: Guilford.

]Yu, C., & Smith, L.B. (2016). The social origins of sustained attention in one-year-old human

infants. *Current Biology*, *26*(9), 1235–1240. http://doi.org/10.1016/j.cub.2016.03.026

Children's Media Referenced

Nosy Crow Limited. (2011). *The three little pigs* [iPad application, version 1.4.1] Available from

https://itunes.apple.com/us/app/three-little-pigs-nosy-crow/id418543664?mt=8.

The Neighborhood Archive. (n.d.) *It's hard to wait* [song lyrics]. Retrieved 20 July 2015 from

http://www.neighborhoodarchive.com/music/songs/hard_to_wait.html

The Roles of Digital Literacies and Critical Literacy for Black Adolescent Females

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Abstract

The purpose of this conceptual thought paper is to argue for critical digital literacies instruction for all students, particularly students from marginalized populations. In this paper, the lived experiences of Black adolescent female avid readers were analyzed because of the complex nature of their discrimination due to their race and gender. Research questions included: What are the technologies and practices used by Black adolescent female avid readers? How and why do they use them? What are the implications for educators? To answer these questions, the voices of Black adolescent female readers from this author's previous study were used to explore the *method* of critical literacy and the *medium* of digital literacies from their lived literate experiences. Concurrent instruction or critical digital literacies instruction could improve students' reading experiences and amplify the voices of marginalized groups such as the Black adolescent females with the greater digital world on the social ills they witness in books and in life.

Keywords: Black adolescents, females, critical literacy, digital literacies

Introduction

The importance of instruction in critical literacy and digital literacies has been well

established in the research of several scholars; however, the relationship between the two has

largely been ignored. In this ever-evolving online age, it is critical to explore how students can

expose bias and move toward social action through digital means. Therefore, in this conceptual

thought paper, I argue for the research and classroom implementation of critical digital literacies,

so that students can astutely advocate for themselves and others.

The empirical research referenced herein focuses on the reading experiences of Black

adolescent female avid readers because of the complex position on experiencing discrimination

in two critical parts of their identity – race and gender. In this paper, I examine these young

women's literacy practices *in situ*, with an eye toward the *medium* and *method* of their reading

practices, where the *medium* could span the spectrum from print-on-the-page to pixels-on-the-

screen, and the *method* could range from mainstream comprehension practices to complex

critical reading strategies. Yet, given the rising tide of digital tools in teens' lives and the push by

educators, leaders, and parents for teens to be more astute and canny users of these tools, an

examination of the media and methods of Black adolescent female participants has the potential

to shed appreciably more light on this marginalized population.

More specifically, to examine the proclivities of Black adolescent female avid readers for

consuming and producing digital texts (i.e., the *medium*) could yield a better understanding of

how to empower and support their academic pursuits that employ online tools. In turn, educators

could then be better equipped to assist these girls in developing their digital literacies skills,

which they will likely need to succeed in the ever-increasing digital global marketplace.

Furthermore, to examine the critical literacy strategies (i.e., the *method*) of Black

adolescent female avid readers as they engage with a range of texts in a variety of contexts could

bear a fuller understanding of how these teens actually learn to do things with texts for various

purposes. Such purposes, for example, could be the need to express frustrations about negative

dominant views of their personhood or to bring greater meaning to their lives (Hall, 2011).

Taken together, these renewed understandings of Black adolescent female avid readers

and their digital and critical literacy (i.e., the *medium* and *method* of their literate activity) have

the potential to inform the design of voracious-creating reading experiences for all students, but

especially those who could benefit from the self-advocacy that critical digital literacies afford.

With the designs for such experiences in hand, educators could better equip their students to (a)

capitalize on the affordances of digital tools and texts, and (b) transpose their needs and

ambitions (whether they are personal frustrations, academic challenges, or professional goals)

into social action targeted at change.

This paper, then, outlines the digital and critical reading experiences of Black adolescent

female avid readers by focusing on the question: What are the technologies and practices used by

these Black adolescent female avid readers, how and why do they use them, and what are their

implications for educators? Before answering this question, the problem for this particular group

of readers must first be unpacked.

Conceptual Background

The Problem

How are Black adolescent female readers seen through the lens of their race and gender?

The research literature emphasizes those Black adolescent females who are remedial readers.

One reason for this emphasis is because of these young adolescents' performance on

standardized measures. At the secondary and post-secondary levels, boys have long outperformed girls on national measures of reading performance (Cohen, White, & Cohen, 2012). Even though recent evidence indicates that this gender gap is reversing, especially for reading (Freeman, 2004), the emphasis on Black female teen who are challenged with reading prevails. For example, data from the National Assessment of Educational Progress shows that 12th grade females in 2005 outperformed male students in reading by a wider margin than they did in 1992. Thus, while more Black adolescent females are performing better in reading (Cohen, White, and Cohen, 2012), the prevailing image of them in the scholarly literature is that they need assistance with reading. While it is admirable to help Black adolescent female "struggling" readers, the lack of attention to those Black adolescent females who love to read leads to a gap in the literature in terms of their voices stating why they love to read, what led them to love reading, how they use reading, among other questions. This gap is problematic in that it provides a one-dimensional view of the reading lives of these girls.

In fact, the result is an absence of evidence to counter these negative narratives of Black adolescent female readers. The limited evidence available suggests that the Black adolescent females who do not excel in reading are not engaged with reading either because of the lack of culturally-relevant texts, interesting texts, or culturally-sensitive pedagogy (Brooks, Sekayi, Savage, Waller & Picot, 2010; Davis, 2000; Gibson, 2010; Sutherland, 2005). If engaged, these scholars argue, Black adolescent females would enjoy reading more, do more reading, and thereby, become more proficient readers. This researcher's phenomenological study on Black adolescent females' love of reading gets to the essence of these questions for the participants, and establishes that they craved reading as one does a favorite dish, but were also particular, as are food connoisseurs.

Now that the need to study Black adolescent female avid readers has been established,

the argument of this paper is to emphasize the need to also study Black adolescent females'

digital and critical literacy skills, as both relate to their voracious reading practices. As students

in the 21st Century, it is vital that these girls are proficient with digital books and tools, as well

as critical literacy skills. My participants loved to read and wanted family and friends with which

to share this desire to read. All of them also owned or desired to own electronic readers. Their

desire for companionship around reading along with their interest in digital books contained

great possibilities for enhancing their reading experiences, finding virtual companions in order to

share their love of reading, and expanding their knowledge of using digital tools for the purposes

of critiquing books. Through our interviews, the Black girl avid readers pointed to their limited

knowledge in engaging with novels in these ways. If they had knowledge of these possible

avenues to heighten their enjoyment of reading, they would have done so.

As I thought about these aspects of their reading experience while also reading scholarly

literature, I found that it was important to explore how educators could best help marginalized

students like Black adolescent females in their classrooms become well-rounded individuals

prepared for the demands of the digital world while simultaneously teaching them how to

question books and advocate for themselves and others. To do so, educators would do well to

consider purposefully designing pedagogy to enhance and promote a combination of digital and

critical literacy. The meshing of these two literacies is especially important for disenfranchized

students because it helps them question the status quo, thereby empowering themselves to

advocate for social change.

Teaching for Social Justice: Critical Literacy

Several scholars have written about the importance of incorporating methods of critical literacy in pedagogy, specifically for minorities and urban youth. Fecho and Waff (1998), Mahiri (1998), and Morrell (2008) purposed to help students question, challenge, and change the status quo. In their scholarly writings, they have encouraged other scholars and practitioners, to focus, in scholarship and practice, on developing relationships with students by incorporating community norms and language in curricula. They also challenged us to teach for social justice across the disciplines, because in an era where discrimination and hegemony continue to abound, students need a curriculum that incorporates the skills of rhetoric and calls for action to eradicate social ills. Social injustices can include immediate concerns about problems locally or abroad, and exploring these topics, which are of keen interest to marginalized students, engages them in subject matter. Oftentimes, teaching academic subject matter alone creates a resistance among students because they do not see the relevance of the curriculum to their daily lives (Mahiri, 1998). These authors challenge us to educate students for the purpose of equipping them to thrive in a world that continues to promote systems of oppression on people of color and the poor. Employing critical literacy instruction empowers students to articulate and expose these exploitive systems in order to initiate change.

While some may argue that incorporating critical literacy is difficult to do in an age of accountability, Avila and Moore (2012) have suggested techniques for incorporating this literacy in disciplinary classrooms. For example, in the case of the current Common Core State Standards, these scholars extracted specific standards that were malleable for inclusion of critical literacy pedagogy, so that teachers could recognize that using this pedagogical method was possible.

In addition to arguing for the pedagogical method of critical literacy, Morrell (2008) also provided several examples of how to include it in most, if not all, of the disciplines. For instance, in a unit on the *Odyssey* (Homer, 1900), he assigned students question systems that tend to downplay cultural norms scaffolding their ability to identify these systems in literary and other written works. To make *The Odyssey* more relevant to their lives, he incorporated the *Godfather* trilogy (Puzo, 1969) in this unit, and using both texts, he prodded students to question whether the values displayed in the works of literature were values forced on them by society. Student questioning was a tenet of critical literacy as they read and questioned Homer's *Odyssey*. Morrell's practical methods of incorporating critical literacy with a group of secondary urban students are just one of many exemplars for teachers and scholars to study for use in other disciplinary contexts.

Teaching for Technology in the 21st Century: Digital Literacies

Next, many scholars are concerned that many teachers are not engaging their students in the medium of digital literacies. To illustrate this dilemma, Hicks, Turner, and Fink (2013) wrote about two fictitious schools, composites of the places where they observed and conducted research; the authors represented dichotomous schools on the continuum of digital literacies implementation. On one end of the continuum, teachers in affluent schools were not using technology in meaningful ways, and on the other end, teachers in under-resourced schools teachers did not have the technological resources; the latter lacked opportunities to engage students in the medium of digital literacies. For example, in the affluent fictitious school, *Access Academy*, the students were surrounded by technology affordances, such as interactive whiteboards in every room, devices for every student, and full Google integration with students having access to free *Google* apps. Even with these devices and teachers' and district leaders'

expressions of commitment for helping students improve their proficiencies in digital literacies,

teachers infrequently used these tools, and only employed them if there was 'extra time' at the

end of the unit. Hicks et al. (2013) stated that the medium in this composite school was "never

[used] in a sustained, inquiry-based manner" (p. 58). As such, the resources were an add-on, not

an integral part of the curriculum. According to these scholars, these circumstances were

indicative of many affluent schools that have plentiful technology, but do not use it for helping

students create and consume texts in critical ways that enable them to develop critical thinking

skills.

On the other end of the continuum, Hicks and colleagues (2013) described an under-

resourced fictitious school that they named *Exodus Elementary*. The problem of scarce funding

and technology was exacerbated by the reality that many students lacked personal computers and

other technological devices that would assist in their development of digital literacies. Without

these technology affordances, Exodus students were set up to be less competitive with affluent

students with these resources. The authors urged teachers in these situations to upgrade their

search for technological resources that enable their students to have equitable opportunities.

Obtaining these resources would likely level the playing field for these students, which would

increase their chances for gaining quality higher educational and career opportunities. Important

in both cases is to recognize that for both fictitious schools, improper or no implementation of

digital literacies instruction was problematic.

Existing Tensions for Digital Literacies Implementation

O'Brien and Scharber (2008) also understood these problematic dichotomies in the

implementation of digital literacies instruction that Hicks et al. (2013) described in their

composite schools. However, O'Brien and Scharber also pointed out the problematic tension

between educators when contending for the inclusion or exclusion of digital literacies instruction

in schools. On one end, educators passionately advocate for the inclusion this instruction, but do

so without honing in on the importance of using them effectively to meet curricular goals.

Conversely, other educators continue to adhere to traditional literacy instruction to the detriment

of students who need technological skills in order to compete in today's digital world. The

authors recommended blending the two extremes in order to create a balanced implementation of

digital literacies instruction, which would create magnificent possibilities for engaging

adolescent readers. In fact, O'Brien and Scharber (2008) stated:

> Some tech enthusiasts might be tempted to import into school the most enjoyable aspects
>
> of young people's social worlds and pleasures gained from creating and using digital
>
> literacies. This desire should be tempered with the understanding that the use of digital
>
> technologies in schools should be driven by educational purposes rather than social ones.
>
> (p. 67).

Accordingly, Hicks et al. (2013) and O'Brien and Scharber (2008), understood that instruction in

digital literacies cannot wait, but they also emphasized the importance of retaining traditional

literacy skills. In other words, they believed in the balance of both. After all, digital literacy

builds on traditional literacies; the latter is still important.

Role of Educators in Use of Digital Texts

Similarly, Gee (2012), with his focus on print and digital literacies and *texts*, pointed out

that whether the text is print or digital, the modeling and oral scaffolding from an adult in how to

critically think through and use these texts have the potential to determine whether the young

person can achieve economic success or not. Gee specifically commented on what he called

grades, or degrees of quality, in traditional print and digital literacies. He stated that the

premium grade led to success in the modern world while the average grade led to working-class

jobs, which had lower benefits and less union support. Gee also expressed the importance of

knowing and utilizing academic language that is associated with traditional print literacy. He

added that many people groan at the mention of academic language when it comes to traditional

print literacy, but that "the forms of language used in research, empirical reasoning, logical

argumentation" are connected to people getting good jobs; those who attain these high-level

positions "are often there because they got through their high school chemistry book and argued

and debated their way through a good college" (p. 418). In other words, traditional print literacy

skills remain important when it comes to having social and cultural capital (Bourdieu, 2001).

Analogous to traditional print literacy, digital literacies also has a premium and average

grade (Gee, 2012). For instance, "premium digital literacy is the ability to use specialist/technical

language connected to digital tools," and "it is also the ability to use academic language

connected to institutional and public-sphere knowledge-building and argumentation" (p. 418). In

print and digital texts, language, although different types, is important, and instruction and

scaffolding by an adult is necessary for students to be prepared for career opportunities. In sum,

instruction in both types of texts is necessary for students to be versatile and adept in both

genres, which will be part of their future academic and career endeavors. Since the benefits of

using traditional print texts are well understood and implemented in schools, it is also important

to understand specific ways in which electronic texts are useful in schools.

Webb (2007) found digital texts an effective means of enhancing students' ability to

enthusiastically engage with literature in his former English language arts classroom. When his

literature anthologies did not arrive on time, Webb was forced to turn to digital texts. In

searching for literature, he found a plethora of digital readings that allowed students to obtain

more in-depth background information, definitions, connections with authors, among other

benefits that made their texts come alive. In the case of their poetry unit, students were more

engaged as they found online recordings of poetry, local poetry reading announcements,

newsletters, and other resources. In another case, students were able to read various translations

of *The Odyssey* (1900); they were also able and create their own line-by-line translations of it

based on more in-depth understandings of the work due to their exposure to different versions of

the play. These are just a few examples of the ways in which Webb (2007) found literary digital

texts exciting and engaging for students.

Relationship Between Digital Texts and Reading Comprehension

However, when it comes to benefits for reading comprehension with digital texts, Wright,

Fugett, and Caputa (2013) found no change when using digital instead of traditional print texts

with elementary-aged children. Also, the children's reading time was consistently longer when

reading from an iPad than from a print source. On the other hand, the children made more use of

reading support sources, such as dictionaries, when reading from electronic texts, and their

enjoyment of reading increased when they read literature electronically. So while no change in

comprehension was found, this study corroborated the findings of Grimshaw, Dungworth,

McKnight, and Morris (2007), who conducted a similar study. In the Wright and colleagues'

research, the children enjoyed reading digital devices because they were easier to hold, the

screen's lighting contrast could be adjusted, electronic bookmarkers were useful, among other

benefits.

Truly, although these studies found that reading comprehension remained unchanged

between print and digital texts, the fact that children's enjoyment of reading and use of

comprehension tools increased is a good reason for educators to incorporate digital texts (and

digital literacies instruction) in classrooms, for fostering the love of reading is just as important as improving students' reading comprehension skills. Therefore, as Hicks et al.'s (2013) article title indicated, digital literacies are no longer a luxury that can wait.

Combining Critical Literacy and Digital Literacies Pedagogy

Peters and Lankshear (1996) discussed the importance of teaching students to not only critique traditional print texts, but digital texts as well, by the following:

> Why are certain bits of text brought [sic] together in a particular constellation? On what principles are images, sounds, and texts amalgamated in this way, in these particular circumstances, at this time? What purposes or interests do these assemblages or constructions of the world serve? How do they affect the way people live? Why are these elements of text, sound, and image brought together in this way and not in other possible combinations? What might it do to put music to this text or text to these images? And so on.

These questions are indeed foundational in critical and digital literacies instruction; however, the focus of this paper is to point to the end result of this questioning, and that is the social action tenet of critical literacy. Because of the vast audience the online environment provides, it is an effective means for students to advocate for themselves and others. Classroom instruction must play a part in how to do so most effectively, so that students are able to get the results they hope to achieve. Getting results, especially for the silenced, is most important. Thus, it is imperative that educators are adept in critical literacy and digital literacies in order to adequately prepare students to make a difference in their lives and the marginalized citizenry.

Empirical Background

While the evidence herein is based on phenomenological research on the lived experiences of five Black adolescent females, the findings are relevant to all adolescents. However, it is crucial for marginalized students to have critical digital literacies skills to combat their own oppression. As such, Black adolescent females were chosen to highlight because of their unique position of experiencing bias based on gender and race. This excludes other parts of their identity that could also be a source of discrimination (e.g., social class, sexual orientation, religion). Their experiences, or the lack thereof, with critical digital literacies are important to researchers and practitioners as we consider the need to help all students question bias and use digital means for social action.

This section, therefore, focuses on these teens' critical digital literacies practices. As the five girls in this study described their experiences with reading, data was collected about their knowledge of how to question authorial intentions and issues of power through digital means. The following paragraphs illustrate the strategic what, how, and why these Black adolescent female avid readers used digital literacies as a means to engage in critical literacy.

Participants' Uses of Critical Literacy

Alexandra (a pseudonym), an intelligent culturally-conscious Black adolescent female, was attuned to issues of race and equality in readings, whether real or perceived. Her ability to notice issues of race in books was largely due to her mother's influence. Her mother, who, interestingly enough was an avid reader and served as a director for a multicultural awareness initiative in a major school system, instilled pride in Alexandra for African and African American history, literature, and culture. Alexandra grew up with her mother reading her and her brother African American children's stories in the book, *The People Could Fly: American Black Folktales*, told by Virginia Hamilton (1993), so she had an early instilment of self-worth;

Alexandra saw her value in an acculturating childhood book, regardless of society's frequent

devaluation of the African American experience. As such, when Alexandra read her favorite

book series, *The Hunger Games* by Suzanne Collins (2008), she was disturbed with the image of

Black people in one district because they worked as food gatherers. She grappled with the idea of

Black people doing work that she considered similar to slave labor in a futuristic setting. At first,

she wondered if the author was trying to send a message about society's thoughts on the

occupational and societal roles Black people should hold. She stated:

> I guess I was like kind of curious as to why she had written it that way. I really – I was
>
> trying to figure out like deeper into the story what – what it was, like if she was trying to
>
> say something. Maybe they've got – maybe because the capital is kind of like this – it
>
> seemed like this white community, as far as people, but I mean, there were – there was
>
> one other black person. His name is Cinna, and he was like the designer of Katniss. But,
>
> I mean, uhm, he was the only other black character in the capital, so it kind of made me
>
> wonder if she thought that maybe society thinks that slavery is like almost a necessity or
>
> if it's something that would make the community better or make the world better.

It appeared that Alexandra was hesitant, as noticed through her "uhms" and breaks in speech, to

accuse the author of maliciousness. She wanted to be fair in her assessment while also stating her

confusion and concern.

As Alexandra continued to question the rationale of portraying Black people as food

gatherers, she moved from wondering if the author thought society felt that Black people should

be in slavery-type positions to wondering about the author's personal intentions. Alexandra

stated:

I guess I would have felt better if it weren't so – like, if were more diverse. And if it was

noticeably diverse. But like, I mean, of course I know it's just a book, but you know I

also know that the author's White. So that's one of the things that comes to mind when I

think of it. For gathering, you know, why would you use Black people? It just kind of

runs through my mind when I -

Alexandra did not state that the author's intentions were racist. However, Alexandra was curious

about the reasoning behind Collins' choice to portray most of the Black characters in this way.

Her curiosity and questioning demonstrated her moving through the method or process of critical

literacy.

Although Alexandra's concern may have been a bit off-centered, that is, she had not yet

grappled with the scene enough to consider all of the polysemous prose; namely, the probable

meaning that Collins' portrayal of Black people as mostly food gatherers was probably to

capture, in its most extreme form, the unjust treatment of the citizenry by the Capitol

(government officials in authority). Nevertheless, Alexandra was adept at questioning and

considering other possible meanings and implications, other than malicious intent, behind the

author's words. She had yet to formulate a solid conclusion at the time of our meetings.

Although Alexandra was one of several teen participants to openly question an author's

intent, the other participants also thought deeply about books and connected to them in personal

ways; however, they did not take the next step and question the authors. Additionally, all of the

participants, including Alexandra, had yet to use questioning to move toward social action,

which could have been used to speak out against any possible malicious authorial motives. This

skill is one they needed in order to combat the fatigue and frustration Alexandra and another

participant, Kayla, felt as a result of curiosities about authors' purposes.

In sum, even though some teen participants engaged in critical literacy practices, their

knowledge of how to fully engage with texts critically was limited. In essence, they seemed to

lack a range of strategies for how to question authors' purposes and issues of power in books. If

they had been taught this skill, which none indicated they had, perhaps they would have felt

more empowered and confident in their assessment of an author's intent as well as

knowledgeable about ways to advocate for those marginalized populations who may have been,

in other cases, inappropriately portrayed in books.

Participants' Uses of Digital Literacies

In terms of their digital literacies text and tool preferences, the adolescent participants in

the author's research were mainly *mono-literate* in that the medium in which text was delivered

was the same (print or digital books). The girls still read books whether they were in print or

digital format; they were simply preoccupied with reading material of any form. In fact, Taylor,

one of the participants, loved her Kindle:

> …[M]y dad got it for me last Christmas and I just, it's so wonderful. This is, it's
>
> definitely helped me to get books easier, since the books come from Amazon and I can
>
> just go right to the store and pick out books I wanta get. And I was so excited when I got
>
> it 'cause I was just like, "oh, I want this book and I want this book and I want this book."
>
> And I actually have a whole list of books that I want… And this has definitely helped me
>
> because before, when I didn't have my Kindle, we'd have to go to the library, and we
>
> couldn't always get to the library because my dad, he works late some days and even on
>
> Saturdays, like he just came back from teaching at [a local school] a few hours ago. And
>
> so we never really had the time to get to the library. And so during that time, I didn't

read as much. I had to always depend on the school's library, but now that I have my

Kindle, it's so much easier, so much better. It really makes me happy.

Like Taylor, the participants who owned an electronic reader, enjoyed having the ease of

securing books quickly and relatively inexpensively while also having the ability to read and

carry around several books on one device. Although Kayla talked about the comprehension tool

on her Kindle, she found the ability to secure some of the complimentary books quickly to be

more appealing than the tools. Consequently, what the participants appreciated most was the

ability to engage and purchase multiple books frequently. In essence, while Taylor and the other

participants loved their digital readers, they did not use them in ways that enhanced their reading

enjoyment other than having books at their disposal all of the time.

The author's concern is that they did not produce any digital artifacts such as blogs,

iMovies, *YouTube* videos, vlogs, tweets, or *Facebook* notes and statuses (Moje, Overby, Tysvaer,

and Morris, 2008) in any way whether to simply share views or question authorial intent. In fact,

when I asked Kayla, a participant who had online access, whether or not she did anything with

her reading pastime online, she stated, "I've heard of Goodreads, but I haven't really gone to it.

And I don't have a *Facebook* and *Twitter*; it's a waste of my time. Like, I just read. I just read."

Indeed, Kayla, like many of the participants, was primarily a consumer of books. This pattern

was consistent across most of the girls in the study: whether they had access or not, the girls

were content to sit in their reading environments and read books whether they were

paper/hardbound or digital in order to fill their unquenchable desire for more and more appealing

plotlines and characters. With one exception, their love of reading had a limited connection to

any online activity that involved production (e.g., writing, designing, communicating, etc.).

So why did these girls refrain from sharing their love of reading except through gatherings with friends, listening to *YouTube* reviews (a step up from face-to-face conversations), and/or watching the movies based on their fascinating books? Listening to their descriptions of their teachers' classroom lessons revealed that a traditional view of literacy was utilized, so they did not view these technological avenues as relevant to their reading experience. The girls did not express technology as being used in their classrooms in diverse, novel ways.

The participants' focus on consumption, and not production (Attewell & Winston, 2003)., speaks to the need for teachers to share and demonstrate how digital products are beneficial to the reading experience, whether students are wired at home or not. All but one participant had Internet access at home, but those wired still did not actively engage or produce digital artifacts. Their responses established that they were not knowledgeable about the ways in which producing artifacts could enhance their reading experience as well as connect them to other readers and interested parties.

Because the girls wanted companionship around their love of reading, it pointed to the necessity for teachers to communicate the benefits of loving to read as well as instruct them on how to share their fervency with others in the greater world. While the girls had some digital literacies skills, they could have been amplified for the purpose of obtaining the companionship they desired, which would, in turn, elevate their already sheer enjoyment of reading. Of the participants, Sydney was most connected online, but she still was not making the most of her online resources. To explain, Sydney enjoyed watching *YouTube* book reviews on the Cass Jay Tuck Channel in order to decide what books she wanted to purchase and have someone to engage with after having read a book. She found this tool especially useful if none of her friends had read her particular book. The reviewer on the Cass Jay Tuck Channel was the person she

could relate to online; interestingly, the *YouTuber* is a white female who appears to be in her

early twenties. Not only did Cass Jay Tuck confirm or contest Sydney's own thoughts about the

book she had read, but the *YouTuber* also served as a role model of sorts in that she was able to

witness that there were indeed people in the world who shared Sydney's love of reading. In fact,

Sydney stated:

> It means like I'm not the only out – like out there who loves to read and that there
>
> are other people who are out there who really like to voice their opinion about the
>
> books that they read. There are other people who agree with those opinions. And
>
> then there – you have people who disagree with the opinions, and you're able to
>
> have a debate over it and it's pretty cool.

In her case, Sydney debated with the reviewer by watching and reading – not participating in

online discussions or writing the *YouTuber*. Nevertheless, this watching and reading were

sufficient enough for Sydney because she had access to someone else that not only enjoyed

reading the same books, but also shared the same passion for reading. This reviewer was

Sydney's virtual companion.

On the other hand, because Sydney did not participate in the *YouTube* dialogue or

produce her own digital artifact, e.g., blog or vlog, she was left out of book conversations on

deeper levels. This void is where a teacher or another adult could have intervened and scaffolded

her knowledge of digital practices and connected them to her love of reading. As Gee (2012)

stated, digital literacies skills are more effective when a knowledgeable adult supports the young

learner. Sydney could have benefited from having a more knowledgeable person as a resource

for the purpose of making her reading experience even more rewarding.

Implications

Given the conceptual and empirical material presented in the previous pages, a number of implications can be drawn for educators who design reading experiences that support the digital and critical literacy experiences, especially students from discriminated populations such as Black adolescent females. In terms of *digital literacies practices*, the design of reading experiences works optimally with a balanced approach, where teens are prepared to read traditional print texts *and* online digital texts critically. This balance means preparing them to read texts in ways that imagine textual meaning that is imbued with a broad range of cultural and linguistic factors in mind. For instance, with the U.S. "projected to become a majority-minority nation for the first time in 2043" … where "no group will make up a majority" (Census Bureau, 2012), readers need to apprehend texts as polysemous, signifying meaning that varies across people, place, and time. Thus, designing the use of digital texts for students will require a multi-dimensional model for balancing the many elements at play when the digital medium of literacy is constituted by many forms with polyvalent functions.

Furthermore, *critical literacy practices*, are also important to all students, so that they can identify bias in their readings, videos/programs, and communities. Again, this paper highlights issues raised by the voices of Black adolescent females because of their complex marginalization due to their race and gender. In many respects, a complex, complicated, discriminatory background has rendered them invisible and silent in national dialogues on literacy.

In recent years, a growing number of scholars have engaged in excellent work on behalf of many of the marginalized and silenced students. I take up their conversation to further the thinking about critical literacy and digital literacies to the more balanced discussion of critical digital literacies to reflect the ever-evolving online era..

Conclusion

In summary, the conceptual and empirical backgrounds of this conceptual work indicate Black adolescent avid reading girls and other adolescents do engage in digital and critical literacies, but in superficial ways. Furthermore, the literature and evidence suggests that more direct support for teaching critical and digital literacies could develop more strategies beyond these limited ways. In line with participants from my study, Hall (2011) concluded, on his study with Black adolescent female writers, that instruction in digital literacies would be ineffective without explaining how these tools could bring meaning to the teens' lives. Due to discrimination based on their age, race, gender, and acuity, marginalized groups have much to say regarding their lives and their lived literate experiences, which could be expressed through various digital venues (e.g., iMovies, blogs, vlogs, social media networks). Although findings from the author's research revealed some of the participants' knowledge of moving through the critical literacy process and using digital tools, their use of the method and medium was not maximized, seemingly due to the lack of purposeful instruction connecting the two literacies together in participants' classrooms.

The dearth of research on adolescents' critical digital literacies skills, indicate a need to understand their practices better. If research on the methods, processes, and imperatives for critical digital literacies are not conducted, an opportunity for effective, widespread online advocacy adolescents' can use for themselves and others could be largely left neglected and untapped. By comprehending the what, how, and why of youths' practices, educators can move from teaching these concepts without consideration of student experiences toward teaching them *in situ*, with relevance, and concurrently. Combining the teaching of these literacies has many benefits, including enhancing the reading experiences and abilities of students for advocating, through digital means, for the oppressed, marginalized, and silenced in books and in life.

References

Attewell, P., & Winston, H. (2003). Children of the digital divide. In P. Attewell & N.M. Seel

(Eds.), *Disadvantaged teens and computer technologies* (pp. 117-136). Münster,

Germany: Waxmann.

Avila, J., & Moore, M. (2012). Critical literacy, digital literacies, and common core state

standards: A workable union? *Theory into Practice, 51*(1), 27-33.

Bourdieu, Pierre (2001). *Masculine Domination*. Stanford: Stanford University Press.

Brooks, W., Sekayi, D., Savage, L., Waller, E., & Picot, I. (2010). Narrative significations of

contemporary Black girlhood. *Research in the Teaching of English*, *45*(1), 7-35).

Cohen, D.J., White, S., & Cohen, S.B. (2012). Closing the gender gap: Improved performance of

U.S-Born females on the National Assessment of Adult Literacy. *Journal of Literacy

Research 44*(4), 343-363.

Collins, S. (2008). *The Hunger Games.* New York, NY: Scholastic.

Davis, R. T. (2000). Black females' voices in the classroom: Young sisters making connections

through literature. *New Advocate, 13*(3), 259-271. Retrieved from

http://www.eric.ed.gov/ERICWebPortal/search/detailmini.jsp?_nfpb=true&_&ERICExtS

earch_SearchValue_0=EJ607825&ERICExtSearch_SearchType_0=no&accno=EJ60782

5

Fecho, B., & Waff, D. R. (1998). Crossing boundaries of race in a critical literacy classroom.

(pp. 75-101) Erlbaum: Mahwah, NJ.

Freeman, C. (2004). *Trends in educational equity of girls and women: 2004.* Washington, DC:

National Center for Education Statistics.

Gee, J. P. (2012). The old and the new in the new digital literacies. *Educational*

Forum, 76(4), 418-420.

Gibson, S. (2010). Critical readings: Black girls and urban fiction. *Journal of Adolescent & Adult*

    Literacy, 53(7), 565-574.

Grimshaw, S., Dungworth, N., McKnight, C., & Morris, A. (2007). Electronic books: Children's

    reading and comprehension. British Journal of Educational Technology, *38*(4), 583-599.

Hall, T. (2011). Designing from their own social worlds: The digital story of three

    African American young women. *English Teaching, 10*(1), 7-n/a.

Hamilton, V. (1993). *The people could fly: American Black folktales.* New York, NY: Random

    House.

Hicks, T., Turner, K. H., & Fink, L. S. (2013). No longer a luxury: Digital literacy can't

    wait. *English Journal, 102*(6), 58-65.

Homer - The Odyssey, Translated by Samuel Butler 1900." *Ancient / Classical History –*

Ancient

    Greece & Rome & Classics Research Guide. N.p., n.d. Web. 8 Oct. 2014.

Mahiri, J. (1998). *Shooting for excellence: African American and youth culture in new century*

    schools. Urbana, IL: National Council of Teachers of English.

Moje, E. B., Overby, M., Tysvaer, N., & Morris, K. (2008). The complex world of

    adolescent literacy: Myths, motivations, and mysteries. *Harvard Educational*

    Review, 78(1), 107-154.

Morrell, E. (2008). *Critical literacy and urban youth: Pedagogies of access, dissent, and*

    liberation. New York, NY: Routledge.

O'Brien, D., & Scharber, C. (2008). Digital literacies go to school: Potholes and

    possibilities. *Journal of Adolescent & Adult Literacy,52*(1), 66-68.

Peters, M., & Lankshear, C. (1996). Critical literacy and digital texts. *Educational Theory, 46*(1), 51-70.

Puzo, M. (1969). The godfather. Fawcett Publications: Greenwich, CT.

Sutherland, L.M. (2005). Black adolescent girls' use of literacy practices to negotiate boundaries of ascribed identity. *Journal of Literacy Research, 37*(3), 365-406.

U.S. Census Bureau. (2012). *U.S. Census Bureau projections show a slower growing, older, more diverse nation a half century from now*. Retrieved from http://www.census.gov/newsroom/releases/archives/population/cb12-243.html

Webb, A. (2007). Digital texts and the new literacies. *English Journal, 97*(1), 83-88.

Wright, S., Fugett, A., & Caputa, F. (2013). Using E-readers and internet resources to support comprehension. *Journal of Educational Technology & Society, 16*(1), 367-n/a. Retrieved from http://ezproxy.msu.edu/login?url=http://search.proquest.com/docview/1287029551?accountid=12598

Disrupting Students' Online Reading and Research Habits: The LINKS Intervention and its Impact on Multiple Internet Text Integration Processes

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Abstract

This study is about eight dyads of ninth grade students conducting collaborative online research on topics related to their science curriculum. It measures the impact of a teaching intervention called LINKS (Learning to Integrate InterNet Knowledge Strategically) on four dyads' use of ten online reading strategies hypothesized to support multiple Internet text integration processes relative to their control-group peers. Results showed that LINKS, as administered in this study, had no statistically significant impact on the frequencies, relative frequencies and relative duration of strategies used during a series of five online inquiry sessions relative to the control group. In their written persuasive arguments at posttest, however, treatment participants were found to integrate information from a more diverse set of websites than control participants. Although more research is needed, this study shows that LINKS disrupted participants' reading and writing processes in ways that nudged them toward more integrative action.

Keywords: dyadic online inquiry, academic digital literacies, multiple Internet text integration, teaching intervention

Introduction

Foundational research on reading strategies has demonstrated that good comprehenders

flexibly monitor, fix up and synthesize understandings from printed texts (Alexander & Jetton,

2000; Duke, Pearson, Strachan & Billman, 2011; Pressley, 2000; Pressley & Afflerbach, 1995).

In classrooms, teaching interventions such as Reciprocal Teaching (Palincsar & Brown, 1984)

that target acquisition and application of reading strategies through gradual release of

responsibility from teacher to students, and that include peer collaborations, seem especially

supportive of learning gains, in part, because they help students to know which reading strategies

to use, when, and how (Duke, et al., 2011; Gersten, Fuchs, Williams & Baker, 2001; Mokhtari &

Reichard, 2002; Pressley & Gaskins, 2006; Van Keer, Verhaeghe, & Taylor, 2005).

Studies of *online* reading comprehension and strategies application have shown that

expert online readers flexibly engage reading strategies, too (Afflerbach & Cho, 2009; Cho &

Afflerbach, 2015; Coiro & Dobler, 2007). With printed texts, good readers set a reading purpose,

cue their background knowledge, preview text structures and use them to both predict and infer

meaning (Goldman & Rakestraw, 2000). Good comprehenders of print also monitor, fix, clarify,

visualize and summarize their understandings by questioning the text, and thinking aloud (Duke

et al., 2011; Kucan & Beck, 1997). And although online readers do all of these things, the unique

contexts, media, and purposes for Internet reading seem to drive the cueing and prioritization of

particular strategies over others (Coiro & Dobler, 2007; Zhang & Duke, 2008). Because the

Internet is open, readers must be incredibly strategic about the ways they construct their reading

trajectories. As Cho and Afflerbach (2015) write, good Internet readers "use strategies for

realizing and *constructing* potential texts as they negotiate the multiple texts, spaces, and reading

choices encountered in Internet reading" (p. 505).

In school, strategies that enable readers to realize and construct potential texts become most important during Internet research and writing tasks (Kiili, Mäkinen & Coiro, 2013). Without the ability to locate, evaluate and synthesize understandings of topics from multiple Internet texts, students can easily become lost online. Rudderless in an infinite sea of search results, hyperlinks, media, and perspectives, students who become lost are less able to learn, participate, and communicate their understandings than those who actively apply strategies for realizing and constructing texts more effectively (Bråten, Strømsø & Britt, 2009; Goldman, Braasch, Wiley, Graesser & Brodowinska, 2012; Hargittai & Hinnant, 2008; Wiley et al., 2009; Thompson, 2013). Especially troubling are analyses that show how variation in students' use of these strategies can be explained, in part, by family income (Hargittai & Hsieh, 2013; Leu, et al., 2014). In the span of a generation, the Internet has become yet another space where those who have higher wealth also acquire the advanced literacies skills that contribute to, and reinforce their positions of privilege (DiMaggio, Hargittai, Celeste & Shaffer, 2004; Hargittai & Hsieh, 2013). Teaching all children the strategies they need to read printed and Internet texts has, therefore, become a critical issue of social justice.

To reverse this troubling divide, research must identify methods of instruction that enable all students to acquire the foundational online reading strategies that will allow them to read, write and participate on the Web (Dwyer, 2016; Mozilla Learning Network, 2016). Although hundreds of studies now describe classroom activities designed to engage students in a range of digital literacies activities in school, relatively few have designed and measured the impact of online reading strategies interventions on students' ability to construct integrated understandings of what they have found and read during online research activities in school (e.g., Kiili, 2013; Kiili, Laurinen, Marttunen & Leu, 2012).

Informed by an integrated set of theoretical frames and research on reading strategies instruction both offline and online, the current study responds to this need. It measures the impact of one instructional intervention called LINKS on a small group of grade nine students' online reading and writing activities, and compares their activities with those of a comparison group.

Theoretical Frameworks

The design, questions and methods of this study are built on several complementary theoretical assumptions. Although this study focuses specifically on students' learning and use of particular strategies while conducting research on the Internet, it is assumed that reading engages not just cognitive processes, but also social and cultural knowledge that inextricably shapes understandings of texts (Pearson, 2009; RAND Reading Study Group, 2000). It is also assumed that where the reading activity takes place (i.e., in school; on the Internet) will cue particular ways of constructing understanding, and that these constructions will be shaped by social and cultural expectations about reading, developed through participation in school and on the Internet (Brown, Collins & Duguid, 1989; Lave & Wenger, 1991; Vygotsky, 1978). It is assumed that reading strategies can be learned, particularly through gradual release of responsibility from teacher to learners (Duke & Pearson, 2002; Duke et al., 2011; Pearson & Gallagher, 1983) and that peer-to-peer negotiation of meaning during reading is supportive of comprehension (Palincsar & Brown, 1984; Kiili, 2012; Wilkinson & Son, 2011). Moreover, is assumed that if students have a more fully stocked cognitive toolkit of reading strategies, they will be more able to construct understandings of multiple texts more dynamically and flexibly as they criss-cross the ill-structured web landscape (Spiro & DeSchryver, 2006).

In this study, participants are asked to construct integrated understandings of topics by finding and reading multiple Internet texts. Integrated understanding means the weaving together of ideas from one text with ideas from others so that understanding of the topic is not just a list of disconnected threads, but rather more like a tapestry. The construction-integration model of reading comprehension (Kintsch, 1998; Kintsch & van Dijk, 1978) and the documents model of multiple text integration (Britt et al., 2013; Perfetti et al., 1999; Rouet, 2006), suggest that readers construct a model of understanding within a single text by first building a text base, and then a situation model for the text. As readers integrate multiple situation models, it is assumed that they must consider relations among texts. These relational, or integrative strategies are taken as unique to the task of synthesizing understanding across and among information sources. It is also assumed that integration of meaning is recursive and iterative; that through a process of cognitive bricolage, a coherent model of understanding is constructed (Britt, Rouet, & Brasch, 2013; Perfetti, Rouet & Britt, 1999; Rouet, 2006).

Thirdly, the multimodal nature of Internet texts is assumed (Kress, 2003). As outlined in the dual-level Theory of New Literacies (Leu, Kinzer, Coiro, Castek & Henry, 2013) it is assumed that students would need to engage multiple, multimodal and multifaceted literacies, and apply new forms of strategic knowledge to construct meaning.

Finally, it is also assumed that writing supports the construction of integrated understandings (e.g., Klein & Rose, 2010; Langer, 1986a, 1986b; Newell, 2006) and that trace evidence of integration processes are evident in participants' written arguments. As such, the organization and content of students' written arguments are taken to represent a constructed version of students' understanding.

Literature

Based on studies of expert multiple text integration with printed, and online texts, a set of strategies was identified for inclusion in an instructional intervention designed to support students' progression toward more expert habits of strategy use. The reading strategies literature that informed *what* to teach is reviewed first. It is followed by a review of research that informed the instructional methods, or the *how* to teach.

What to Teach?

The "what" of the LINKS intervention, summarized in Table 1, includes ten reading strategies that coalesce around five categories: focus on reading purpose and relevance, compare and contrast information, evaluate trustworthiness, cue pre-existing knowledge and self-regulate.

Focus on reading purpose and relevance of text options. To construct a documents model of understanding (Rouet, 2006) good readers of multiple Internet texts evaluate potential texts for content relevance (Rouet, 2006; Wiley et al., 2009). For middle-schoolers labeled as proficient online readers (Coiro & Dobler, 2007) text relevance is often assessed through a process of forward inferencing at the search engine results page (SERP), before a text is chosen for closer reading. For example, one student in Coiro and Dobler's study used information from the snippet text to anticipate the relevance of a website before clicking on the link, "I'll probably go to 'Tiger Basics' because it says after the link 'tiger facts, physical characteristics,' and that kind of stuff...I think it might show their habitat, I guess." (p. 232). Afflerbach and Cho (2009) also describe initial evaluation of content utility or relevance as one strategy for "realizing and constructing potential texts to read" (p. 82). They note that good readers "sample goal-related information at the initial stage of reading to establish a dynamic plan to achieve one's own goal" (p. 82). Given these findings, teaching students how to identify and determine relevance based on reading purpose, and how to make inferences about the relevance of texts from cues at the

SERP, such as the snippet text and the URL, were taken as important strategies to include in the intervention.

Comparing and contrasting information. Offline, good multiple text integrators corroborate relevant facts, looking for similarities and differences among the texts they read (Rouet, Favart, Britt & Perfetti, 1997; Stahl, Hynd, Britton, McNish & Bosquet, 1996; Wineburg, 1991). After reading texts closely, and extracting salient content, good readers weigh the relative value of the information they've gathered to construct an integrated documents model of understanding that includes multiple ideas (Cerdán & Vidal-Abarca, 2008; Kintsch, 1998; Rouet, 2006). Given these data, comparing and contrasting information were included as essential strategies in the intervention.

Evaluate trustworthiness using multiple cues. People who expertly integrate multiple texts, evaluate trustworthiness of information using a range of heuristics and cues. Offline, they use sourcing cues such as authorship to indicate text value (Wineburg, 1991; Rouet, 2006). Online, they use content provided in the snippet text, and clues in the URL (Afflerbach & Cho, 2009; Braasch, Bråten, Strømso, Anmarkrud & Ferguson, 2013; Braten, Stromso & Britt, 2009; Coiro & Dobler, 2007). Experts also seem to leverage signals of trustworthiness from text structure and aesthetic design (e.g., Lindgaard, Dudek, Sen, Sumegi, & Noonan, 2011; Wang & Emurian, 2004), text genre, its' intended audience, purpose, tone and feel (Afflerbach & Cho, 2009). Importantly, college students who are better at identifying the trustworthiness of texts have also been found to learn more content from their online research (Wiley et al., 2009). Those who learn more also seem to engage qualitatively sophisticated reasons for their choices (Goldman et al., 2012). Teaching students to flexibly evaluate trustworthiness using diverse cues (e.g., text structure, text genre, aesthetic design, authorship credentials, snippet content, URL

structure) was therefore considered essential.

Pre-existing knowledge of topic. McNamara and Shapiro (2005) note that the

construction of a cohesive situation model from multiple linked hypertexts is dependent on the

structure of the hypertext environment itself, and also on the reader's pre-existing domain

knowledge. Readers with more content knowledge are more able to construct meaning in open

hypertext systems whereas readers with less content knowledge benefit from hypertext

environments that explicitly cue the relationships among texts. This evidence suggests that

novice online readers and multiple text integrators could benefit from knowing something about

the topic before they begin to read online. The intervention therefore asked students to cue and

share their background knowledge before searching for information sources.

Self-regulation of strategy use. Expert online readers, in comparison to weaker readers,

also seem to engage self-regulatory strategies that allow them to strategically manage their focus

on purpose, relevance, trustworthiness, and on the similarities, differences and connections

between and among texts (Afflerbach & Cho, 2009; Azevedo & Cromley, 2004; Azevedo &

Witherspoon, 2009; Balcytienne, 1999; Bråten & Strømsø, 2011; Dwyer, 2010; Eveland &

Dunwoody, 2000; Goldman et al., 2012; Sevensma, 2013). In their study of better and poorer

undergraduate learners, Goldman et al. (2012) found that better learners' stated reasons for

leaving websites also reflected "greater planfulness and goal-directedness" (p. 370) than reasons

given by those who learned less during the study. It would seem that an important part of what to

teach would therefore be how to engage in planful goal setting throughout the research process.

For this reason, the intervention explicitly cued students to progressively monitor what they had

come to understand and to identify what they still needed to learn through additional search

cycles. In the intervention, this strategy is named *Continually Update Understanding*.

The $[(PST^2) + (iC)^3]$ strategies framework was developed in response to this body of research. Outlined in Table 1, the framework names the strategies and includes a list of questions that treatment participants in this study were taught to ask themselves.

How to teach these skills?

For adolescents, the reading and multiple text integration strategies outlined above have been shown to improve with practice (Strømsø, Bråten, & Samuelstuen, 2003) and instruction (Braasch et al., 2013; Britt & Aglinksas, 2002; Wiley & Voss, 1999; Wiley et al., 2009). The design of the task prompt itself may also be an essential support for integrative processing. Wiley and Voss (1999) found that students produced the most integrated and causal essays in response to prompts that asked them to form an argument from multiple information sources presented on a website. Based on this finding, LINKS task prompts were designed accordingly. Each prompt asked students to write persuasive arguments for a particular audience, based on what they had read from multiple online information sources.

Promising instructional methods for teaching online reading and inquiry processes seem to align with the most widely supported methods for teaching reading comprehension as well. In an Irish school district serving disadvantaged populations of children over a two-year time period, Dwyer (2010) used a formative and design experiment (Reinking & Bradley, 2008) to test the impact of an instructional environment that sought to "scaffold the development of effective online reading and information-seeking strategies [...], within an integrated classroom curriculum, through a series of linked interventions." (p. 74). Importantly, students in her study worked collaboratively with peers and in groups. Her instructional methods drew heavily from (a) Guthrie's Concept Oriented Reading Instruction (CORI) model, which combines strategy instruction with conceptual knowledge instruction in science, and methods that support readers'

motivation and engagement with texts (Guthrie et al., 1996; Guthrie, McRae & Klauda, 2007; Guthrie & Wigfield, 2000; Guthrie, Wigfield & Klauda, 2012). She also borrowed methods from Palincsar & Brown's (1984) Reciprocal Teaching framework that emphasizes four essential comprehension strategies: predicting, questioning, clarifying and summarizing, along with more general strategic comprehension monitoring. In this model, teachers use gradual release of responsibility (Duke & Pearson, 2002; Duke et al., 2011; Pearson & Gallagher, 1983) moving from direct instruction to student-led discussions of their own reading strategies that are socially supported and positioned within learners' zones of proximal development (Vygotsky, 1978). Within the gradual release of responsibility model, Dwyer found three instructional strategies to be particularly supportive of online strategy development: (a) brief, but explicit strategy instruction using think-aloud techniques (Kucan & Beck, 1997; Newell & Simon, 1972), (b) adaptive scaffolding that was just-in-time and responsive to students' immediate learning needs, and, (c) peer-to-peer collaboration (p. 361).

The Teaching Internet Comprehension to Adolescents (TICA) project (Leu & Reinking, 2005a), the goals for which are to increase the use of Internet reading comprehension strategies to concomitantly improve (a) reading online and offline, (b) academic engagement and, (c) achievement among middle-schoolers at risk of dropping out (Leu & Reinking, 2005b) has also adopted a version of Palincsar & Brown's (1984) reciprocal teaching model (Leu, et al., 2008) with promising results. As measured by specific Online Reading Comprehension Assessments (ORCA), scores on a paired-samples t-test for treatment students who received the Internet Reciprocal Teaching (IRT) intervention were significantly higher in the second year of the TICA study (Leu et al., 2008, p. 333). Consistent with Dwyer's instructional methods, IRT also prescribes teacher-led instruction, collaborative modeling of specific online reading

comprehension strategies, and gradual release of responsibility until students engage in their own

online inquiries (Leu et al., 2008, pp. 328-330).

Together, these findings suggest that an integrated gradual release of responsibility model

for online reading instruction that includes teacher modeling, responsive dialogic scaffolding,

peer collaboration and opportunities for student inquiry could support progression toward more

expert online reading and integration of ideas. Previous studies have shown general gains in

online reading comprehension skills with strategies instruction (Castek, 2008; Dwyer, 2010; Leu

et al., 2008). However, it is not yet clear how to design strategies instruction that supports the

development of multiple text integration skills in particular. The LINKS intervention was

designed to address this need by leveraging the promising instructional methods reviewed above.

LINKS

Based on an examination of promising methods for offline and online reading

comprehension instruction, the LINKS intervention included seven integrated instructional

elements, implemented in the following order: (a) dyadic discussion of reading prompt, reading

purpose and background knowledge; (b) quick, direct introduction and review of $[(PST)^2 + (iC^3)]$

strategies and supporting questions, by teacher; (c) teacher modeling of strategy use for the

purpose of constructing an integrated understanding of topics from multiple texts via a series of

three screencasts that gradually release responsibility to students over three intervention sessions;

(d) 30 minutes of dyadic online reading and inquiry; (e) guided teacher questioning that prompts

application of $[(PST)^2 + (iC^3)]$ strategies during reading; (f) note taking that requires students to

change ink color to delineate information gathered from different information sources; (g)

writing a persuasive argument independently for 20 minutes.

The intervention is called *L*earning to *I*ntegrate Inter*N*et *K*nowledge *S*trategically

(LINKS). The acronym articulates the intervention's purpose. Knowledge, in this case, stands for

the schemas students build from the processes of gathering, evaluating and integrating

information from multiple texts. The word LINKS is synonymous with integration, or synthesis

and connotes the Internet's fundamental property—the hyperlink, often *link* for short.

Research Questions

This study asks two questions:

1. What impact, if any, does the LINKS intervention have on students' use of online reading
   and integration strategies hypothesized to support integration of meaning from multiple
   information sources during Internet inquiry?

2. What impact, if any, does the LINKS intervention have on trace evidence of integration
   processes in students' written persuasive arguments?

Method

Design

A repeated measures design with one control group and one treatment group was used to

explore the impact of LINKS on (a) application of strategic processes during dyadic online

inquiry, and (b) evidence of integration in individual students' written persuasive arguments.

Participants were purposefully assigned to dyads. Dyads were then randomly assigned to

treatment or control condition. Each participant was part of one dyad for the duration of the

study. Non-independence was assumed during online inquiry; members of dyads were

considered indistinguishable (Kenny, Kashy & Cook, 2006). Participants wrote persuasive

essays independently, however.

All participants completed five online inquiry sessions focused on topics related to the

state science curriculum. Dyad 4 completed the study in seven weeks. Six others completed the

six sessions over 10 weeks. Dyad 5 completed it in 11 weeks. This variability reflected the

logistical realities of the school-based contexts in which the study was conducted.

Pretest (session 1) and posttest (session 5) followed the same format for both groups. For

the treatment group, the LINKS intervention was administered by the researcher, as teacher,

during the three practice sessions (sessions 2, 3 and 4). For the control group, these three

sessions offered a comparable online inquiry experience, but without the LINKS teaching

intervention. For control dyads, the researcher was present, and checked in to see what the

students were reading, but offered no guided questioning to support strategies use.

Participants

Results for eight purposefully selected dyads (16 participants) are reported in this study.

Participants were recruited from two schools—one public and one independent— in a

Midwestern state. All participants were in the first semester of ninth grade. The average age of

participants at the start of the study was 14 years, eight months (or 14.67). On a self-report

survey, 11 students self-identified as white/Caucasian, three as Black/African American, one as

South-Asian and one as Persian/Middle Eastern. All minority students attended the independent

school.

Assignment to dyad. Participants were purposefully matched to dyads using two factors:

(a) similarity of scores on the Woodcock Reading Mastery Passages Comprehension Subtest

(version III) (Woodcock, 2011) (WRMT), and (b) students' given preferences of partner, as

stated on a free-choice form. This approach was informed by evidence that offline reading

comprehension scores are statistically significant predictors of online reading comprehension

scores (Coiro, 2011) and evidence that the degree to which students trust or like their partners

influences their collaborative reading outcomes (Dirks, 1999; Kiili, Laurinen, Marttunen, & Leu,

2012). It was hypothesized that students reading at similar levels who also expressed interest in working together would have a higher probability of performing as well as possible on each inquiry session.

Eight dyads were purposefully selected for this analysis from among the 11 dyads who finished the study so that control and treatment groups were as balanced as possible on their pretest online reading scores, school, and self-reported racial/cultural identity. The gender distribution of the purposefully selected dyads, 11 girls, 5 boys, reflects the general gender disparity in the larger sample (14 girls and 8 boys completed the study). The control group included three girl-girl dyads and one boy-boy dyad. The treatment group included one boy-girl dyad, two girl-girl dyads, and one boy-boy dyad.

Self-report survey data for the eight dyads showed that participants were generally familiar with the Internet. All participants reported Internet access at home, and at school. At school, 14 (87.5%) participants reported using Google searches to find information about topics, and visiting websites in school for specific purposes as directed by a teacher. Eleven (68.75%) reported using library resources such as online databases to find information for projects.

Research Context

Both schools were located in communities with median household incomes that exceeded the state median. In the public school, 22% of students qualified for free or reduced-price lunch. Free/Reduced-price lunch data were not available for the independent school, although admissions policies explicitly focused on inviting a student body that reflected the racial, economic, religious and social diversity of the surrounding community; tuition payments were also prorated to family income.

Both schools were equipped with high-speed Internet via wifi in all classrooms. Both schools provided laptops on carts for teachers to use in classrooms. Desktop computers were available for student use in media information centers and computer labs in both schools. In both schools, students were excused from classes to participate in the research study.

Online Inquiry Tasks

The inquiry prompts followed a consistent structure for each of the five sessions. Each prompt introduced an issue inspired by a curriculum expectation and then asked students to read about the topic and write a persuasive argument. Both groups received the same prompts. For example:

Practice Session Prompt 2

Curriculum Expectation: Describe peaceful technological applications of nuclear fission and radioactive decay. (P 4.12A)

Anti-nuclear advocates say there are no safe uses of nuclear energy. However, many countries around the world use nuclear fission peacefully to meet their energy needs. Are the peaceful uses of nuclear fission important enough to outweigh the risks?

Using multiple, trustworthy Internet texts of any type (e.g., print, photos, video, graphics, charts, figures, tables etc.) read about the risks of nuclear fission and the peaceful uses of this technology. Then, using what you have learned, write a persuasive argument for leaders of a country considering nuclear power that would convince them of whether to use nuclear fission or not.

Screencasts

To maintain a consistent teaching experience for all dyads, the researcher recorded a series of three screencasts for treatment and control participants (Techsmith, 2012a). For the treatment

condition, the first screencast included modelling of all $[(PST^2) + (iC)^3]$ strategies. The second

focused uniquely on the integrative strategies -- identify important information, compare,

connect and continually update. The third included modelling with less thinking aloud so that

participants could identify the strategies that were being used.

The control group screencasts were designed to include the same web-based content as

treatment participants saw and read, but no think-aloud scaffolding was provided to them.

Instead, control participants were asked to read the websites silently on the screen. The time

given for reading each web-based information source was the same in both versions of the

screencasts. All screencasts can be found at http://mschirahagerman.com/research/links-

intervention/.

Data Collection and Analysis: Evidence of Strategy Use during Online Inquiry Sessions

Audio, video and navigational clickstream data. For all online inquiry sessions, audio,

picture-in-picture video, and navigational clickstream data were recorded using Morae Recorder

screencapture software (Techsmith, 2012b). The recordings, each approximately 30 minutes in

length, were then imported to Morae Manager where they were reviewed, transcribed (audio)

and coded for evidence of strategy use.

Notes and background knowledge. All participants were asked to record relevant or

important information on transparency film using colored pens to indicate change of information

source. Treatment participants wrote their background knowledge on one transparency film.

They used the second to record details during the 30-minute online inquiry session. Using two

films permitted separation of background knowledge from other information acquired or

considered during the inquiry session. Control participants used the first transparency sheet to

record notes or ideas that occurred to them during silent reading of "starter texts" through their

screencast viewing time, but were not explicitly instructed to record what they already knew on

the topic. Since it was hypothesized that awareness of background knowledge would promote

integration of multiple texts in the treatment condition (e.g., Anderson & Pearson, 1984; Kintsch,

1998; McNamara & Shapiro, 2005) notetaking on the first transparency film was framed

differently for the groups.

Coding for Strategy Use

Unit of analysis. Codes were assigned to *strategic episodes*, defined as actions,

decisions, exchanges and/or explanations that appeared connected to the same strategic online

reading process (Kiili, 2013). Given that video, audio, and clickstream data were simultaneously

analyzed for evidence of strategic processing, codes could be based on evidence from one, two

or all three of these modalities. A new strategic episode was assumed to begin when evidence for

a new strategic process became evident.

Coding methods. Strategic episodes were coded deductively for processes that aligned

with the $[(PST^2) + (iC)^3]$ framework (Miles, Huberman & Saldaña, 2014, p. 75). Each inquiry

session was coded for evidence of students' discussion of reading purpose (A), and prior

knowledge (B), use of search key words or phrases (C), selection of an information source (D),

discussion of text type (E) and evaluation of trustworthiness (F). I also coded evidence of

participants identifying important (relevant) information (G), making comparisons to prior

knowledge (H), connecting to other texts (I) and continually updating their understanding (J).

Additional codes were added through inductive coding of the data (Miles et al., 2014, p. 81). In

particular, a code was added to differentiate discussion of trustworthiness before selecting an

information source from the Search Engine Results Page (F) and discussion of trustworthiness

during reading (Y). A code was added for the series of processes students engaged to construct

understanding within a single text (M), for moments when reading was tangential to the reading purpose, for the broad procedural or technical questions that they asked, and for their notetaking processes. Codes were also developed for researcher scaffolding in the treatment group and researcher check-ins in the control group. In sum, 3006 episodes were identified in the set of 40 videos recorded by these eight dyads.

Interrater agreement. To test the validity of the codes and the reliability of their application to the data, coding progressed through two phases of constant comparison (Glaser & Strauss, 1967; Miles et al., 2014) and interrater agreement.

Phase 1. A set of 6 purposefully selected videos, three treatment, and three control group, were initially transcribed and coded to develop consistent coding methods. The first iteration of the coding manual was reviewed with an expert colleague. These discussions focused on the structure, meaning, and consistent application of the codes. The expert colleague coded 40 randomly selected excerpts. All coding differences were resolved through discussion, review of the original video data, and careful review of definitions. The refined codes and nuanced interpretations discussed during this session informed all subsequent coding of video data. Although we negotiated agreement on a random sample of codes, this phase of interrater agreement was designed to identify and resolve problems at an early stage (Bazeley, 2013) so that subsequent analyses would be more reliable. Revisions to the coding scheme based on these discussions were applied to the first six videos and to the remaining 34.

Phase 2. Once all video process data had been coded, the same expert colleague coded a random sample of 264 strategic episodes. Interrater agreement was very high (Landis & Koch, 1977, p.165) $k=.874$, $p<.001$. All differences were resolved by viewing and discussing the original video evidence.

Finally, all process codes were updated and checked a third and final time to ensure consistency.

Data Collection and Analysis: Evidence of Integration of Multiple Texts in Written Arguments

Persuasive essays. After reading and talking with a partner for 30 minutes, each participant wrote a persuasive argument in response to the topic prompt. This writing was done independently, for 20 minutes, in individual Google documents.

Integration rubric. I developed a scoring rubric for evidence of integrative processing in students' written persuasive arguments. The Trace Indicators of Integration (TII) rubric included a set of ten indicators of integration that were informed by both the ORCA-Open (Leu, Coiro, Kulikowich, Sedransk, Everett-Cacopardo, McVerry et al., 2012) and the theoretical foundations for the definition of multiple text integration as iterative, recursive, framed by purpose, and supported by writing itself. All criteria were scored on a three point scale (0, 1, 2). The minimum score on the rubric was 0, the maximum 20. The rubric is provided in Appendix.

For each essay, integration was evaluated immediately after watching, transcribing and coding the corresponding online inquiry processes. The immediacy of this process was methodologically important so that each writer's reading process was fresh in my mind as I evaluated trace evidence of integrative processing in each persuasive argument.

Interrater agreement. Interrater agreement for the essays was within an acceptable range ($k = .617$) (Landis & Koch, 1977; Bakeman & Quera, 2011). All differences were resolved through discussion and review of the evidence. Final index scores were carefully reviewed to ensure adequate evidence to support each value judgment and consistency in coding following from those discussions.

Results

Pretest Comparison of Reading Scores

Woodcock Reading Mastery Test (WRMT) Passages Subtest scores for treatment and

control participants were compared to determine pretest differences between groups on this

validated measure of reading comprehension ability. Shapiro-Wilk tests showed that the

assumption of normality was met for treatment (W=0.958, p = .793) and control groups (W =

0.925, p = 0.472) on this measure. Assumptions of homogeneity of variance, as determined by

Levene's test, were also met F (1,14) = 0.493, p = 0.494. An independent samples t-test was

therefore justified. The null hypothesis was retained. Mean scores on the WRMT at pretest

(n=16) did not differ statistically between groups (t = -0.075, p = 0.942). Given this finding,

equivalent offline reading comprehension skill, a known predictor of online reading

comprehension skills (Coiro, 2011a), was assumed between groups.

LINKS and its Impact on Strategic Processing During Inquiry [RQ1]

Several between-group comparisons were conducted to determine the impact, if any, of

the LINKS intervention on strategy use during inquiry. Pre-test vs. post-test comparisons were

made, as were repeated measures comparisons that included the three treatment sessions.

Comparisons included: (a) the total sums of strategies used at pre-test vs. post-test between and

within groups, (b) frequency counts of specific strategies at each stage of the study, (c) relative

frequencies of strategies use, and (d) relative duration of strategies used.

Comparison of mean total strategies. The mean number of strategies applied by

treatment and control groups was taken as a macro-level indicator of participants' strategic

processing during inquiry. Total frequencies of strategic episodes for each dyad were defined as

the sum of all $[(PST)^2 + (iC^3)]$ codes, plus M (constructing understanding within a single text)

and Y (trustworthiness during close reading) codes. The null hypothesis was retained for within

groups and between groups differences. Mean frequencies of all strategies applied at pre-test and

post-test were compared with repeated measures ANOVA; assumptions of homogeneity of

variance and sphericity were met. There was no statistically significant main effect of session

$F(1,6) = 1.048$, $p = .345$ within groups, meaning that frequency totals for strategic processing

episodes did not differ between pretest or posttest in treatment and control conditions. Likewise,

the interaction of session and condition was not statistically significant $F(1,6) = .816$, $p = .401$.

The type of treatment received had no statistically significant impact on the mean number of

processing strategies applied during inquiry activities. Treatment participants did not use more or

fewer strategies, overall, than control group participants.

Strategy-by-strategy frequencies comparisons. Although groups did not differ at pre-

test or at post-test on the total number of strategies used, the next series of comparisons focused

on the mean between-groups frequencies of each strategy code. A series of non-parametric

Mann-Whitney U tests were conducted to compare group means because assumptions for

normality and homogeneity of variance were not consistently met for all data. Nearly all null

hypotheses for between group differences on individual strategies frequencies were retained;

only one post-test difference was determined between groups. The frequencies distributions of

control and treatment groups on the Pre-Existing Knowledge code were found to differ

statistically $U=0.00$, $p = 0.029$, $Z = 2.38$, $r = .84$. This finding suggests that treatment participants

discussed and then wrote down their pre-existing knowledge at posttest as they had been taught

to do during the intervention but that comparison group students did not engage this strategy as

often.

Strategy-by-strategy relative frequencies comparisons. For each strategy at each moment in the study, I compared mean relative frequencies as a way to explore the patterns of strategy use between groups. Relative frequencies were calculated by dividing sum frequency counts by the sum total of all strategies used at each session. This was calculated for each dyad. A mean was then taken for treatment and for control groups. Mann-Whitney U tests were used to compare distributions for all relative frequencies. Analyses of relative frequencies were identical to analyses of frequencies. Null hypotheses were retained for all post-test comparisons, except one: *Pre-existing Knowledge* episodes at Posttest $U = 0.00$, $p = .029$, $Z = 2.36$, $r = .83$ did differ between groups.

Comparisons of relative duration of strategy use. Relative duration is a measure of the proportion of time spent using a given strategy. To calculate relative duration, I used onset sequence data collected in Morae (Techsmith, 2012) for each code. The difference, in seconds, between the onsets of two sequential codes was taken as the duration of the first code. When graphed, the data reveal remarkably consistent patterns of time use. Figures 1 and 2 show that at posttest, all participants spent the most time searching and selecting texts and identifying important information in texts that they selected to read. Pretest data showed the same patterns. No statistically significant difference of mean duration for any strategic process was found between groups.

LINKS and its Impact on Trace Indicators of Integration in Persuasive Arguments [RQ2]

Trace indicators of integration in persuasive essays index. Mean values for the trace indicators of integration index (TII Index) were compared. Table 2 shows descriptive statistics for treatment and control groups for the five essays. Figure 3 shows comparisons of mean TII scores graphically.

The Shapiro-Wilks test confirmed the assumption of normality was met for all treatment distributions but not for control group essays at practice session 3 (essay 4) or at posttest (essay 5). Given these violations, non-parametric tests were used to compare between-group differences and within group change over the course of the study on the TII measure. No statistically significant between-groups results were found at any point in the study on the TII index score, including at posttest, $U = 27.5$, $Z = -.483$, $p = .645$.

Results of Friedman's ANOVA, which tests repeated-measures change **within groups**, were not statistically significant for control or treatment groups. For the control group, $c^2 (4) = 4.189$, $p = .381$. For the treatment condition, $c^2 (4) = 7.709$, $p = .103$. Given the increase in the mean TII scores seen at practice session 1, and then maintained by the treatment condition over the remainder of the study, mean differences between pre-test and practice session 1 were compared using the Wilcoxon signed-rank test. The result was not strictly significant at the alpha $= .05$ level, $Z = -1.895$, $p = .058$. However, the effect size, $r = .67$ suggested an effect worthy of consideration. A Wilcoxon signed-rank test that compared the pre-test scores with scores at practice session 2 were, in fact, statistically significant , $Z = -2.384$, $p = .017$, $r = .84$.

Analysis of discrete indicators of integration. Consistent with the scoring rubric for the ORCA-Open (Leu et al., 2012) which uses evidence of intertextuality, and integration of details from two websites in a written product, comparisons of scores on three rubric items provided a more granular view of students' integrative processing in their written arguments. Measures of (a) inclusion of information from more than one Internet text, (b) the use of corroborating information from two or more Internet texts, and (c) the use of counter-facts to the main argument that were collected from websites not used to inform the main argument were

compared for groups. Evidence of students' use of integration of background knowledge in their written arguments was also compared.

Results of a Mann-Whitney U test showed that at pretest, control and treatment groups seemed equally likely to include information from more than one Internet text in their written arguments $U = 20.00$, $Z = -1.852$, $p = .064$. The same was true at posttest $U = 28.00$, $Z = -1.00$, $p = .317$. The groups were also equally likely to include corroborating information in their written arguments from two or more Internet texts at pretest, $U = 26.00$, $Z = -.77$, $p = .441$. They were also equally likely to include corroborating facts from two or more texts at posttest $U = 20.00$, $Z = -1.852$, $p = .064$.

On their use of counter-facts to the main argument and the use of background knowledge in their written arguments, control and treatment groups were, however, found to differ at posttest. Specifically, the rubric accounted for the inclusion of counterpoints to the central argument collected from one or more sources that were *different* from the sources used to construct the central argument. This criterion was designed to tap into students' process of gathering and use of multiple perspectives from multiple texts. On this criterion at pre-test, the control condition mean rank (10.56) was statistically significantly higher than the mean rank for the treatment condition (6.44) $U = 15.5$, $Z = -2.031$, $p = .042$, with an effect size $r = .51$ meaning that the control participants were more likely to show evidence of this process in their essays at the start of the study, and that the size of that effect was large (Cohen, 1992). At posttest, however, the means were flipped. The mean rank for the treatment condition was 10.50 and for the control, it was 6.50 with $U = 16$, $Z = -1.936$, $p = .053$, $r = .48$. Although this between-groups comparison was not strictly statistically significant at the .050 level of alpha, the size of the effect at posttest was large. Moreover, a within-group pre-post Wilcoxon Signed Ranks

comparison for the treatment condition on this criterion was statistically significant $Z = -2.236$, $p = .025$, $r = .79$, suggesting that by posttest, treatment participants were able to include more counterpoints in their essays that they gathered from texts that were not also used to construct their main argument. Again, the calculated effect size was large for this pre-post difference (Cohen, 1992). In contrast, the pre-post Wilcoxon Signed Rank comparison for the control group revealed no statistically significant difference $Z = -1.265$, $p = .206$. For the control group, it therefore cannot be said that the pretest and posttest scores were sampled from different populations. Together, these data suggest that more change occurred in the treatment condition on this criterion of counterpoint use than in the control condition.

Finally, and consistent with the strategies analyses, treatment participants were also found to have integrated more evidence of background knowledge in their posttest written arguments than the control group, $U = 11.5$, $Z = -2.45$ $p = .014$ $r = .61$. At pretest on this criterion, however, the groups were found to have been sampled from the same population, $U = 28.00$, $Z = -1.00$, $p = .317$. Moreover, the Wilcoxon Signed Rank comparison for pretest vs. posttest mean ranks revealed a statistically significant within-group difference for the treatment group, $Z = -2.33$, $p = .02$, $r = .83$, suggesting that at posttest, the treatment participants, who were found to make more explicit note of their prior knowledge on the topic while reading, also included that knowledge more often in their argumentative essays. The control condition did not change on this criterion between pretest and posttest, $Z = 0.00$, $p = 1.00$.

Discussion

Based on these results, the general theme of the LINKS intervention story is one of disruptive promise rather than general, conclusive impact. LINKS nudged treatment participants toward new processes of strategic and integrative action during online inquiry and writing of

persuasive arguments in ways that were not evident for the control group. Findings suggest moderate, targeted disruption of reading and writing processes, rather than wholesale transformation. As shown in figures 1 and 2, all students applied a remarkably consistent set of strategies in remarkably similar patterns at posttest, and yet, two important signals suggest that LINKS nudged treatment participants toward more strategic, integrative action.

First, during dyadic online inquiry, treatment participants engaged more discussion of background knowledge at posttest than the control group. Evidence of students' background knowledge was also more prevalent in treatment participants' posttest arguments, perhaps because they made more explicit note of it to begin with and it was therefore more frequently evident during analysis. If discussion of background knowledge is especially supportive of understanding, as a study by Wilkinson & Son (2011) found, then LINKS may have supported activation of this particularly important multiple text integration strategy in ways that were not available to the control group students.

Secondly, at posttest, treatment participants did use information in the development of counter arguments that could be traced to a broader set of information sources than were used by the control group. Given the complexity and the importance of multiple, multimodal Internet text integration skills development, this evidence suggests that LINKS enabled treatment participants to leverage a broader set of information sources as they constructed a persuasive argument in response to an academic prompt. Given findings that many adolescents struggle to construct an integrated mental model of understanding from multiple texts (e.g., Cerdán & Vidal-Abarca, 2008; Sevensma, 2013; Wineburg, 1991) this study offers a promising point of departure for future research and for teachers searching for methods that could support development of advanced digital academic skills.

Colwell, Hunt-Barron & Reinking (2013) have argued that pedagogies which develop "ingrained, spontaneous use of strategies for locating and evaluating information on the Internet when completing academic tasks" (p. 314) are especially challenging to cultivate, and that "spontaneous transfer to more authentic tasks is the acid test that should be the measure of an intervention's success" (p. 315). For most strategies, LINKS did not pass the acid test, and yet, the observed intractability of most strategic actions does raise several important questions for future research.

First, why didn't treatment students engage more strategies known to be used by expert multiple text integrators more frequently, after receiving an intervention designed to support this? One answer could simply be that the visible, audible, spontaneous application of discrete strategic actions during online inquiry, as defined in this study, takes more time and practice for grade nine students to develop than was available to them in this study. Given that LINKS concomitantly presented treatment participants with a set of ten strategies to engage during dyadic online inquiry, it may simply have been the case that three intervention sessions were not enough to support changes in patterns or frequencies of strategy application, or at least not enough to support more significant strategic shifts than those that occurred in a group of control condition participants who practiced the tasks without the LINKS intervention. To address this question, future research of LINKS should offer students more time. On this point, the 50-minute time constraint (i.e., 30 minutes for reading, 20 minutes for writing), which is the length of many high-school class periods, might also have limited participants' strategic actions. If participants were allowed, for instance, to research a question for as long as they felt they needed, would strategic actions change? Would more comparisons to background knowledge, consideration of contrasting perspectives between and among texts occur? Would students stop to update their

understandings more often, or would they take more time to take stock of next steps? These

questions are especially pertinent to the design of classroom inquiry activities and future

research.

The reported findings also beg the question of why cueing background knowledge was

the only strategy, explicitly taught, that transferred in any statistically significant way to

treatment participants' posttest inquiry process, and also to posttest argumentative writing.

McNamara and Shapiro (2005) found that the construction of a cohesive situation model from

multiple linked hypertexts was dependent on the structure of the hypertext environment itself,

but also on the reader's pre-existing domain knowledge. Readers with more content knowledge

in McNamara and Shapiro's study were more able to construct meaning in open hypertext

systems whereas readers with less content knowledge benefitted from hypertext environments

that explicitly cued the relationships among texts. Measured comparisons of pre-existing

knowledge were not part of this study, but LINKS did prompt treatment students to write down

and talk about everything they already knew, as a dyad, about a topic before they started to

search for information. This extended dialogue, before students began their online inquiry

process, may have allowed students to begin their search more aware, at least, of what they did

know. Whereas other strategies were engaged by students on the fly, in quick succession as they

tried to build an understanding of the topic from new information sources, the dialogic

construction of a common background knowledge text, even before students searched for,

evaluated, or read any information may explain this statistically significant result.

Importantly, this study did not measure or compare how much students knew on each

topic, the veracity of participants' background knowledge, or whether students were more or less

likely to recognize flaws in their background knowledge as a result of their online inquiry

processes. Although "compare with background knowledge" was among the strategies explicitly modelled during LINKS, treatment students were not found to engage this strategy more often than their control group peers during reading and research. Future work should examine how to engage this particular strategy so that ultimately, adolescent online readers learn to critically examine their own pre-existing assumptions as they construct an integrated understanding of an academic topic. Moreover, future designs should include a measure of students' background knowledge on each of the topics so that analyses can ascertain whether pre-existing knowledge predicts choice of texts during online inquiry for an argumentative purpose, or even use of those texts in the construction of written arguments.

Results of students' use of trace indicators of integration in their written arguments have important implications for teachers. Although we might expect steady improvement in students' ability to construct an integrated understanding of topics with practice and with instruction, data for the treatment condition suggest that teachers might see a quick improvement in traces of integrative action, followed by a plateau. The control group saw no analogous bump during treatment sessions 1 and 2 in their TII index scores, suggesting that the think aloud modeling of strategies did offer treatment participants some support. For grade nine students, LINKS may be especially helpful as online inquiry and multiple text integration activities are introduced. Also, teachers can gain useful insights into students' integrative processing by asking them to explicitly cite the information sources they used to write their persuasive arguments. Treatment participants used information from a broader set of information sources to construct counter arguments in their writing at posttest, but this type of integrative trace is impossible to see if students do not take careful notes and cite information sources. Students might also benefit from

examples that show what it looks like to use multiple sources of information to construct primary

and counter arguments in a persuasive essay.

Fundamentally, strategies instruction in reading comprehension, whether online or

offline, is meant to help students know when, how and why to engage particular processes to

meet particular reading and writing goals (Duke et al., 2012; Pearson, 2009). Certainly, the

LINKS intervention was designed to scaffold precisely the skills that Azevedo & Witherspoon

(2009) identify as essential for self-regulated learning, understanding, and problem solving in

hypermedia contexts, namely, "planning processes such as activating prior knowledge, setting

and coordinating sub-goals that pertain to accessing new information […] coordinating several

informational sources, generating hypotheses, extracting relevant information from the resources,

re-reading, making inferences, summarizing, and re-representing the topic based on one's

emerging understanding through taking notes and drawing" (p. 321). With its protocols very

closely aligned with those outlined by Azevedo & Witherspoon, LINKS may have scaffolded

self-regulatory processes for treatment condition participants in ways that supported greater

integrative thinking at certain moments during the study, including at posttest for two key criteria

of integration. This hypothesis is speculative, of course, but future research should examine

evidence of self-regulatory processing for students who have received the LINKS intervention.

And, given the social-justice issue raised by studies that have revealed income-based disparities

in Internet reading and participation (e.g., Hargittai & Hseih, 2013; Leu et al., 2014), future work

must include children living in communities where mean household incomes are lower than

national and state averages.

Limitations

Results should be interpreted cautiously because of methodological limitations. Primarily, the between-groups comparisons reported here are based on just eight dyads, a small sample size. Essay comparisons included just 16 cases, with eight participants' data in each group. Non-parametric tests were used to compare groups. Future research with more participants will be required to make stronger inferential claims about the impact of the LINKS intervention on students' multiple Internet text integration skills during online inquiry and as evidenced in written arguments.

Another limitation is the variability in timing of practice sessions. Although efforts were made to ensure all dyads participated at generally equal intervals at each phase of the study, scheduling conflicts resulted in variability that could have influenced the general impact of the intervention as well as the control experience.

Also, the intervention was delivered on a pull-out basis in students' schools rather than with full classes of students. Although a pilot study with a group of sixth-grade students suggests that instruction of $[(PST^2) + (iC)^3]$ strategies can support online inquiry (Hagerman & White, 2013) the instructional method described here has not been implemented with full classrooms of students. Future studies should involve older high school aged students as well so that in time, developmental trajectories of multiple Internet text integration processes can be constructed.

Conclusion

Given the need for methods of instruction that support students' development of online reading comprehension strategies and multiple Internet text integration skills, the LINKS intervention offers teachers a point of departure. In addition to articulating the rationale for its design, this study offers preliminary evidence of the intervention's impact on grade 9 students' ability to (a) engage a set of strategies known to be used by expert multiple text integrators

during inquiry activities in school, and (b) write persuasive arguments that demonstrate integrative thinking a measured on a range of criteria. Most significantly, at posttest and in comparison with a control group, participants who received the LINKS intervention more frequently used information in the construction of written counterpoints from websites that had not been used to construct their central arguments. Though perhaps only evidence of a *nudge* in a promising direction, it does raise important questions that can inform future research. LINKS may have provided an organizing framework that enabled treatment participants to regulate their integrative actions in ways not available to control group participants. Future investigations of students' emergent multiple Internet text integration processes should explore this hypothesis, and modify the intervention so that it is delivered over a longer period of time in diverse classroom settings, with more students, and in ways that place more explicit focus on modeling the types of integrative actions students can make in written arguments.

References

Afflerbach, P., & Cho, B.-Y. (2009). Identifying and describing constructively responsive

comprehension strategies in new and traditional forms of reading. In S. E. Israel & G. G.

Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 69-90). New York:

Routledge.

Alexander, P. A. & Jetton, T.L. (2000). Learning from text: A multidimensional and

developmental perspective. In M.L. Kamil, P.B. Mosenthal, P.D.Pearson & R. Barr (Eds)

Handbook of reading research (Vol. 3, pp. 285-310). Mahwah, NJ: Lawrence Erlbaum

Associates.

Anderson, R. C., & Pearson, P. D. (1984). A schema-theoretic view of basic processes in reading

comprehension. In P D Pearson, R. Barr, M. L. Kamil, & P. Mosenthal (Eds.), *Handbook

of reading research* (Vol. 1, pp. 255-291). New York: Longman.

Azevedo, R., & Cromley, J. G. (2004). Does training on self-regulated learning facilitate

students' learning with hypermedia? *Journal of Educational Psychology, 96*(3), 523–535.

http://doi.org/10.1037/0022-0663.96.3.523

Azevedo, R. & Witherspoon, A.M. (2009). Self-regulated learning with hypermedia. In D.J.

Hacker, J. Dunlosky, & A. Graesser (Eds.). *Handbook of metacognition in education*,

(pp. 319-339). New York: Routledge.

Bakeman, R. & Quera, V. (2011). *Sequential analysis and observational methods for the

behavioral sciences.* New York: Cambridge University Press.

Balcytienne, A. (1999). Exploring individual processes of knowledge construction with

hypertext. *Instructional Science, 27*, 303–328.

Bazeley, P. (2013). *Qualitative data analysis: Practical strategies*. New York: Sage.

Braasch, J. L. G. G., Bråten, I., Strømsø, H. I., Anmarkrud, Ø., & Ferguson, L. E. (2013).

    Promoting secondary school students' evaluation of source features of multiple

    documents. *Contemporary Educational Psychology, 38*(3), 180–195.

    http://doi.org/10.1016/j.cedpsych.2013.03.003

Bråten, I., & Strømsø, H. I. (2011). Measuring strategic processing when students read multiple

    texts. *Metacognition and Learning*, *6*(2), 111–130. http://doi.org/10.1007/s11409-011-

    9075-7

Bråten, I., Strømsø, H. I., & Britt, M. A. (2009). Trust matters: Examining the role of source

    evaluation in students' construction of meaning within and across multiple texts. *Reading*

    Research Quarterly, 44(1), 6-28. http://doi.org/10.1598/RRQ.41.1.1

Britt, M.A., Rouet, J.-F. & Braasch, J. (2013). Documents as entities: Extending the situation

    model theory of comprehension. In M.A. Britt, S. R. Goldman & J.-F. Rouet (Eds.)

    Reading-from words to multiple texts (pp. 160-179). New York: Routledge.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning.

    Educational Researcher, 18(1), 32-42.

Castek, J. (2008). How do 4th and 5th grade students acquire the new literacies of online reading

    comprehension? Exploring the contexts that facilitate learning. (Doctoral dissertation).

    Retrieved from ProQuest dissertations and theses (3340875).

Cerdán, R., & Vidal-Abarca, E. (2008). The effects of tasks on integrating information from

    multiple documents. *Journal of Educational Psychology, 100*(1), 209–222.

    http://doi.org/10.1037/0022-0663.100.1.209

Cho, B.-Y., & Afflerbach, P. (2015). Reading on the Internet. *Journal of Adolescent & Adult*

    Literacy, *58*(6), 504–517. http://doi.org/10.1002/jaal.387

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159.

Coiro, J. (2011). Predicting reading comprehension on the Internet: Contributions of offline reading skills, online reading skills, and prior knowledge. *Journal of Literacy Research, 43*(4), 352–392. http://doi.org/10.1177/1086296X11421979

Coiro, J., Castek, J., & Guzniczak, L. (2011). Uncovering online reading comprehension processes: Two adolescents reading independently and collaboratively on the Internet. In P.J. Dunston et al. (Eds.) *60th yearbook of the Literacy Research Association* (pp. 354-369). Oak Creek, WI: Literacy Research Association.

Coiro, J., & Dobler, E. (2007). Exploring the online reading comprehension strategies used by sixth-grade skilled readers to search for and locate information on the Internet. *Reading Research Quarterly, 42*(2), 214-257. http://doi.org/10.1598/RRQ.42.2.2

Colwell, J., Hunt-Barron, S., & Reinking, D. (2013). Obstacles to developing digital literacy on the Internet in middle school science instruction. *Journal of Literacy Research, 45*(3), 295-324. http://doi.org/ 10.1177/1086296X13493273

DiMaggio, P., Hargittai, E., Celeste, C., & Shafer, S. (2004). Digital inequality: From unequal access to differentiated use. In K. Neckerman (Ed.), *Social inequality* (pp. 355-400). New York: Russell Sage.

Dirks, K.T., (1999). The effects of interpersonal trust on work group performance. *Journal of Applied Psychology, 84*, 445-455.

Duke, N. K., & Pearson, P. D. (2002). Effective practices for developing reading comprehension. In A. E. Farstrup & S.J. Samuels (Eds.), *What research has to say about reading instruction* (3rd ed., pp. 205–242). Newark, DE. International Reading Association.

Duke, N.K., Pearson, P.D., Strachan, S. L., & Billman, A.K. (2011). Essential elements of

fostering and teaching reading comprehension. In S.J. Samuels & A.E. Farstrup (Eds.),

What research has to say about reading instruction (4th ed., pp. 51-93). Newark, DE:

International Reading Association.

Dwyer, B. (2010). Scaffolding Internet reading: A study of a disadvantaged school community in

Ireland. (Doctoral dissertation, University of Nottingham). Retrieved from

http://etheses.nottingham.ac.uk/2426/

Dwyer, B. (2016). Engaging all students in Internet research and inquiry. *Reading Teacher*,

69(4), 383–389. http://doi.org/10.1002/trtr.1435

Eveland, W. P., & Dunwoody, S. (2000). Examining information processing on the world wide

web using think aloud protocols. *Media Psychology*, *2*(3), 219–244.

http://doi.org/10.1207/S1532785XMEP0203_2

Gersten, R., Fuchs, L. S., Williams, J. P., & Baker, S. (2001). Teaching reading comprehension

strategies to students with learning disabilities: A review of research. *Review of

Educational Research*, *71*(2), 279–320. http://doi.org/10.3102/00346543071002279

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory*. Chicago, IL: Aldine.

Goldman, S. R., Braasch, J. L. G., Wiley, J., Graesser, A. C., & Brodowinska, K. (2012).

Comprehending and learning from Internet sources : Processing patterns of better and

poorer learners. *Reading Research Quarterly, 47*(4), 356–381.

http://doi.org/10.1002/RRQ.027

Goldman, S. R., & Rakestraw, J. A. (2000). Structural aspects of constructing meaning from text.

In M. L. Kamil, P. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of Reading

Research, Vol. 3* (Vol. 3, pp. 311–335). Mahwah, NJ: Lawrence Erlbaum Associates.

Guthrie, J. T., Van Meter, P., McCann, A. D., Wigfield, A., Bennett, L., Poundstone, C. C., Rice,

    M. E., et al. (1996). Growth of literacy engagement: Changes in motivations and

    strategies during concept-oriented reading instruction. *Reading Research Quarterly,*

    31(3), 306–332. http://doi.org/10.1589/RRQ.31.3.5

Guthrie, J. T., & Wigfield, A. (2000). Engagement and motivation in reading. In M. L. Kamil, P.

    B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3,

    pp. 403-424). Mahwah, NJ: Lawrence Erlbaum Associates.

Guthrie, J. T., Wigfield, A., & Klauda, S. L. (2012). Adolescents' engagement in academic

    literacy (Report No. 7). Retrieved from www.corilearning.com/research-publications

Hagerman, M.S. & White, A. (2013, December). What's the best formula for enhancing online

    inquiry skills? $[(PST)^2 + (iC^3)]$. *Reading Today.* Newark, DE: International Literacy

    Association.

Hargittai, E., & Hinnant, A. (2008). Digital inequality: Differences in young adults' use of the

    Internet. *Communication Research*, *35*, 602–621.

    http://doi.org/10.1177/0093650208321782

Hargittai, E., & Hsieh, Y. P. (2013). Digital inequality. In W. H. Dutton (Ed.), *The Oxford*

    handbook of Internet studies (pp. 129–150). Oxford, England: Oxford University Press.

    http://doi.org/0.1093/oxfordhb/9780199589074.001.0001

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. New York, NY: The

    Guilford Press.

Kiili, C. (2012). *Online reading as an individual and social practice*. [Doctoral Dissertation]

    University of Jyväsklä, Jyväskylä, Finland. Retrieved from

    http://www.academia.edu/download/37050961/978-951-39-4795-8.pdf

Kiili, C., Laurinen, L., Marttunen, M., & Leu, D. J. (2012). Working on understanding during

collaborative online reading. *Journal of Literacy Research, 44*(4), 448-443. http://doi.org/

10.1177/1086296X12457166

Kiili, C., Mäkinen, M., & Coiro, J. (2013). Rethinking Academic Literacies. *Journal of

Adolescent & Adult Literacy, 57*(3), 223–232. http://doi.org/ 10.1002/JAAL.223

Kintsch, W. (1998). *Comprehension: A paradigm for cognition*. Cambridge: Cambridge

University Press.

Kintsch, W., & van Dijk, T. A. (1978). Toward a model of text comprehension and production.

Psychological Review, 85(5), 363-394. http://doi.org/10.1037/0033-295X.85.5.363

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction

does not work: An analysis of the failure of constructivist, discovery, problem-based,

experiential, and inquiry-based teaching. *Educational Psychologist, 4*(2), 75–86.

http://dx.doi.org/10.1207/s15326985ep4102_1

Klein, P. D., & Rose, M. A. (2010). Teaching argument and explanation to prepare junior

students for writing to learn. *Reading Research Quarterly, 45*(4), 433–461. http://doi.org/

10.1598/RRQ.45.4.4

Kress, G. (2003). *Literacy in the new media age*. London: Routledge.

Kucan, L., & Beck, I. L. (1997). Thinking aloud and reading comprehension research: Inquiry,

instruction, and social interaction. *Review of Educational Research, 67*(3), 271-299.

http://doi.org/10.3102/00346543067003271

Landis, J.R. & Koch, G.G. (1977). The measurement of observer agreement for categorical data.

Biometrics, 33(1), 159-174. http://doi.org/10.2307/2529310

Langer, J. A. (1986a). Learning through writing : Study skills in the content areas. *Journal of*

Reading, 29(5), 400–406.

Langer, J. A. (1986b). Reading, writing, and understanding: An analysis of the construction of

meaning. *Written Communication, 3*(2), 219–267.

http://doi.org/10.1177/0741088386003002005

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New

York: Cambridge University Press.

Leu, D.J., Coiro, J., Castek, J., Hartman, D.K., Henry, L., Reinking, D. (2008). Research on

instruction and assessment in the new literacies of online reading comprehension. In C.C.

Block & S. R. Parris (Eds.) *Comprehension instruction: Research-based best practices*

(2nd ed., pp. 321-346). New York: Guilford Press.

Leu, D. J., Forzani, E., Kulikowich, J., Sedransk, N., Coiro, J., McVerry, G., Zawilinski, L.,

O'Byrne, I., Hillinger, M., Kennedy, C., Burlingame, C., Everett-Cacopardo, H. (2012,

April*). Developing three formats for assessing online reading comprehension: The*

ORCA project year 3. Paper presented at the meeting of the American Educational

Research Association, Vancouver, Canada.

Leu, D.J. & Reinking, D. (2005a) *Teaching Internet comprehension to adolescents (TICA)*

project. Retrieved from http://www.newliteracies.uconn.edu/iesproject/

Leu, D.J. & Reinking, D. (2005b) *TICA overview*. Retrieved from

http://www.newliteracies.uconn.edu/iesproject/documents/IRTOverview.pdf

Leu, D. J., Kinzer, C. K., Coiro, J., Castek, J., & Henry, L. A. (2013). New literacies : A dual-

level theory of the changing nature of literacy, instruction, and assessment. In D. E.

Alvermann, N. J. Unrau, & R. B. Ruddell (Eds.), *Theoretical models and processes of reading* (6th ed., pp. 1150–1181). Newark, DE: International Reading Association.

Leu, D. J., McVerry, J. G., O'Byrne, W. I., Kiili, C., Zawilinski, L., Everett-Cacopardo, H., Kennedy, C., & Forzani, E. (2011). The New Literacies of Online Reading Comprehension : Expanding the Literacy and Learning Curriculum. *Journal of Adolescent & Adult Literacy, 55*(1), 5–14. http://doi.org/10.1598/JA

Lindgaard, G., Dudek, C., Sen, D., Sumegi, L., & Noonan, P. (2011). An exploration of relations between visual appeal, trustworthiness and perceived usability of homepages. *ACM Transactions on Computer-Human Interaction, 18*(1), 1–30. http://doi.org/10.1145/1959022.1959023

Mateos, M., Martín, E., Villalón, R., & Luna, M. (2007). Reading and writing to learn in secondary education: online processing activity and written products in summarizing and synthesizing tasks. *Reading and Writing, 21*(7), 675–697. http://doi.org/10.1007/s11145-007-9086-6

McNamara, D.S. & Shapiro, A.M. (2005). Multimedia and hypermedia solutions for promoting metacognitive engagement, coherence, and learning. *Journal of Educational Computing Research, 33*(1), 1-29. http://doi.org/10.2190/7N6R-PCJL-UMHK-RYPJ

Miles, M.B., Huberman, A.M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Thousand Oaks, CA: Sage.

Mokhtari, K., & Reichard, C. A. (2002). Assessing students' metacognitive awareness of reading strategies. *Journal of Educational Psychology, 94*(2), 249–259. http://doi.org/10.1037//0022-0663.94.2.249

Mozilla Learning Network (2016). *Web literacy 2.0.* Retrieved from

http://mozilla.github.io/content/web-lit-whitepaper/

Negretti, R. (2012). Metacognition in student academic writing: A longitudinal study of

metacognitive awareness and its relation to task perception, self-regulation, and

evaluation of performance. *Written Communication, 29*,142–179.

http://doi.org/10.1177/0741088312438529

Newell, G.E. (2006). Writing to learn: How alternative theories of school writing account for

student performance. In C.A. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of

writing research* (pp. 235-247). New York: Guilford.

Newell, A. & Simon, H. A. (1972). *Human problem solving*. Englewood Cliffs, NJ: Prentice-

Hall.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and

monitoring activities. *Cognition and Instruction, 2*, 117-175.

http://dx.doi.org/10.1207/s1532690xci0102_1

Pearson, P. D. (2009). The roots of reading comprehension instruction. In S. E. Israel & G. G.

Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 3–31). London:

Routledge.

Pearson, P. D., & Gallagher, M. C. (1983). The instruction of reading comprehension.

Contemporary Educational Psychology, 8, 317–344. http://dx.doi.org/10.1016/0361-

476X(83)90019-X

Perfetti, C. A., Rouet, J.-F., & Britt, M. A. (1999). Toward a theory of documents representation.

In H. van Oostendorp & S. R. Goldman (Eds.), *The construction of mental

representations during reading (pp. 99-122). Mahwah, NJ: Lawrence Erlbaum
Associates.

Pressley, M. (2000). What should reading comprehension instruction be the instruction of? In M.
L. Kamil, P. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of Reading Research,
Vol. 3* (Vol. 3, pp. 311–335). Mahwah, NJ: Lawrence Erlbaum Associates.

Pressley, M., & Gaskins, I. W. (2006). Metacognitively competent reading is constructively
responsive reading comprehension: How can such reading be developed in students?
Metacognition and Learning, *1*(1), 99–113. http://doi.org/10.1007/s11409-006-7263-7

RAND Reading Study Group. (2002). *Reading for understanding: Toward an R&D program in
reading comprehension*. Santa Monica, CA: Rand Education. Retrieved from
http://www.rand.org/pubs/monograph_reports/MR1465.html

Reinking, D., & Bradley, B. A. (2008). *Formative and design experiments: Approaches to
language and literacy research.* New York: Teachers College Press and National
Conference on Research in Language and Literacy (NCRLL).

Rouet, J.-F. (2006). *The skills of document use: From text comprehension to web-based learning*.
Mahwah, NJ: Lawrence Erlbaum Associates.

Rouet, A. J., Favart, M., Britt, M. A., & Perfetti, C. A. (1997). Studying and using multiple
documents in history : Effects of discipline expertise. *Cognition and Instruction*, *15*(1),
85–106. http://dx.doi.org/10.1207/s1532690xci1501_3

Sevensma, K. (2013). Negotiating new literacies in science: An examination of at-risk and
average-achieving ninth-grade readers' online reading comprehension strategies.
(Doctoral Dissertation). Retrieved from ProQuest, UMI Dissertations Publishing (2013.
3563033.)

Spiro, R. J., & Deschryver, M. (2006). Constructivism: When It's the wrong idea and when it's the only idea. In S. Tobias & T.M.Duffy (Eds.) *Constructivist instruction: Success or failure? (*pp.106-124). New York: Routledge.

Stahl, S. A., Hynd, C. R., Britton, B. K., Mcnish, M. M., & Bosquet, D. (1996). What happens when students read multiple source documents in history? *Reading Research Quarterly, 31*(4), 430-456. http://doi.org/10.1598/RRQ.31.4.5

Strømsø, H. I., Bråten, I., Samuelstuen, M. S. (2003). Students' strategic use of multiple sources during expository text reading : A longitudinal think-aloud study. *Cognition and Instruction, 21*(2), 113-147. http://dx.doi.org/10.1207/S1532690XCI2102_01

Techsmith Corporation (2012a). Camtasia for Mac (Version 2.2.2). [Computer software]. East Lansing, MI: Techsmith.

Techsmith Corporation (2012b). Morae (Version 3.3.2). [Computer software]. East Lansing, MI: Techsmith.

Thompson, P. (2013). The digital natives as learners: Technology use patterns and approaches to learning. *Computers and Education, 65*, 12-33. http://doi.org/10.1016/j.compedu.2012.12.022

Van Keer, H., Verhaeghe, J. P., & Taylor, P. (2005). Effects of explicit reading strategies instruction and peer tutoring on second and fifth graders ' reading comprehension and self-efficacy perceptions. *Journal of Experimental Education*, *73*(4), 291–329. http://dx.doi.org/10.3200/JEXE.73.4.291-329

Wang, Y. D., & Emurian, H. H. (2005). An overview of online trust: Concepts, elements, and implications. *Computers in Human Behavior, 21*(1), 105–125. http://doi.org/10.1016/j.chb.2003.11.008

Wilkinson, I. & Son, E.H. (2011). A dialogic turn in research on learning and teaching to

comprehend. In M. L. Kamil, P.D. Pearson, E.B. Moje & P.P. Afflerbach (Eds.)

Handbook of reading research (Vol. 4, pp. 359-387). New York: Routledge.

Wiley, J., & Voss, J.F. (1999). Constructing arguments from multiple sources: Tasks that

promote understanding and not just memory for text. *Journal of Educational Psychology,

91(2)*, 301-311. doi: 10.1037/0022-0663.91.2.301

Wiley, J., Goldman, S.R., Graesser, A.C., Sanchez, C.A., Ash, I.K, & Hemmerich, J.A. (2009).

Source evaluation, comprehension and learning in Internet science inquiry tasks.

American Educational Research Journal, 46(4), 1060-1106. http://doi.org/

10.3102/0002831209333183

Wineburg, S. (1991). Historical problem solving: A study of the cognitive processes used in the

evaluation of documentary and pictorial evidence. *Journal of Educational Psychology,

83(1)*, 73-87. doi: 10.1037/0022-0663.83.1.73

Woodcock, R.W. (2011). Woodcock Reading Mastery Tests (3rd Ed.). San Antonio, TX:

Pearson Education.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*.

Cambridge, MA: Harvard University Press.

Zhang, S., & Duke, N. (2008). Strategies for Internet Reading with Different Reading Purposes:

A Descriptive Study of Twelve Good Internet Readers. *Journal of Literacy Research*,

40(1), 128–162. http://doi.org/10.1080/10862960802070491

Table 1

[(PST²) + (iC)³] Strategies and Supporting Questions

Pre-Reading	**P: Purpose** What do we have to learn about? What do we have to create with this information? **P: Pre-existing knowledge** What do we already know about this topic?
For Finding, Previewing and Evaluating	**S: Search** What search terms should we use? **S: Source selection** Which of these sources looks most promising, and why? **T: Type of Text** What type of text is this? Does this help us understand more about the information it provides before we select it? **T: Trustworthiness** How trustworthy is this source?

MOUSE CLICK/CHOICE

During Close Reading	**I: Identify important information** What information can we use to meet our reading purpose? **C: Compare to pre-existing knowledge** How does this information compare with what we already know? **C: Connect to other texts** How does this information connect with information that we have read in other texts? **C: Continually update understanding** What does our overall understanding of the topic look like now?

Table 2

Summary of Mean TII Scores for Control and Treatment Groups

| | Control | | Treatment | |
	M (SD)	95% CI	M (SD)	95% CI
1 Pretest	13.13 (1.73)	[11.93, 14.32]	9.00 (4.84)	[5.65, 12.35]
2 Practice 1	12.75 (2.66)	[10.93, 14.56]	12.25 (3.81)	[9.60, 12.90]
3 Practice 2	11.12 (3.31)	[8.82, 13.41]	12.50 (3.89)	[9.81, 15.20]
4 Practice 3	12.88 (3.09)**	[10.77, 14.99]	11.12 (2.99)	[9.05, 13.20]
5 Posttest	11.00 (2.39)**	[9.34, 12.66]	11.00 (3.42)	[8.62, 13.37]

**Normality assumption violated.
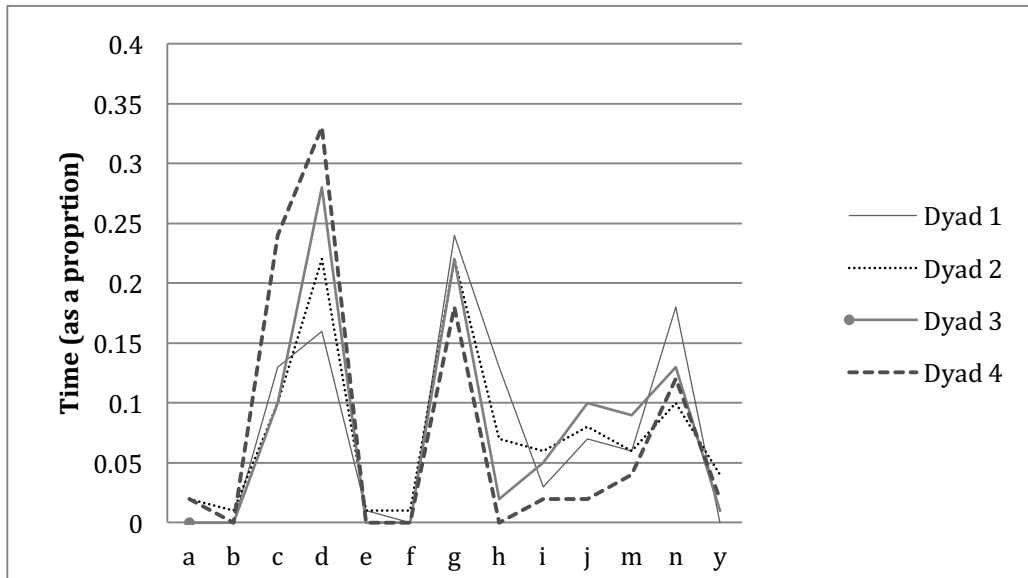
Figure 1. Control group. Posttest relative duration of strategies use. *Coding Legend* a: Purpose, b: Pre-existing Knowledge, c: Search, d: Source Selection, e: Type, f: Trustworthiness, g: Identify Important Information, h: Compare to pre-existing knowledge, i: Connect to other texts, j: Continually Update, m: Close reading of a single text, n: Notetaking, y: Evaluating trustworthiness while reading a text.
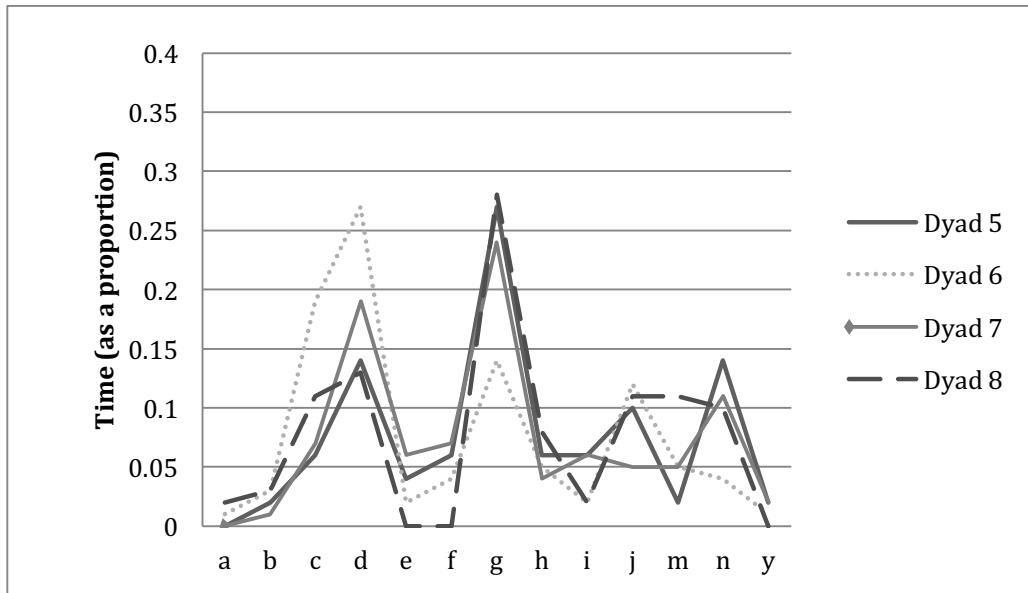
Figure 2. Treatment group. Posttest relative duration of strategies use. See Figure 1 for coding legend.
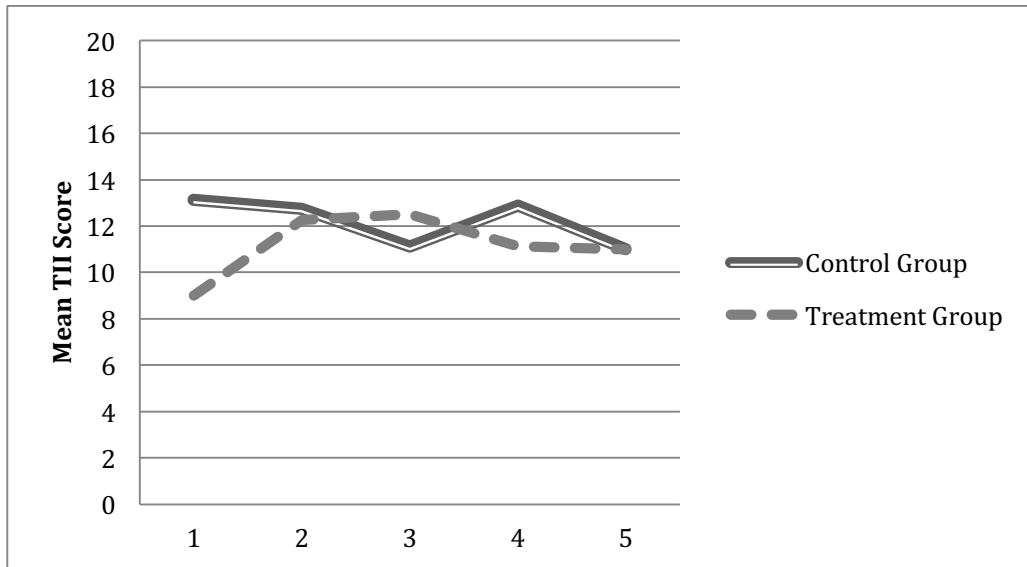
Figure 3. Mean Trace Indicators of Integration Index scores for both groups on all five essays.

Appendix

Trace Indicators of Integrative (TII) Index Rubric

Criterion	Score 0 = no 1 = somewhat, or one example; meets minimum 2 = yes definitely, or more than one example; exceeds minimum	Evidence/Justification
Does the persuasive essay make an argument consistent with the expectations outlined in the topic prompt.		
Does the persuasive essay include information learned from more than one source?		
Does the persuasive essay include information learned from more than one medium?		
In the persuasive essay, is the central argument/position grounded in corroborating facts from two or more websites/texts?		
Does the persuasive argument include counterpoints to the central argument collected from one or more sources different from the sources used to construct the central argument?		
Does the persuasive essay integrate facts that were recorded as part of the author's bank of pre-existing knowledge?		
Does the essay provide evidence for construction of an integrated mental model of understanding: Is there evidence of integration of information across texts and/or within texts, and/or with background knowledge?		
Does the persuasive essay include linguistic markers indicative of integration (e.g., seriation, transitional phrases that connect ideas, connectives, parallel structures that show an integrated understanding)		
Does the persuasive essay include explicit reference to source information [i.e. mention of author, a reason for why we should trust this information]?		
Does the persuasive essay include a thesis/synthesis statement that communicates an integrated understanding of the topic?		

Digital Poetry Practicum: Preservice English Language Arts Teachers' Dispositions of New Literacies

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Abstract

This qualitative study investigated how graduate preservice teachers (PSTs) engaged in a digital practicum experience with a geographically distant secondary English Language Arts (ELA) classroom. The graduate PSTs, enrolled in a Masters of Arts, English Education program at a university in the mid-Atlantic United States, mentored the 9th-grade students in the online spaces of a course wiki and video conferencing. In this portion of a larger study, PSTs mentored the students during a poetry unit organized by the ELA cooperating teacher and housed in the ELA classroom. A goal of this practicum was building PSTs' Pedagogical Content Knowledge (Shulman, 1986) and Technological Pedagogical Content Knowledge (Koehler & Mishra, 2009) specific to the use of emerging technologies within the ELA classroom. The findings of this study show that online spaces can develop dispositions of New Literacies (Knobel & Lankshear, 2007) and can bridge theory and practice in teacher preparation programs.

Keywords: Teacher education; wikis; New Literacies; poetry; digital literacy; English Language Arts; collaboration

Introduction

Effectively enhancing classroom literacy instruction with value-added technology can be challenging without models. Even experienced classroom teachers often struggle to lead students with curriculum rather than to lead with technology. This struggle is even greater for the preservice teacher (PST), who lacks curriculum and lesson development experience in addition to lacking models for technology integration. This is then coupled with the challenge teacher preparation programs often have with finding practicum placements for PSTs where they can experiment with a confident teacher who effectively integrates technology. When any theory investigated in the university classroom is not enacted in a classroom experience, PSTs may be less likely to adopt it, and the dispositions of New Literacies (Knobel & Lankshear, 2007) are no different. This could then perpetuate the lack of models of effective integration of digital technology. Furthermore, K-12 online courses are offered in all 50 states; however, less than 2% of responding programs in teacher education address this need for online teaching and learning experiences by providing PSTs with chances to explore teaching with digital tools (Kennedy & Archambault, 2012).

Digital practica can provide PSTs an introduction to teaching students in online spaces and a chance for in-depth mentorship (Nobles, Dredger, & Gerheart, 2012; Townsend, Cheveallier, Browning, & Fink, 2013). The online practicum places PSTs in a position to observe a classroom teacher's curriculum design in digital spaces, as well as to understand how to work closely with students who are physically far away. This study explores the results of implementing a six-week digital practicum for PSTs. The primary goals of this practicum experience were 1) building PSTs' Pedagogical Content Knowledge

(PCK, Howey & Grossman, 1989; Shulman, 1986) and Technological Pedagogical Content Knowledge (TPACK, Koehler & Mishra, 2009), specific to the use of emerging technologies within the English Language Arts (ELA) classroom, and 2) supporting high school students in the development of academic confidence through college mentors and peer review. While this larger project impacted both the students and the PSTs, this article articulates the impact on the PSTs.

Local practicum placements for PSTs do not always model pedagogies steeped in effective technology integration. The teacher educators in this study decided to take full advantage of the affordances of digital practicum experiences and placed PSTs with a teacher who was a leader in integrating technology in her school's 1:1 program, even though her school was over 200 miles from the university. The PSTs never physically traveled to their placement. Instead, they logged into the classroom wiki and communicated with their cooperating teacher and her students predominantly asynchronously.

This study investigated how these six PSTs, all preservice ELA teachers, mentored 19 ninth-grade students in poetry interpretation, response, and recitation within the digital collaboration space of a wiki. Shulman's PCK (1986) established the premise that PSTs needed to be not only strong in their content area (ELA in this study) but also in the specific effective pedagogies that are most successful in teaching ELA. PCK implies that teacher preparation programs are most effective when delivered in a context, that math teaching, for example, is distinctively different than the teaching of ELA. Likewise, TPACK implies using technologies specific to the enacting of the ELA curriculum.

The poetry unit, common in high school curriculum, is one in which many teachers lack confidence because of the subjective artistry that can define poetry. This lack of confidence can, in turn, affect student interest. Some argue poetry is the least well-taught genre, at least in part because of this cycle: teachers themselves were not taught poetry well when they were students and therefore lack confidence and/or interest (Dymoke & Hughes, 2009). This cycle can be hard to change without changing people's experiences with poetry.

To attempt to break the cycle, the unit for the high school students was designed around objectives focused on student choice and exploration supported by the PST in the role of mentor. The students were asked:

- To connect with poetry by finding poems they enjoy reading;

- To recite a poem they enjoy by memory and with expression;

- To understand that poetry is different than prose in writing expectations;

- To identify and explain an author's purpose with the support of a mentor;

- To be able to write poetry using literary techniques to intentionally create meaning with the support of a mentor; and

- To submit an original poem for possible publication.

For engagement purposes, the students chose two poems to post on their wiki pages and annotate over the course of several weeks, leading to a final deep analysis of one poem that included an audio recording of the student reciting the poem. The cooperating teacher offered the students a choice of these poems they would study in depth to increase engagement. The students also posted drafts of at least three of their own poems over the six-week period, culminating in posting three final poems and submitting at least one to a

poetry competition. To help her students feel comfortable with sharing all of this work, the cooperating teacher created a wide safety net for her students' explorations of poetry, a net that included herself and the PSTs serving as collaborators and mentors for the students in their poetry analysis and composition in this digital space. This collaboration offered the high school students an expanded set of readers for their poetry writing and recitations, making this work more meaningful (Applebee & Langer, 2011; Gee, 1989).

The unit was designed to offer the PSTs practice with responding to students' poetry interpretations in a smaller group setting to help them develop skills they could then transfer with confidence to their own future classrooms. Objectives from the course that applied directly to the practicum required students to:

- Evaluate and experiment with multiple strategies and a range of content materials and texts, both traditional and alternative and both explicitly and in the context of writing instruction, in order to move toward the goal of reaching *all* students;

- Use multimodal composition and communication technologies to facilitate reflection and instruction; and

- Utilize major components of reader-response theory as a means of enhancing reading within content-area environments.

This practicum was titled "Real World Readers," and the collaboration counted toward 10% of their ELA methods course grade. Following the expectations provided to the students by the cooperating teacher (see Appendix), the PSTs visited their students' wiki pages each time the students posted a new or revised analysis or poem or replied to the comment thread. In this way, the PSTs were a constant presence to their students, supportively encouraging them to develop as thinkers and writers.

As a nationally accredited teacher preparation program, the practice of formally aligning activities with the NCTE/NCATE (now NCTE/CAEP) standards focused this work. The digital practicum supported Standard 2, 3.1, and 3.7:

- Standard 2. Through modeling, advisement, instruction, field experiences, assessment of performance, and involvement in professional organizations, candidates adopt and strengthen professional attitudes needed by ELA teachers.

- Standard 3.1: Candidates demonstrate knowledge of and skills in the use of the English language.

- Standard 3.7: Candidates demonstrate knowledge of research theory and findings in ELA. (NCTE/NCATE Program Standards, 2003)

This digital practicum housed within the poetry unit served these standards. Additionally, self-efficacy in teaching was developed as PSTs worked alongside an experienced teacher.

Finally, this digital practicum gave PSTs a needed opportunity to work with a tech-savvy English teacher (Hicks, 2016: Kajder, 2010; Kist, 2005). TPACK makes a similar argument to PCK about the critical importance of context. Technology integration courses in teacher preparation programs should not be siloed, divorced from the content. Instead, effective teaching with technology can be effectively embedded in content-specific teacher preparation courses. The digital tools and strategies can be leveraged thoughtfully to enhance student learning in each content area. This practicum offered the PSTs a model for effective content and technology integration within a secondary ELA poetry unit through its careful design to meet the needs of each learner by leveraging the digital space for increased individual student support. The cooperating teacher modeled instructional

practices that integrated technology in support of curricular goals, as well as supported a

different approach to poetry. And the PSTs practiced their professional responsibilities of

both PCK and TPACK in a safe, instructive environment with support from a university

supervisor and in collaboration with a master teacher. This practicum provided the PSTs a

rich digital learning model of how a traditionally nondigital ELA unit can be amplified with

a digital connection.

Classroom Innovation Using Wikis

This poetry unit was housed in a wiki. A wiki is a dynamic internet composition

space in which multiple users can add, change, and revise, either collaboratively or

individually. Users can also store documents and multimodal artifacts in the wiki space and

track a revision history to see the collaborative process in action. This revision history

served as a record of accumulated knowledge creation.

As a metaphor, the wiki is a digital three-ring binder. Imagine a binder so large that

students, year after year if needed, can share notes and insights on the concepts covered in

a course. Then imagine that student notes in this binder could include multimedia

perspectives of the skills and content of the class and that all of this knowledge could be

accessed electronically. This notebook metaphor (Nobles, Dredger, & Gerheart, 2012) or

"knowledge platform" (Parker & Chao, 2007, p. 58) has been used to describe the power of

a course wiki. Course wikis can include notes and perspectives from each student, and

teachers may organize the space by student name, much like files in a filing cabinet or

tabbed dividers in a notebook. Teachers may also set up the wiki with tabs delineated for

course objectives or themes. Furthermore, wikis can be stored indefinitely so that the

accumulated knowledge can live year to year or can be confined to specific units of

learning.

What makes the wiki much improved over the binder is the ease of sharing both the

creation of knowledge and the knowledge created. Wikis privilege authentic collaboration,

an important skill today's students need to learn (Dredger, 2014; Dymoke & Hughes, 2009;

Edmonson, 2012; Kajder, 2010; Wake & Modla, 2012). Teachers who believe that

"everyone together is smarter than anyone alone" (Richardson, 2009, p. 57) find that wikis

encourage students to work more efficiently while co-constructing knowledge. The word

"wiki," derived from the Hawaiian language, means "fast," and 21st-century learners have

the opportunity with wikis to access and evaluate digital information critically and quickly

and to "engage in the purposeful work of negotiating and creating truth" (Stevenson, 2010,

p. 57) using multiple perspectives.

Users of these tools espouse their ease of navigation and the power of the

collaborative space. Even though wikis are deemed by research as supportive in helping

teachers develop students' online competencies in a networked age, they are used with

students less than 1% of the time for the intended collaborative purpose (Reich, Murnane,

& Willet, 2012). That said, educators who are wary of new technologies that swirl like fads

through in-service presentations and practitioner websites are wise. Classroom teachers

who are trying to use the power of Web 2.0 and 3.0 (mobile) technologies to meet students

in learning spaces that are familiar to them, such as social networking spaces (Abbitt, 2011;

Ertmer, Ottenbreit-Leftwich, & York, 2007), also can struggle with the lack of models

guiding them in effective academic integration of digital tools. Empirical research that

helps teachers understand the questions of what works, when, and why with technology

integration should be used to inform classroom practice. In addition to studying the impact

of digital practica, this study also hopes to provide a research-based examination of the

impact of thoughtfully integrating wikis into the classroom.

Anchoring the Curriculum

For this four-week unit, the ninth-grade students studied poems and poetry writing

in their traditional classroom with their regular teacher, Ms. King (a pseudonym).

Meanwhile, PSTs read poems and discussed in their traditional methods classroom ways to

respond to students' poetic attempts and to student observations and analysis of poetry

that served as mentor texts within the composition process. The wiki then offered a shared

classroom space where the students and the PSTs could collaborate and test their learning.

The students posted their analyses of poems as well as their own poems and poetry

recitation audio recording on the wiki, and the PSTs, using the discussion tab, commented

on student work. The students then responded both in the discussion as well through

revisions to their poems and recitations.

This unit and subsequently this research study aligned with the Common Core

Initiative (National Governors Association, 2010). The students worked within "a deep and

flexible understanding" (CCSSO, 2011, p. 8) of poetry as a genre. Specifically, students:

- Cited strong and thorough textual evidence to support analysis of what the
  text says explicitly as well as inferences drawn from the text (CCSS.ELA-
  Literacy.RL.9-10.1);
- Showed their ability to "determine a theme or central idea of a text and
  analyze in detail its development over the course of the text, including how it

emerges and is shaped and refined by specific details; [and] provide[d] an
objective summary of the text" (CCSS.ELA-Literacy.RL.9-10.2);

- Determined "the meaning of words and phrases as they are used in the text,
  including figurative and connotative meanings; [and] analyzed the
  cumulative impact of specific word choices on meaning and tone (e.g., how
  the language evokes a sense of time and place; how it sets a formal or
  informal tone)" (CCSS.ELA-Literacy.RL.9-10.4); and

- Drew "evidence from literary or informational texts to support analysis,
  reflection, and research" CCSS.ELA-Literacy.W.9-10.9).

While students also read poetry as suggested by the CCSS, it is inappropriate to
suggest whether they were reading within CCSS grade level bands because poetry is not
appropriately analyzed with a readability score (Mesmer, 2007). CCSSs also do not suggest
that student writing of poetry is an essential skill in ninth grade ELA classrooms. This study
shows the value of the practice.

Research Question

What began as a partnership between an independent secondary school and a
university in 2008 became a formalized research study in the fall of 2011. After
experiencing this symbiotic partnership, the authors determined that pursuing this project
as a research study would highlight the nature of the discourse between the learning
groups involved, uncovering the effects of both the digital practica and the participation in
a wiki.

Joining the discussion about the use of classroom wikis and about mentorship in
areas of PCK (Shulman, 1986) and TPACK (Koehler & Mishra, 2009), the authors wanted to

know whether perceptions of quality interactions bore out under rigorous discourse

analysis viewed from a New Literacies lens (Knobel & Lankshear, 2007; Lankshear, &

Knobel, 2011). The research question of this study was, "What is the nature of the online

discourse between PSTs and ninth graders interacting from geographically distant

places?"

Theoretical Framework

The examination of the discourse of the PSTs and the students within the space of a

course wiki offers insight into English educators' responsibility to prepare future teachers

to negotiate the demands and affordances offered by technology integration. New

Literacies and Cognitive Flexibility Theory, defined below, come together to frame this

study.

New Literacies

For the purposes of this study, we refer to New Literacies as Knobel and Lankshear

(2007) define them in *A New Literacies Sampler*. This theoretical framework informed our

purpose in that teaching digitally will always mean that the available tools will change but

that an attitude of reflective implementation when enacting curricula with emerging

technology will always be important. What might be called "Old Literacies" valued the

dispositions of centralized expertise, ownership, normalization, and fixity. New Literacy

practices value participation, distributed expertise, sharing, experimentation, and

evolution (see Figure 1). New Literacies is a term that has been coined in light of the influx

of tools that have flooded our existence. How we use these tools in the ELA classroom

requires reflective practitioners. New Literacies provide the opportunity to use technology

in a transactional way.

Knoebel, M. and Lankshear, C. (2007). *A new literacies sampler*. New York: Lang.
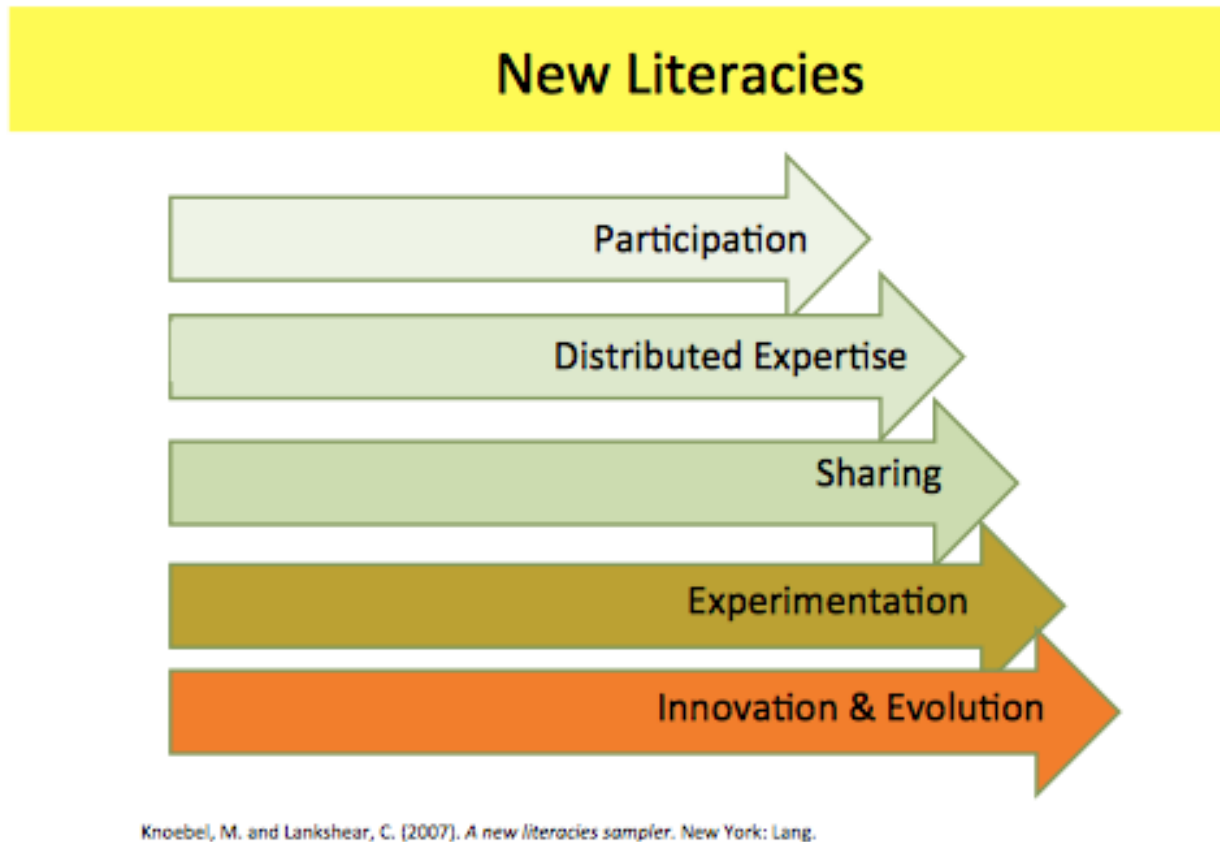
Figure 1: Moving toward dispositions of New Literacies (Concept synthesized in Dredger,

Woods, Beach, & Sagstetter, 2010).

Analysis of New Literacies (Knobel & Lankshear, 2014) requires that researchers examine

how participants use tools and practices in order to inform teaching and learning (p. 97).

Cognitive Flexibility Theory

Cognitive Flexibility Theory (CFT, Spiro, Coulson, Feltovich, & Anderson, 2004)

states that advanced knowledge acquisition happens in classrooms that avoid

oversimplification. For example, this type of knowledge acquisition would be evidenced in

the highlighting of exceptions in a body of knowledge. CFT can be applied to teaching with

technology, as technology-rich classrooms are also information-rich and therefore must focus on managing all the available knowledge without simplifying it.

CFT is also applicable in the teaching of poetry, an intricately robust genre. The following themes of CFT map strongly with developing a deep understanding of poetry.

- *Multiple Representations:* In poetry texts, the amount and type of diversified examples lead to complex thinking about how concepts manifest themselves.

- *Case Studies:* CFT requires that classrooms look at actual occurrences of phenomena, referred to in the medical community as "cases." Hence, case study has been deemed an effective way to study complex issues. The cooperating teacher in this study planned the instruction within this wiki to explore multiple poetic texts, or "cases," to honor multiple ways of looking at a poem.

- *Flexible Schema:* In classrooms that are honing flexible schemas, patterns are disrupted. Fixed knowledge is devalued, and potential knowledge is privileged. The cooperating teacher in this study used this concept by creating a culture where there were not singular, "correct" interpretations of poetry.

- *Multiple-Connectedness:* CFT classrooms are marked by an effort to see similarities and differences across representations. Thus, students and teachers in an ELA classroom may point out how poems relate to other poems, other texts, to history, or to personal experience.

- *Mentor Support:* CFT suggests that the learning of complex concepts cannot just be handed to the student. Instead, guidance, offered in myriad ways,

should support knowledge acquisition. The combination of the cooperating

teacher and the PSTs as mentors created strong support for the students in

this study as they embraced the complexity of poetic texts.

The high-level thinking tasks that engaged both the secondary students and PSTs required

more than connecting. CFT, with its focus on application, multiple representations, diverse

interpretations, multiple connections, and mentor support, better suited the genre of

poetry within this collaboration.

From this we use the term affordances, explained by Beach and O'Brien (2012) as

"both those literacy practices which the [technologies] are designed to foster as well as

those literacy practices you are inviting students to employ" (italics in original, loc. 133).

This explanation is grounded in Gibson's (1977) suggestion that humans alter the world (in

this case in their use of tools) to serve an emerging purpose. Hence the use of the tool

supports both the teacher-identified outcomes and the unexpected but appropriate

learning that emerges from the practice. As such, students **doing**, in this case creating,

reflecting, sharing, and revising poetic works, with the tools available frame the enduring

understanding of the unit of learning.

Intersections of Frameworks

New Literacies and CFT converge in a logical place when studying the affordances of

a new tool like a closed course wiki used to create a learning space for different sets of

learners with different learning goals. While our PSTs were being challenged within this

space to consider the learner, the content, the instruction, and their own professional

dispositions (CCSSO, 2011), the secondary students were concurrently being asked to (a)

refine their academic thinking within multiple perspectives; (b) create original poetry; (c)

think critically about the aspects of poetry that include figurative language, polysemous words, appeals to emotions, author's style, economy of language, narrative arc, rhythm, tone, speaker, and purpose.

New Literacies moves both secondary students and graduate students to a place of experimentation and innovation, privileging sharing and distributed expertise. The paradigm of New Literacies and the affordance of the tools supports students in their development of cognitive flexibility, with the intended consequence of developing critical thinking in students. The unit was based in complicated discussion around poetry, and New Literacies supported the academic discourse that resulted.

Literature Review

The body of literature about the use of wikis in the classroom has depth, breadth, and longevity. Richardson's (2006) first edition of *Blogs, Wikis, Podcasts and Other Powerful Web Tools for Classrooms* and Kajder's (2003) *The Tech-Savvy English Teacher* are early examples of practitioner texts that examined these issues. Both authors are pioneers of technological integration in secondary ELA classrooms.

Preparing students for 21st Century Literacies (Kress, 2003; New London Group, 1996) means modeling ways that geographically distant colleagues can collaboratively construct knowledge and course design in digital ways. Secondary teachers have shared that students are engaged when New Literacies offer them spaces to collaborate and create to meet individual learning needs (Kajder, 2010; Kist, 2005; Richardson, 2009). Differentiated classrooms (Beecher & Sweeny, 2008; Tomlinson, 2001) allow for individualized learning environments that create both familiar learning spaces (Dredger,

Woods, Beach, & Sagstetter, 2010; Moll & Greenberg, 1990) and move students in new directions for essential growth in content skills.

The research on teaching poetry through digital means shows that multimodality, larger audiences, and performance enhance the teaching of poetry (Dymoke & Hughes, 2011). This study found that some PSTs resist teaching poetry at times because they dislike the genre. They may think that poetry is only for the elite, is inaccessible and too difficult to assess, is not as important as other genres; and is not a collaborative creative space (Dymoke & Hughes, 2011). Teacher educators, armed with the findings of such research, can start to support PSTs in breaking down these notions. Dymoke and Hughes (2011) discuss ways that, pedagogically speaking, ELA PSTs need mentorship in the art and science of teaching such creative composition. This specifically speaks to some of the more recent scholarship on the importance of content knowledge development in teacher education (Forzani, 2014; Gitomer & Zisk, 2015; Lowenberg-Ball, Thames, & Phelps, 2008). Additional literature in the use of digital tools in the ELA classroom has focused on the use of digital literacies to support the accessing and sharing of knowledge, the collaborative power of gaining conceptual understandings, and the ways that new technologies can support reflection on learning (Beach, 2012). Poetry pedagogy, particularly in digital contexts, has been explored in terms of implications and restraints of the tools (Carlin-Menter, 2013; Dymoke & Hughes, 2009; Li, Snow, & White, 2015).

Teacher educators need to continue to find ways to "keep the pace" (Alvermann, 2011) as digital technologies offer opportunities for engagement in specific disciplines. In sum, this work follows the lead of these above research studies in examining specifically the ways that PSTs are guided in the thoughtful integration of technology in the ELA

classroom. As new tools move into classrooms, teachers need to be trained in their implementation and the ways that they can amplify learning the enduring understandings of the discipline.

Methodology

The three researchers, education professionals with nearly forty years combined experience teaching in secondary ELA classrooms, formalized this qualitative study two years into a six-year partnership between a secondary classroom and a university classroom, specifically in a teacher preparation course. The researchers used discourse analysis to analyze the anonymized collection of all written interactions, collected on the course wiki, between the students and the PSTs within the course of one unit. The research team defined discourse as Goldman and Wiley (2004) do. Discourse analysis of written text describes the "ideas and the relations among the ideas present in a text" (p. 64). This is especially important in a text such as a wiki and in a geographically distant mentoring environment where the main interaction between the adolescent classroom students and their mentors is in text, not in verbal dialogue. Goldman and Wiley propose that written text is a window into the "mental model" (p. 74) of the learner and that these learner-produced texts give researchers sound data for subjectively but not arbitrarily furthering understanding of student learning.

The 19 ninth-grade student participants were predominantly white (20% were non-Caucasian) students at a college-preparatory, independent PK-12 school located 220 miles away from the university. Twelve were boys and seven girls. The students owned or leased from the school laptops that they used in the classroom each day as well as brought home. All of the students had internet access at home in addition to the access they had at school.

In addition to their English class, each student was enrolled in four other academic classes

and at least one elective class.

The participants in this study included six PSTs in a Masters of Arts in Education

teacher preparation program in English Education in a large research university in a mid-

Atlantic state. The PSTs were all Caucasian, and five were females in their early twenties

working toward teacher licensure. The one male participant was in his mid-thirties and had

chosen a career change to pursue teaching. All of the PSTs owned laptop computers with

internet access and also had access to university computers when needed. While

participating in this project, PSTs were concurrently enrolled in at least three other

master's level education courses, including a fall field practicum experience in a local

secondary school two days a week. The examples in the analysis and discussion sections

are taken from five PSTs and 10 students. The pseudonyms for these participants are

shown in Table 1.

Table 1

Study participants

Cooperating Classroom Teacher	Preservice Teacher (PST) Mentor	Corresponding Student Mentee
Ms. King	Ms. Aldich	Prekan
	Ms. Reznik	Jake
		Alice
		Erika
	Ms. Dean	Camille

		Colton
		Kobe
	Ms. Wilkins	Aaron
	Ms. Atkins	Peyton

Because the course wiki and the written comments that were shared between student and PST were preserved in an online document, this work is well-suited to written discourse analysis. This study is especially informative in that the participants only exchanged verbal conversations twice: short introductions at the beginning of the unit and poetry recitations via Skype as a culminating activity. The dialogue that exists on the wiki is essentially the entirety of the interaction between each student and their PST mentor. Thus, a third space (Bhabha, 1990; Soja, 1996) apart from the secondary classroom and the university classroom was created through the power of Web 2.0 technologies that in turn created a community of practice (Lave & Wenger, 1991) for all of the community's participants.

The research team coded the data using the constant comparative method (Strauss & Cobin, 1994). First, each researcher separately read and reread each interaction recorded on the course wiki, including posts, uploads, and comments. The researchers each coded these digital interactions of the secondary students and the PSTs using these initial codes:

- Social niceties
- Expert language

- Expert thinking

- Complex communication (e.g. a probing question or dialogue)

- Integration of complex communication and expert thinking

The researchers then reread the data together. After collaboration and deliberation,

the original codes were meshed and situated within the theoretical frameworks of our

research. For example, the term "expert thinking" emerged as important to what the

students and PSTs were displaying. The research team chose to explain that within a

broader theme of "expertise" then "distributed expertise" over centralized expertise to

show the changing face of what literacy means and how the digital tool offers affordances

to share the knowledge and classroom learning. The final codes were:

- Participation

- Distributed expertise

- Sharing

- Experimentation

- Innovation

- Evolution

The theoretical framing of these codes into a New Literacies framework, organized

hierarchically, informed our findings, discussed below.

Findings

In this community of practice, four distinct findings emerged. The discourses of the

PSTs showed developing dispositions in tenets of New Literacies (Knobel & Lankshear,

2007), specifically in the following:

- the support of student participation;

- the distribution of expertise to the students;

- the encouragement of sharing knowledge over owning it; and

- the spirit of experimentation, both for the PSTs in their practicum classroom and in their own pedagogical choices.

As a team, we organized these findings hierarchically, suggesting that learners must first participate to be seen as a knowledgeable expert. Then we suggest that sharing comes from respect in the learning community to support others' knowledge growth. Finally, we want to see ways that learners are empowered to try new things as they apply knowledge to new situations, effectively experimenting in a safe environment.

Finding #1: Participation Over Publishing

The New Literacies paradigm of participation over publication was evident throughout this digital collaboration. One of the affordances of a wiki is the ease of the creative process. The revision history of the wiki shows that a final product is not produced upon a first, or even second and third, draft of any composition. For example, Erika's (all names are pseudonyms; see Table 1) wiki page showed 26 revisions. Erika clearly understood that composition is a process and that the product may not be as important as this process.

The power of the wiki to enhance creative collaboration within the focus on participation was shown in the dialogue that developed between each student and their PST mentor. Each of the 19 students was assigned a PST. The PSTs prompted each of their

mentees through inquiry, helping them both learn and encouraging participation. For

example, Ms. Aldich probed her student mentee, Prekan:

> I'd like to hear more about your process. Did you write what you wanted the poem
>
> to say, then go back and match it to the acrostic, or did you keep it in mind while you
>
> were writing? How did you decide on the subject of a salsa maker?

The PSTs were encouraged to engage through thoughtful questioning, honoring the

learning process and respecting the personal nature of artistic creation.

Participation over publication also was shown in the thinking processes of the

students, as evidenced in their comments. For example, Camille explained to her mentor,

Ms. Dean, "I put line breaks in this poem so people would take pauses to slow down the

poem and make the reader stop for a moment and think about what they are reading." This

example showed a developing author attending to her future audience, one that was not

just her teacher. She referred to "people" with the confidence that she would have readers.

Her current audience, the assigned PST Ms. Dean, served as a sounding board within her

process.

The private wiki also gave a safe space for students to participate. Participating in

an online environment can be intimidating initially, but the data showed students and PSTs

mentoring each other to participate, even when reluctant. PST Ms. Atkins, seeing that

Peyton was not participating often or fully, commented to him,

> I'm starting to see that you aren't a poetry fan :) [sic] That's fine, there are plenty of
>
> people who don't like poetry. Maybe you don't like writing it? Maybe you've just
>
> read some bad poems over the years that make no sense? I don't know, but I hope
>
> you never give up on the genre! There's a poet for everybody. :) I really like this

> poem by Wilfred Owens. I think it is very poignant, and I like that it is written by a
>
> young man in his early twenties, reflecting on the horrors of war. Like others of
>
> Owens' poems, this one does a good job of expressing sadness and anger and giving
>
> readers honest thoughts on war. Good choice!

This demonstrated the affordance of the wiki as a digital space where Peyton was able to

get individual support to help him overcome his reluctance to participate.

The PSTs, too, showed some concern in the process of engaging in digital

interaction. Ms. Reznik, for example, failed to respond initially to Jake's posts. University

faculty clarified expectations and encouraged prompt participation. Ms. Reznik gave

pointed, positive feedback and wrote:

> I also wanted to write a short message to apologize for not commenting on your
>
> wiki posts earlier. I was very confused; I was looking for your posts in the wrong
>
> spot and thought that you just hadn't posted yet! Thank you for being patient with
>
> me; I enjoyed reading your wiki posts and hope that you find my comments helpful.

Jake responded, "Also, by the way, it's okay for the delay in comments. I didn't exactly

understand how the Wikis worked either, but as you probably know I was delayed in

posting a second, original poem I wrote." Students and PSTs, through the supportive

nature of the wiki, overcame any initial reluctance and embraced the participatory,

collaborative nature of a wiki. In doing so, the students practiced being true writers who

know that writing is never done, and the PSTs practiced supporting students as they made

this sometimes intimidating step into this community of writers.

Finding #2: Distributed Expertise

A second affordance of using the educational space of the wiki technology is the shifting roles we saw in the teachers and the students. As illustrated in the aforementioned example of Ms. Reznik and Jake, the PSTs showed that they were learning with the students, and the students at times took a nurturing response.

This distributed expertise reflects a paradigm shift from the teacher providing information to the students to an environment where the teacher models learning and the students are valued holders of information as well. In this authentic learning process, expertise is shared among all parties. When Ms. Reznik acknowledged Erika's expertise in using imagery, for example, she showed Erika a strength in her writing that she may not have been aware of before the practicum experience. After Ms. Reznik pointed out her strengths, Erika said, "I appreciate your thoughts and have noticed that my strongest areas in poetry are using strong imagery and words." Erika had clearly developed a sense of her own expertise as a writer.

It takes time to read and comment on the strengths and areas for growth for each student, and the digital practicum afforded more one-on-one attention than a single classroom teacher can give. Because of this, distributed expertise is much more challenging to achieve in a traditional classroom. In the third space of the wiki, the classroom teacher had the assistance of the PSTs to acknowledge all students' expertise and encourage them in ways they excelled in writing. None of this would have happened without the high school English teacher letting go so that her students could be mentored by growing professionals in the field of English Education. That is, none of this expertise would have been distributed without the teacher being open to the affordances of the wiki and she and the university

supervisor trusting the students and PSTs to work professionally. Distributed expertise

came with letting go, while maintaining a thumb on the pulse of the interactions.

As the example above showed, encouraging shared expertise helped the students

gain confidence. What was even more powerful was when students became confident

enough to note their own strengths and explain the choices they made in writings. Colton

explained some of his poetic choices to Ms. Dean:

> I thought the tone or message might just be to live through the day. I thought it
>
> might be calming to the reader. I really just chose to use a bat to show this because
>
> it's easy to rhyme. I decided to take out the alliteration in some parts because I
>
> didn't like how it changed the flow.

Colton's confidence in his decision to take out alliteration because it seemed forced and

"changed the flow" showed his emerging expertise in experimenting with figurative

language.

The Web 2.0 tools used in this collaborative poetry unit fostered a space for these

higher-level thinking skills that were invited through inquiry and a place to think and

respond. Kobe showed this reflection when he explained some of the choices he made to

his assigned PST Ms. Dean, "I really tried to make it feel as though even though getting over

a fear is scary, life or death situations really help you out." While the expertise shown here

was not involving figurative language or specific poetic devices, Kobe was showing

confidence in his writing choices, an area where he saw himself as an expert. Beyond

reflecting on his own writing, Kobe noted a poet's use of repetition:

> Repetition- this really helped for this poem because it explains how important it was
>
> for these men to be 'free' from their lives that they had supposedly been unhappy in

previously. It also really forces the reader to memorize this statement making it
stick to the reader.

It is powerful for writers to use mentor texts (published poems) as they gain expertise.

Similarly, significant support from a mentor, in this case PSTs, can help learners gain

confidence.

The structure of the digital practicum kept students from feeling unsupported.

When Ms. Wilkins, a PST, suggested to Aaron that he end a poem with a stanza he had used

previously, he responded, "Well the reason i [sic] didn't was because the format of this

poem did not have that i will ask Ms. King if i can do that. Thanks!" There was a sense of

needing to return to the classroom teacher for the expertise that fit her role, but that

expertise was not limited to her.

Similarly, the PSTs noted learning from the students. Ms. Reznik wrote to Alice:

I really enjoyed your poem. I love that so much of it is comprised of two-word

sentences...those are hard to come by in literature, and I love them. I think that they

emphasize the power of words, and in your poem, they show the power of a state of

being and help your reader to stay tuned into your human experience. I think you

had a nice use of repetition throughout your poem-- it seemed to emphasize what

was most important to you. I think it shows that as humans we tend to have a root

issue that shows up in our lives in various way. In this case, you touched on an issue

that almost everyone deals with at some point: worry. I liked how honest you were

in this poem...I am not a talented poet, and I appreciate anyone who can express

such honesty in so few words. Thank you for sharing!

The students may learn from the teacher, but ultimately, distributed expertise means students learning from students, from technology, from experience, and from problem-solving, and the teachers learning from the students as well.

Finding #3: Sharing Over Ownership

A third tenet of New Literacies that emerged from the data went beyond simply putting one's work online to be read. In New Literacies, sharing is being willing to put one's work online for others to use, that is to borrow, remix, and excerpt. The ethos of new media is one of open access.

The discourse between the PSTs and students showed that both parties could practice this tenet of sharing via the wiki. One of the PSTs' roles was to suggest new poems for the students to read based on the types of poems the student had shared on the wiki. While some of the PSTs simply suggested a title and author, others linked to websites that freely provided their chosen author's poetry. For example, Ms. Reznik wrote to Jake, "I'd like to suggest that you read 'Free River' by Patrick Dumas. I wanted to suggest another poem about a river because you chose to write a personal poem about a river. Here's a link to the poem: http://poemhunter.com/poem/free-river/." Ms. Reznik was relying on the open ethos of existing websites to provide a poem that Jake could easily access. The website *Poem Hunter* (www.poemhunter.com) is a free site for authors to publish their poems. The site's copyright notice explains that poets still hold their own copyrights, so the poems cannot necessarily be published elsewhere. So, Ms. Reznik supported Jake by sending him to the site where the poet himself had chosen to share his poem, and Jake, like most people, was much more likely to read this suggested poem because he could access it

immediately and for free. A wiki makes it easy to take advantage of the open source

possibilities of the digital world.

This type of sharing (linking to work put on the Internet by other authors) has been

embraced by many. This project pushed the PSTs and students, particularly the students

who were sharing their own poems, much further into the New Literacy of sharing by

having them agree to have their work be part of the open access archive of the Internet. Ms.

Dean approached Camille's poem with a similar disposition: if it is accessible on the

Internet, then it is available for sharing. She wrote to Camille, "I'm going to be completely

honest, I teared up when reading 'Tides.' I called my Mom and read it to her, it moved me so

much. (I didn't give your name or anything like that obviously. I hope you don't mind.)" Her

explanation to Camille showed that only after the fact did she consider that Camille might

not have fully embraced the new literacy of sharing. Ms. Dean's discourse, even as she

realized this somewhat too late, showed how this level of sharing is something people must

learn and practice.

Camille's response then showed that, not only was she willing to have her poem

shared, this sharing was a positive experience for her as a writer: "Thank you so much and I

am glad you liked it enough to share it." The PST's choice to share the poem, which was

made possible by the collaborative affordances of the wiki, ultimately became a powerful

moment of feedback for Camille. It was not Camille's one classroom teacher who had read

and appreciated her poem; it was a PST two hundred miles away and her mother.

Finding #4: Experimentation Over Normalization

At the highest level of our suggested hierarchy is experimentation. This tenet of New

Literacies was exemplified in this data as the choice to try something beyond the expected

or established. Just as New Literacy sharing becomes sharing with anyone in the world, the

New Literacy of experimentation holds much wider possibilities through the affordances of

digital tools. For example, audio and images can be readily created, borrowed, and remixed.

The discourse from this project exhibited experimentation in three ways: the PST

experimenting with her role as teacher; the student experimenting with ways to present

her ideas; and the PST and the student exploring experimentation together.

Ms. Atkins performed what was expected of all PSTs on the wiki. She responded to

Peyton's poems by exploring techniques she saw him using. Yet through her discourse, it

became clear that she was intuiting a resistance to poetry in Peyton. Peyton wrote nothing

directly about his feelings about poetry, but Ms. Atkins decided to experiment with her role

on the wiki. Excerpted from what the longer segment we quoted earlier, she wrote,

> I'm starting to see that you aren't a poetry fan :) [sic] That's fine, there are plenty of
>
> people who don't like poetry. Maybe you don't like writing it? Maybe you've just
>
> read some bad poems over the years that make no sense? I don't know, but I hope
>
> you never give up on the genre!

Ms. Atkins took this risk of writing to Peyton about something she was sensing, albeit

without face-to-face contact with the youth. This careful attention to the nuances of one's

student's discourse is an important aspect of being an effective teacher. The wiki afforded

Ms. Atkins the chance to explore and grow as a teacher.

Camille also demonstrated self-exploration through the wiki. As a student, she was

assigned to post an image with one of her chosen poems; however, Camille decided to

experiment as a poet with how visuals contributed to her poems' meanings. She chose

images for all her poems, something made easy by the image uploading capabilities of the

wiki. She then decided to explain one of her image choices: "My picture is also kind of like a

Metaphor [sic] because it is in the ground and then grows and find [sic] out what light is

and keeps growing without question. This is like how if you don't know what love is u [sic]

fall in love without question even thought [sic] it might be a bumpy road" (see Figure 3).

Figure 3: Creative commons licensed photograph included in wiki,
http://creativecommons.org/licenses/by-sa/2.0/deed.en, Photo by KuniakiIGARASHI.

Camille applied her knowledge of poetic techniques, specifically the metaphor, by

experimenting with images, showing even more deeply how much she understood what a

metaphor is.

Ms. Reznik and Alice discussed about experimentation in writing. Ms. Reznik first wrote, "Your 'I Am' and Pantoum poems seem to be very personal; I like the way you used refrains in your Pantoum to emphasize the realization you've had about how you live life." Ms. Reznik was asking Alice to think about the experimentation Alice was doing with her writing: being autobiographical. It was Alice's response that showed the true level of her experimentation:

> Thank you so much! I glad you liked all of my poems and comments. As for my "I Am" and Pantoum poems, I wrote them to make it seem as though it was personal but in reality its [sic] not all entirely true. :) I just really enjoy writing about real things that don't happen to me or never have, its [sic] fun!

Alice was pushing herself as a writer, something that can certainly happen in a traditional classroom. However, the first part of what she wrote alludes to the fact that having a responsive audience on the wiki made this experimentation even more worthwhile.

Discussion

This research details the ways that PSTs and students worked with one another in this digital literacy practicum through written correspondence on a course wiki. The data showed a willingness on the parts of all the participants to experiment with emerging technologies. The student writers sought feedback and made connections with their PST mentors, and these relationships helped the students feel like full members of a writing community. In turn, the PSTs practiced applying the content knowledge and theoretical digital pedagogy they were studying in a practicum that was unavailable in local placements.

It matters that this interaction happened between PSTs and ninth-grade students. Peers within a ninth-grade classroom may not situate themselves to encourage others but instead want to show academic knowledge that they feel right. The tendency may not be to be quiet and listen to other students. In the third space of the wiki, no student dominated the conversations. Every student had time to think about their work, and as evidenced by the content on their individual pages, students participated much more equally than in traditional classroom discussions.

This time and space for reflection also helped students grow in their comfort as readers and writers of poetry. For many ninth graders, even those who have an English teacher trying to change the cycle of poetry anxiety, the genre does not lend itself to experimentation. Ninth graders want the poem to rhyme and to mean something clear. This wiki collaboration offered places for PSTs to be additional voices to the classroom teacher to show students that real poets experiment. This unit, because of the affordances of space and time of the embedded digital practicum, made more of the students feel like poets than we had ever seen before in our combined years of teaching.

Poetry is complex. Polysemous vocabulary, sophisticated subject matter, nuanced tone, elusive speakers, and nontraditional syntax vex adolescents as they are challenged to construct meaning from these varied texts. An ELA classroom committed to advanced knowledge acquisition has even more opportunities for complex thinking and communication to develop with the mentors offered by this digital practicum. The PSTs served as learning mentors who helped students embrace versus simplify the complexities of poetry. For example, one of the considerations that Dymoke and Hughes (2011) caution against is the mistake of assuming that poetic voice is necessarily equated with the author.

We saw students grappling with this complexity in discussions with their mentors. One student tried on an identity as a speaker in her poetry writing that did not reflect her as a person, and the PST encouraged her to talk about this choice and how writing from a different speaker perspective felt. Success for students comes in "offering many opportunities to discuss in a safe and collaborative environment [by tapping] into new communicative spaces, such as wikis" (Dymoke & Hughes, p. 55). The wiki in this practicum and the audience of the mentors provided this expanded, safe, communicative space, and the data showed experimentation that welcomed specific feedback and increased discussions beyond the traditional classroom.

As a research group, we pushed deeper into this concept of authentic audience within this project. We asked ourselves whether commenting on art is authentic. While we imagine that leaving a theatre and discussing a play or commenting on a piece in an art museum is authentic conversation about art, there is some performative nature in modeling the discussion of poetry for neophyte poets and neophyte teachers. What we found to work as a shared experience for us, the researchers, was a comparison to the peer-review process. We recognized that there is a language and an art to thinking critically about written poetry and prose in the academic world. This is the forum that we saw created by this digital network. Students were encouraged to think and create with a larger audience than just their classmates and the teacher in mind, an audience that modeled the academic discourse of poetry analysis. The ninth-grade students showed some nerves and saw this for the challenging learning environment it was. But they also grew into confident thinkers and writers who could clearly articulate their understanding of the choices that writers make.

PSTs also had an authentic audience of students and therefore had the opportunity to practice their developing teacher voice within the discourse of the wiki. They worked on being encouraging but also constructively critical, and this balance was difficult for these neophytes. Encouraging stances in comments to student poetry are a challenge, even for seasoned educators, and this invited space for interaction seemed to make the PSTs want to do well. Revision and reflection served a purpose, beyond the classroom teacher; this additional audience seemed to make a difference.

In addition to working with students, the PSTs were mentored in an ELA classroom where New Literacies was practiced for the skills that could be nurtured instead of just as a fascination with emerging tools. In this way, the PSTs were offered a bridge between theory and practice. PSTs saw innovative teaching practices with technology, and the cooperating teacher's classroom became a mentor text that PSTs could "read" to conceptualize their future classroom. Too often, cooperating teachers are encouraging of technology but may not be particularly innovative, or may even be reluctant because of past negative experiences. If a teacher preparation program wants to teach New Literacies, they need to offer practicum experiences in real classrooms that are technologically rich. Those placements may not be nearby.

This digital practicum also offered a place where PSTs (moving to the other side of the desk) could begin to see themselves as the teacher in a classroom. The nature of the collaborative space of the wiki made it clear that there were many experts in this space, from the cooperating teacher to the fellow PSTs to the students themselves as they developed their distributed expertise. The practicum invited the PSTs to practice teaching within these shifting roles by conveying themselves as not knowing everything. Ultimately,

this created a space that encouraged possibility versus a space to control. This notion of

distributed expertise is especially important when considering emerging tools in the ELA

classroom. When PSTs are mentored in distributed expertise, they can begin to see that

they will never be expert in all content or in the tools that they will teach. They can take

confidence as a learning coach as opposed to an all-knowing sage, continually learning with

their students.

Classroom management, often a struggle for PSTs, was taken out of the equation

with the wiki, giving them even more space to explore their roles as fellow experts with

students. PSTs could focus on honing pedagogical skills instead of the management ones

they need to master in face-to-face practicum experiences. As an introductory practicum,

this experience proved dynamic even though a student was on the other side of the screen

and the PST never left their university classroom and never dealt with classroom

management issues. The PSTs could focus on constructive responses/feedback that

promoted critical thinking.

Conclusion

Ultimately, this was a Deweyan experience for the PSTs in the sense that they were

doing, while interacting with real students who were reading and writing while using

technology (Dewey, 1938). Because of the affordances of technology, the lines are blurred

in regards to the limits of not leaving the university world of theory and discussion. Online

spaces can bridge the gap between theory and practice that is often lamented in teacher

preparation programs (Perrow, 2013). In 2009, 21% of teachers surveyed reported

requiring students to contribute to class learning via blogs or wikis (Gray, Thomas, &

Lewis, Tice, & National Center for Education Statistics, 2010). Wikis may be the educational

Web 2.0 tool that best harnesses the ease and power of collaborative

publishing. Richardson (2009) acknowledges that the idea that "anyone can edit anything

on the site any time that they want" (p. 56) may be daunting to teachers from the

management perspective, but it need not be. Just as a traveler in a new town feels a bit

disconcerted at first, frequenting the site and experimenting with the navigation options

brings familiarity. The controls on the wiki that require visitors to gain permission to

access the site may help mitigate some of the concerns of initial wiki usage as well as mini

lessons and classroom rules on acceptable use. Ultimately, we are living in new times when

it comes to creating, collaborating, and interacting in the world, and the innovators with

the dispositions of New Literacies will thrive (Coiro, Knobel, Lankshear, & Leu, 2014).

Teacher education can create spaces for these practices.

This study has limitations. While this analysis is of one semester of a six-year

partnership, it chronicles a small group of students and PSTs and is not meant to be

generalizable. We see ways that further research could explore longer interactions and

could study achievement data and student and PST perceptions of such practicum

experiences. We see ways that the dynamics of this particular classroom teacher could have

made for a particularly positive experience when another may not have. We recognize the

importance of developing in PSTs a critical stance with emerging technologies; we do not

claim that our PSTs continued to take this stance into their own classrooms. This is ripe for

further research.

While not without these limitations, this study has implications in the teacher

education classroom. Hughes and Dymoke (2011) caution PSTs to "evaluate the poem, not

the student" (p. 55). The wiki afforded this, as the PSTs working asynchronously were able

to focus on the words in each poem. The lack of face-to-face contact actually afforded this focus on the poetic devices versus a focus on the person who wrote the poem. While social connections were forged, equating the poem with the person did not occur.

Richardson (2009) reminds us, "As we continue to move toward a world where everyone has access to ideas and where collaboration is the expectation rather than the exception, wikis can go a long way to teaching our students some very useful skills for their future" (p. 59). Mentors using technology learn quickly that the mentorship goes two ways, that we are always learning new skills, hacks, and remixes when it comes to literacies, technology use, and practical applications. This close examination of one semester of interactions exemplifies some of these expectations in a time of shifting dispositions towards literacies and technologies in the classroom.

References

Abbitt, J. T. (2011). An investigation of the relationship between self-efficacy beliefs about

technology integration and technological pedagogical content knowledge (TPACK)

among preservice teachers. *Journal of Digital Learning in Teacher Education*, *27*(4),

134-143.

Alvermann, D. E. (2011). Moving on, keeping pace: Youth's literate identities and

multimodal digital texts. In S. Abrams & J. Rowsell (Eds.), *Rethinking identity and*

literacy education in the 21st century. *National Society for the Study of Education*

yearbook (vol. 110, part I, 109-128). New York: Columbia University, Teachers

College.

Applebee, A. N., & Langer, J.A. (2011). A snapshot of writing instruction in middle schools

and high schools. *English Journal, 100*(6), 14-27.

Bhabha, H. (1990). The third space. In J. Rutherford (Ed.), *Identity, community, culture*

and difference (207-221). London, United Kingdom: Lawrence and Wishart.

Beach, R. (2012). Uses of digital tools and literacies in the English language arts classroom.

Research in the Schools, 19(1), 45-59.

Beach, R., & O'Brien D. (2012). Using iPad and iPhone apps for learning with literacy across

the curriculum. Retrieved from http://www.amazon.com/iPhone-Learning-

Literacy-Curriculum-ebook/dp/B00ATIVZCK

Beecher, M., & Sweeny, S. (2008). Closing the achievement gap with curriculum enrichment

and differentiation: One school's story. *Journal of Advanced Academics, 19*(3), 502-

530.

Carlin-Menter, S. (2013). Exploring the effectiveness of an online writing workspace to

    support literacy in a social studies classroom. *E-Learning and Digital Media, 10*, 407-

    419. http://dx.doi.org/10.2304/elea.2013.10.4.407

Coiro, J., Knobel, M., Lankshear, C., & Leu, D. J. (Eds.). (2014). *Handbook of research on new*

    literacies. New York: Routledge.

Council of Chief State School Officers. (2011, April). Interstate Teacher Assessment and

    Support Consortium (InTASC) Model Core Teaching Standards: A Resource for State

    Dialogue. Washington, DC: Author. Retrieved from p. 8

    http://www.ccsso.org/documents/2011/intasc_model_core_teaching_standards_20

    11.pdf

Dewey, J. (1938). *Experience and education*. New York: Macmillan.

Dredger, K. (2014). Preparing intermediate and secondary teachers of reading today:

    Apprenticeship models with emerging tools. In D. Loveless, B. Griffith, M. Bérci, E.

    Ortlieb, & P. Sullivan (Eds.), *Academic knowledge construction and multimodal*

    curriculum development (pp. 283-299). Hershey, PA: IGI Global. doi:10.4018/978-1-

    4666-4797-8.ch018

Dredger, K., Woods, D., Beach, C., & Sagstetter, V. (2010). Engage me: Using New Literacies

    to create third space classrooms that engage student writers. *Journal of Media*

    Literacy Education 2(2), 85-10.

Dymoke, S., & Hughes, J. (2009). Using a poetry wiki: How can the medium support pre-

    service teachers of English in their professional learning about writing poetry and

    teaching poetry writing in a digital age? *English Teaching: Practice and Critique, 8*(3),

    91-106.

Edmondson, E. (2012). Wiki literature circles: Creating digital learning communities.

English Journal, 43-49.

Ertmer, P. A., Ottenbreit-Leftwich, A., & York, C. S. (2007). Exemplary technology-using

teachers: Perceptions of factors influencing success. *Journal of Computing in Teacher*

Education, 23(2), 55-61.

Forzani, F. M. (2014). Understanding "core practices" and "practice-based" teacher

education learning from the past. *Journal of Teacher Education, 65*(4), 357-368. doi: I

0.1177/0022487114533800

Gee, J. P. (1989). Literacy, discourse, and linguistics: Introduction. *Journal of Education,*

171(1), 5-14.

Gibson, J. J. (1977). Perceiving, acting, and knowing: Toward an ecological psychology. *The*

Theory of Affordances, 67-82.

Gitomer, D. H., & Zisk, R. C. (2015). Knowing what teachers know. *Review of Research in*

Education, 39(1), 1-53.

Goldman, S. R., & Wiley, J. (2004). Discourse analysis: Written text. *Literacy research*

methodologies, 62-91.

Gray, L., Thomas, N., Lewis, L., Tice, P., & National Center for Education Statistics. (2010).

Teachers' use of educational technology in U.S. public schools, 2009: First look.

Washington, DC: National Center for Education Statistics, Institute of Education

Sciences, U.S. Dept. of Education.

Hicks, T. (2016). *Research writing rewired: Lessons that ground students' digital learning.*

Thousand Oaks, CA: Corwin.

Howey, K. R., & Grossman, P. L. (1989). A study in contrast: Sources of pedagogical content

knowledge for secondary English. *Journal of Teacher Education*, *40*(5), 24-31.

Hughes, J., & Dymoke, S. (2011). "Wiki-ed poetry": Transforming preservice teachers'

preconceptions about poetry and poetry teaching. *Journal of Adolescent & Adult

Literacy*, *55*(1), 46 -56.

Kajder, S. B. (2003). *The tech-savvy English classroom.* Portland, ME: Stenhouse.

Kajder, S. B. (2010). *Adolescents and digital literacies: Learning alongside our students.*

Urbana, IL: NCTE.

Kennedy, K., & Archambault, L. (2012). Online learning: A national survey of teacher

education programs. *Journal of Teacher Education*, *63*(3), 185-200.

Kist, W. (2005). *New literacies in action: Teaching and learning in multiple media* (Vol. 75).

New York: Teachers College Press.

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge?

Contemporary Issues in Technology and Teacher Education, *9*(1), 60-70.

Knobel, M., & Lankshear, C. (2007). *A new literacies sampler* (Vol. 29). New York: Peter

Lang.

Kress, G. (2003). *Literacy in the new media age*. Oxford: Psychology Press.

KuniakilGARASHI. (2006, September). Sunflower. [photograph)]. Retrieved from

https://www.flickr.com/search/?user_id=87545778%40N00&view_all=1&text=sun

flower

Lankshear, C., & Knobel, M. (2011). *New literacies: Everyday practices and social learning*

(3rd ed.). New York, NY: Open University Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.*

Cambridge, MA: Cambridge University Press.

Li, J., Snow, C., & White, C. (2015). Teen culture, technology, and literacy instruction: Urban

adolescent students' perspectives. *Canadian Journal of Learning and Technology,*

41(3).

Lowenberg-Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching:

What makes it special? *Journal of Teacher Education*, *59*(5), 389-407. doi:

10.1177/0022487108324554

Mesmer, H. A. E. (2008). *Tools for matching readers to texts: Research-based practices*. New

York: Guilford Press.

Moll, L., & Greenberg, J. (1990). Creating zones of proximal development. In L. Moll (Ed.)

Vygotsky and education: Instructional implications and applications of sociohistorical

psychology. Cambridge: Cambridge University Press.

NCATE/NCTE Program Standards. (2003). English language arts education. Retrieved from

http://www.ncate.org/Standards/ProgramStandardsandReportForms/tabid/676/

Default.aspx#NCTE

National Governors Association Center for Best Practices & Council of Chief State School

Officers. (2010). *Common core state standards for English language arts and literacy*

in history/social studies, science, and technical subjects. Washington, DC: Authors.

New London Group. (1996). A pedagogy of multiliteracies: Designing social futures.

Harvard Educational Review, 66(1), 60-92.

Nobles, S., Dredger, K., & Gerheart, M.D. (2012). Collaboration beyond the classroom walls:

Deepening learning for students, pre-service teachers, teachers, and professors.

Contemporary Issues in Technology and Teacher Education, 12(4), 343-354

Parker, K. R., & Chao, J. T. (2007). Wiki as a teaching tool. *Interdisciplinary Journal of*

Knowledge and Learning Objects, *3*(1), 57-72.

Perrow, M. (2013). "Welcome to the real world: Navigating the gap between best teaching

practices and current reality." *Studying Teacher Education*, *9*(3), 284-297.

Poem Hunter (2017). Retrieved from https://www.poemhunter.com/.

Pyper, J. S., Chin, J., & Reeve, R. (2016). Professional literacies with mathematics, English

language arts, and science teacher candidates. *Journal of Literacy & Technolog*y,

17(3), 41-60.

Reich, J., Murnane, R., & Willett, J. (2012). The state of wiki usage in U.S. K–12 schools:

Leveraging web 2.0 data warehouses to assess quality and equity in online learning

environments. *Educational Researcher, 41*(7), 7- 15. doi:

10.3102/0013189X11427083.

Richardson, W. (2009). Becoming network-wise. *Supporting the whole child: Reflections on*

best practices in learning, teaching, and leadership. Arlington, VA: Association for

Supervision and Curriculum Development.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational*

Researcher, 15(2), 4-14.

Soja, E. W. (1996). *Thirdspace: Journeys to Los Angeles and other real-and-imagined places*.

Oxford: Blackwell.

Spiro, R. J., Coulson, R. L., Feltovich, P.J., & Anderson, D.K. (2004). Cognitive flexibility

theory: Advanced knowledge acquisition in ill-structured domains. In R.B. Ruddell &

N.J. Unrau (Eds.), *Theoretical models and process of reading* (5th ed.) (640-653).

Newark, DE: International Reading Association.

Stevenson, P. (2010). Opening up the curriculum with 21st century literacy. *NATE

Classroom*, *10*, 41-43.

Strauss, A., & Corbin J. (1994). Grounded theory methodology: An overview. In N. K. Denzin

and Y. S. Lincoln (Eds.), *Handbook of qualitative research* (273-285). Los Angeles, CA:

Sage Publications.

Tomlinson, C. A. (2001). *The differentiated classroom: Responding to the needs of all learners*

(2nd ed). Alexandria, VA: Association for Supervision and Curriculum Development.

Townsend J. S., Nail, A., Cheveallier, J., Browning, A., & Fink, L.S. (2013). An online writing

partnership: Transforming classroom writing instruction. *English Journal, 102*(4),

74.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.*

Boston: Harvard University Press.

Wake, D. G., & Modla, V. B. (2012). Using wikis with teacher candidates: Promoting practice

and contextual analysis. *Journal of Research on Technology in Education, 44*(3), 243-

265.

Appendix
Poetry Practicum Expectations in ELA Methods Course

Expectations of Preservice Teachers

Wednesday, Oct. 15:
- Get familiar with wiki site
- Comment on introduction page on students' wiki pages
- Research what Poetry Out Loud (POL) is

Wednesday, Oct. 22:
- Comment on POL page:
    - their poem choice, the image they chose to represent a spot in the poem, and techniques students have explained
    - What do you see happening in the poem to help students understand it?
- Comment on the introduction page:
    - Respond to student comments back to you

Wednesday, Oct. 29:
- Comment on the POL page:
    - Respond to students'' new reflection
    - What tone(s) do you think the student evoke when reciting this poem?
    - Listen to their audio recordings (on the bottom of the POL page) and give feedback for reflection or improvement
- Comment on the new page original poetry page:
    - Give feedback on this first poem students chose to share with you

Wednesday, Nov. 5:
- Comment on the POL page:
    - Respond to their reflection on student recitation
    - Suggest a new poem the student might want to read
- Comment on original poetry page(s):
    - Give feedback on poem draft(s) looking specifically at how they are trying to use poetic techniques

Wednesday, Nov. 12:
- Read the final project guidelines (posted on wiki):
    - Be sure to click on full assignment and exemplar
    - You can view other examples on Past Readers and Writers/Poetry Pages from past Classes (linked at bottom of page list on left)
- Comment on the students' final project page:
    - What thoughts do you have on their poem choice and how they might make their final analysis and recitation for it?
- Comment on original poetry page(s):
    - Students will have posted revised poem(s) or new poem(s)

Friday, Nov. 14 - Sunday, Nov. 16:
- Comment on original poetry page(s):
    - Students will have posted revised poems for your final feedback, revision ideas, etc.

Wednesday, Nov. 19:
- Comment on original poetry page(s)
    - Students will have posted 3 or more finalized poems for your final comments.

Wednesday, Nov. 26:
- Comment on final project page:
    - Watch final project and give feedback
    - Suggest one last poem for the students to explore