Enhancing Literacy Instruction through Technology

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Abstract

Technology has altered how children experience language. As technology has taken root in society, literacy skills have expanded beyond simply reading and writing print texts to include interacting with digital texts and media. To prepare students to operate in this digital environment, teachers should integrate technology into language arts instruction; however, many teachers feel unprepared to do so effectively. Additionally, some teachers hesitate to implement technology into language arts instruction as a tool because of its supposed negative effects on literacy. Despite beliefs about technology inhibiting reading and writing, teachers can utilize technology to enhance literacy instruction. The digital age has laid the foundation for new literacies, and teachers must build upon it.

Enhancing Literacy Instruction through Technology

Introduction

As technology has become a central aspect of society, it is altering the traditional

methods of reading and writing. Not only must children today develop traditional literacy

in reading and writing, but they must also develop other literacy skills which are

grounded in technology and media, often labeled new literacies. These new literacies

present a need for educators to develop technology-integrated pedagogy which considers

the benefits and potential shortcomings of technology in reading and writing instruction.

As many teacher have begun to do, teachers today should prepare to effectively integrate

technology into the language arts classroom to expand literacy skills in the classroom and

prepare students for the modern world.

New Literacies

With the emergence of technology, the scope of literacy has evolved beyond print

communication to also include proficiency in reading, writing, and responding to digital

texts, images, and other forms of media (Pasternak et al., 2016). Zoch, Langston-DeMott,

and Adams-Budde (2014) emphasize that these new literacies also include "the

competencies associated with them, such as design, navigation, and collaboration" (p.

32). In addition to the various print texts students have traditionally learned to read and

write, technology has presented new avenues for students to comprehend and create

digital texts and media. As a result, teachers should instruct their students in

communicating through diverse print and digital means (Hutchison & Woodward, 2014b)

so that they can function in an increasingly digital society (McKenna, 2014). However,

many teachers hesitate to integrate technology into language arts instruction due to insufficient resources, which may be solved through grants and fundraising, and overall doubts that technology significantly contributes to literacy, which may be combated through considering current research concerning technology. This research will be discussed over the course of this thesis. While teachers holding this view may use technology as an instructional tool, they primarily continue to elevate traditional print means of reading and writing as the most important component of developing literacy (Zoch et al., 2014).

Defining Traditional Literacy

Before examining the broadened scope of literacy ushered in by technology, it is important to revisit the traditional definitions of literacy held apart from the new literacies definition. Even before technological advancements altered the definition of literacy, the concept of literacy was difficult to define. Describing this challenge, Keefe and Copeland (2011) introduced that defining literacy "deceptively suggests simplicity, but instead opens up a world of complexity" (p. 92). Literacy is a multifaceted and complex ability, and since it is an essential skill and considered by many to be a basic human right (Keefe & Copeland, 2011), defining it properly is vital. The definitions of traditional literacy lie at the center of the definitions of new literacy with technology; therefore, understanding traditional literacy is foundational to this discussion.

At its core, language arts centers on modes of communication. Bender-Slack and Young (2016) explained that many educators consider the components of language arts to include reading, writing, listening, and speaking, expanding upon the traditional view

which only included written words; however, these researchers continued to explain that

the International Reading Association (now called the International Literacy Association)

and National Council of Teachers of English additionally include viewing and visually

representing as modes of communication. Literacy principally involves being able to

communicate in each of these six areas.

The definition of literacy held by the United Nations Educational, Scientific, and

Cultural Organization (UNESCO, 2008) presented another definition of literacy centering

on communication with comprehension, stating that a literate individual "can with

understanding both read and write a short simple statement on his (her) everyday life"

(p.18). UNESCO further notes that literacy is not an isolated skill of understanding, but

rather occurs in the context of operating successfully in society, explaining that literate

individuals "can engage in all those activities in which literacy is required for effective

functioning of his (her) group and community" (p.18). Considering this explanation,

literacy involves not only communicating through the six modes of language arts and

with understanding, but also using those skills to participate in a community.

Recognizing literacy as an avenue to participate in a community points to the

importance of literacy in a societal context. Kalman (2008) underscored the importance

of literacy as the basis of development and achievement in society. Keefe and Copeland

(2011) went so far as to consider literacy to be an immutable human right. Though not all

individuals would normally list literacy as a human right, the importance of literacy and

communication in accessing other agreed-upon human rights and participating in society

cannot be denied. Most workplaces require some degree of communication, and tasks

ranging from purchasing goods and services to voting in elections are supported by

literacy. As the place where individuals typically develop literacy, "school has been

promoted as the institution responsible for the education of new readers and writers who,

according to this view, will learn the basic skills necessary for entering the work force"

(Kalman, 2008, p. 525). The school has long been responsible for teaching students to

communicate through reading, writing, speaking, listening, and visually representing in

order to participate fully in society; with the advent of new literacies, this responsibility is

expanding to increasingly infuse digital means into such communication.

Defining New Literacies

Technology builds on the foundational components of literacy by providing

augmented means for communicating in society. Modern society no longer consists only

of print texts; rather, digital texts and new forms of media have become central forms of

communication for many communities. Zoch et al. (2014) emphasize that the changes to

everyday life due to technology "demand that we equip students with the knowledge,

skills, and dispositions necessary to be successful. This requires knowing how to use new

technologies and adopting a broader conceptualization of literacy that encompasses

digital as well as written forms of texts" (p. 32). Technology presents the opportunity to

develop what many have termed new literacies, referring to the new technological

vehicles for communication. In addition to traditional literacies, new literacies also

include reading and writing digital texts, creating and responding to other forms of digital

media, understanding social and interactive components of digital media, and proficiency

in related digital competencies (Zoch et al., 2014).

The component of new literacies most similar to traditional literacy skills consists of reading and writing digital texts. Technology necessitates this extension of literacy to "encompass not only print texts but also digital texts" (Pasternak et al., 2016, p 375). Students no longer write only with a pencil and paper; rather, they often use keyboards and word processing programs, which add a new dimension to traditional writing. This type of writing may contain the same content and structure as traditional writing, but requires additional skills to execute. Similarly, students no longer read only printed books and papers; instead, they may read digital texts on a tablet or computer. Though this type of reading requires the same decoding and comprehension skills as traditional reading, students must also utilize additional technological skills to navigate digital texts.

In addition to reading and writing digital texts, which are generally similar to traditional practices of literacy, new literacies also include viewing and visually representing new forms of media. These new forms of media ushered in by technology can include videos, photographs, digital images, audio, and numerous related forms of digital expression. Though many of these forms of media have been developing over the last century, the new focus on digital communication has made them not an optional art form, but rather an important component of literacy. At the core, new literacies are based on "theories of multimodality that include new means of expression such as digital composing with video and Internet-based activities that include visuals and sounds" (Perttula, 2017, p. 51). This new focus on analyzing digital media is "expanding what it means to be literate" (Reed, 2017, p. 38) in the modern world.

New literacies also involve the technological abilities necessary to communicate through digital means. In order to understand digital forms of media, students must first develop the capabilities to navigate various digital and internet programs (Zoch et al., 2014). Similar to how traditional concepts of print facilitate reading, computer skills provide the necessary basis for comprehending digital media. Just as students cannot fully read until they can open a book, turn a page, and track words on a line, they cannot truly interact with digital media until they can perform tasks such as opening a computer program, navigating an internet browser, or playing and pausing a video. These building blocks of new literacies cannot be ignored as an essential component of it; rather, they must be considered an integral part of digital literacy for modern students.

In order to be digitally literate, students must also be able to understand the related social connections of digital media. Just as traditional texts include cultural connections, new forms of digital media also contain social interactions that students must examine in order to completely understand the media (Reed, 2017). When analyzing or creating digital media, students must learn to consider "the people to whom they refer, social practices, critical perspectives, and other situational instances that require meaning-making strategies" (Pasternak et al., 2016, p. 375). Technology adds a new dimension both to communication and cultural expression. Since literacy is ultimately a means to participate in a community, understanding the social context behind digital media is essential.

As a whole, new literacies build upon the components of traditional literacies. New literacies include the abilities to read and write both traditional print texts and

similar digital texts, to understand and create new digital and multimodal forms of media,

to competently navigate technologies essential digital texts and media, and to understand

the social contexts of these forms of expression. This broadened scope of literacy

presents the important opportunity for teachers to integrate technological communication

skills into their language arts instruction.

Hesitancies toward New Literacies

Although technology has added a new component to literacy, many teachers do

not recognize new literacies as holding significant importance compared to traditional

literacies and are hesitant toward teaching them. Due to issues of insufficient access to

technology, preparation of educators, and time for instruction, many teachers still elevate

traditional beliefs and practices of literacy above new digital ones (Zoch et al., 2014). Of

course, reading and writing in the traditional sense are essential prerequisite skills to the

rest of education; therefore, schools should prioritize these skills, in addition to speaking

and listening, in language arts instruction. Further, students can do little with digital

media without well-developed skills in these areas. However, these priorities do not

negate the possibilities for using technology as a tool to enhance literacy.

While many STEM (science, technology, engineering, and math) subjects have

quickly embraced the educational capacities of technology, for the language arts

classroom "the appropriateness of technology is less obvious, and teacher resistance has

been higher from the outset" (McKenna, 2014, p. 10). Though the connections between

technology and literacy are numerous, they are not always obvious without sufficient

training for educators. Many teachers are therefore hesitant to put forth the effort and

time to integrate technology into their already busy language arts instruction, as they do

not understand how technology can support and enhance their existing instruction.

In order to effectively implement technology into language arts instruction,

teachers must develop positive views of how technology can contribute to literacy.

Adopting such a view, which Saudelli and Ciampa (2014) referred to as a new literacies

stance, is "dependent not only on the amount of training a teacher receives, but also the

teacher's beliefs about the benefits and uses of technology in the classroom" (p. 229).

Rather than viewing technology as replacing traditional literacy, teachers can instead

view it as augmenting the literacy experience for their students. New literacies are an

expansion of traditional literacies, not a replacement. As teachers recognize the need and

benefits of integrating the new literacy stance into their current instruction, their student

will receive the most benefits.

Technological Pedagogy

The digital modes of communication that contribute to new literacies have

amplified the importance of integrating technology into the language arts classroom. The

International Society for Technology in Education (ISTE, n.d.) explains that the quick

access to information through the internet presents a need for higher-order thinking skills

driven by technological pedagogy. Mishra and Koehler's (2006) Technological

Pedagogical Content Knowledge (TPACK) framework provided an early foundation for

the need to carefully integrate content and pedagogy with technology which many

researchers have expanded upon. Hutchison and Woodward (2014a) explained the

simultaneous nature of each component of the TPACK framework: "Mishra and Koehler

suggested that the most effective way to integrate technology into classroom instruction is to simultaneously draw on technological, pedagogical, and content knowledge" (p. 318). The Common Core State Standards also emulate the need for technology to be integrated into content by embedding it in content standards (Saine, 2013).

Need for Technological Pedagogy

Just as literacy has expanded to encompass technology through new literacies, so also should traditional classroom pedagogy evolve to include technology. While this change can be applied across all content areas, it is especially pertinent in the language arts classroom. Teachers can effectively equip students to develop both traditional literacy skills and technological communication skills by regularly using technology in their instruction (McKenna, 2014). Technology has not only changed the modes of communication which students can experience, but also provided faster and wider access to information (ISTE, n.d.). Therefore, teachers should prepare students to use technology as a tool to communicate in the modern fast-paced environment. This begins with teachers adopting a new literacies stance with positive beliefs about technology and regular inclusion of digital texts, media, and internet sources in instruction (Perttula, 2017). In order to develop and implement such a stance, teachers first must understand the benefits of including technology in their language arts pedagogy (Saudelli & Ciampa, 2016).

Implementing technological pedagogy involves preparing students not only to use technology, but also to develop the cognitive abilities necessary to process the levels of information it provides. The internet provides quicker access to rapidly changing

information than traditional forms of research and communication (ISTE, n.d). Students

must learn to interpret this type of information using higher level thinking. Because

technology creates an "anytime, anywhere access to a universe of facts, an emphasis on

top-down knowledge delivery and rote memorization no longer makes sense" (ISTE,

n.d.). Pedagogy fueled by technology can promote this higher-level thinking, which

involves analyzing, evaluating, and creating information (Anderson & Krathwohl, 2000).

Technological Pedagogical Content Knowledge (TPACK)

In an early response to the possibility for teachers to implement technology in

their classrooms, Mishra and Koehler (2006) developed a theoretical and conceptual

framework for integrating technology into instruction termed Technological Pedagogical

Content Knowledge (TPACK). These researchers maintained that "merely introducing

technology to the educational process is not enough" (Mishra & Koehler, 2006, p. 1018).

Other current researchers have continued to research this framework; for instance,

Hutchison and Woodward (2014a) explained that the TPACK framework "suggested that

the most effective way to integrate technology into classroom instruction is to

simultaneously draw on technological, pedagogical, and content knowledge, which

requires teachers to see new possibilities for how the three areas can interact" (p. 318).

Neither technology, nor pedagogy, nor content is enough in isolation; effective

instruction depends on all three components.

The TPACK framework builds upon the earlier foundation of Shulman's (1986)

idea of Pedagogical Content Knowledge, which emphasized "the blending of content and

pedagogy into an understanding of how particular aspects of subject matter are organized,

adapted, and represented for instruction" (Mishra & Koehler, 2006, p. 1021). Teachers

should not focus solely on content or solely on pedagogy as they prepare for instruction,

but rather should blend the two together (Shulman, 1986). To teach effectively, teachers

should master the content they teach so that they can help their students understand the

subject correctly. However, they should also master pedagogical strategies so that their

instruction can effectively reach their students. Mishra and Koehler (2006) added a third

system of knowledge to Shulman's (1987) dynamic: technology.

Technology has provided new avenues for instruction which have the potential to

improve classroom learning (Hutchison & Woodward, 2014a). Unlike the other areas of

content and pedagogy, technology is constantly changing; therefore, "teachers will have

to do more than simply learn to use currently available tools; they also will have to learn

new techniques and skills as current technologies become obsolete" (Mishra & Koehler,

2006, p. 1023). The rapidly changing nature of technology creates the need for teachers

to include new technology knowledge in their preparation for instruction. Mishra and

Koehler (2006) described this component of TPACK as both "knowledge about standard

technologies, such as books, chalk and blackboard, and more advanced technologies,

such as the Internet and digital video" (p. 1027). As teachers develop this crucial

technology knowledge, they must not consider it an isolated skill, but rather must

recognize technology as overlapping with content and pedagogy.

The TPACK framework focuses on how technology, pedagogy, and content

knowledge overlap to form an integrated approach to instruction. Looking at how

technology interacts with content, teachers should ask how technology can change the

subject matter they are teaching (Mishra & Koehler, 2006). For example, technology changes the content of the language arts classroom both by enhancing traditional forms of literacy through reading and writing on digital platforms and by providing new forms of video, audio, and internet-based expression. Technology also affects pedagogy as teachers ask how to use technology in their instruction and how technology might change the practice of teaching in general (Mishra & Koehler, 2006). In the language arts classroom, teachers might use technology to provide their students with digitals ways to read and write, to help their students analyze and create new forms of media, and even to allow students to use computer guided programs or other digital applications to guide their learning. One case study found that as a teacher used the TPACK framework to integrate technology, pedagogy, and content knowledge during instruction, "her instruction become more consistent with a new literacies perspective and, consequently, her classroom environment changed" (Hutchison & Woodward, 2014a, p. 329). When teachers consider technology, pedagogy, and content as overlapping factors, they can best accommodate a new literacies approach to instruction.

Common Core

The importance of integrating technology with instruction is evident in how the Common Core State Standards (CCSS, 2010) infuse content standards with technology skills. With "technology embedded standards" (Saine, 2013, p. 100) specifically in the English Language Arts, the CCSS emphasize the role of technology for modern-day literacy. The ISTE points out that the CCSS recognize "education as it's always been done is not enough in the digital age" (n.d., New Skills for a New World section, para. 1)

and promotes the use of technology "to focus our energies on research and media

literacy, creativity, collaboration, problem solving, and critical thinking" (n.d.,

Technology-Powered Pedagogy section para. 1).

   In their description of college and career ready students, the CCSS (2010) include

the strategic use of technology and digital media as an important capability of literate

individuals. According to this portrait, students who meet the English Language Arts

standards ultimately "employ technology thoughtfully to enhance their reading, writing,

speaking, listening, and language use" (CCSS, 2010, p. 7). Literate students also compare

knowledge from traditional and digital sources (Saine, 2013). As students integrate what

they learn offline and online, they must learn to recognize both the benefits and

limitations of technology (CCSS, 2010).

   The CCSS (2010) also embed technology in the standards for writing. One of the

anchor standards for writing outlines that students must be able to "use technology,

including the Internet, to produce and publish writing and to interact and collaborate with

others" (CCSS, 2010, p. 18). Beginning in kindergarten, students are expected to

"explore a variety of digital tools to produce and publish writing, including in

collaboration with peers" (CCSS, 2010, p. 19). In fourth grade, students must also be able

to "demonstrate sufficient command of keyboarding skills to type a minimum of one

page in a single sitting" (CCSS, 2010, p. 21); this standard increases to a minimum of

two pages in fifth grade. These standards reflect how technology has pushed writing to be

more of a digital process than traditionally; they also showcase how digital writing

provides means for collaboration, which students must practice.

Additionally, the CCSS note that technology has changed the dynamic of speaking and listening as it pertains to language arts and literacy. As a preface to the standards for speaking and listening, the standards note that "new technologies have broadened and expanded the role that speaking and listening play in acquiring and sharing knowledge and have tightened their link to other forms of communication" (CCSS, 2010, p. 48). This is reflected in one of the anchor standards for presentations which outlines that students should be able to "make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations" (CCSS, 2010, p. 48). For instance, students might enhance research presentations using digital images, videos, or audio clips embedded in a PowerPoint presentation. Students must continually adapt to the ways technology has changed speaking and listening and the broadened possibilities it has created.

While technology has been infused into the Common Core State Standards, technology has not replaced traditional content. Reading, writing, speaking, and listening skills apart from technology are still vital; however, the standards underscore the ways technology has added to existing language arts instruction.

Educator Preparation

Despite the potential to integrate technology with pedagogy and content, many teachers do not know pedagogical strategies for teaching their subjects with technology (Saudelli & Ciampa, 2016). Lack of preparation can prove detrimental to technology integration, as teachers who try to integrate technology without proper training might sacrifice the quality of their instruction (Hutchison & Woodward, 2014a). While

technology functions primarily to support the content of language arts, teachers must first

learn how to use technology effectively in their classrooms in order to implement it

(Pasternak et al., 2016). However, teachers need not be experts of technology, as many

students are self-motivated to learn through collaborating and exploring (Zoch, Langston-

DeMott, & Adams-Budde, 2016, p. 35).

Deficiencies in Professional Development

Many in-service teachers feel that they do not receive adequate professional

development on how to implement technology in the classroom. Because technology is

rapidly advancing, many experienced teachers have not received adequate training in

current technology. Saudelli and Ciampa (2016) explained that many professional

development workshops which attempt to remedy this focus too closely on the features of

technology rather than pedagogical application. In a case study by these researchers, one

teacher noted that many of the brief workshops she attended simply focused on listing

useful digital applications rather than improving practical skills for integrating

technology into the classroom. This type of training is not sufficient; rather, effective

technology training for teachers should involve opportunities for experimentation and

collaboration. More than workshops, professional development in technology should

center on the implementation of professional learning communities within schools that

allow teachers to collaborate in learning and implementing new technologies (Saudelli &

Ciampa, 2016). This technology-centered professional development should not replace

existing professional development, but rather should add to it.

Specifically pertaining to language arts instruction, many teachers have not been prepared to integrate technology into literacy instruction, nor have they realized the ways technology can support literacy. Many educators may hesitate to embrace technology and continue to focus on print literacies instead because of this lack of preparation. To illustrate this with one example, in a case study of multiple educators by Saudelli and Ciampa (2016) in which teachers integrated iPads into their classrooms, one teacher continued to pursue traditional content and pedagogy in language arts instruction despite the available technology, only adding technology as an aid rather than embracing a new literacies approach. This teacher did not feel competent in using the available iPads and lacked the time to explore the instructional possibilities.

Training in classroom technology is essential for effective technological pedagogy. Hutchison and Woodward (2014a) noted through a case study that when teachers attempt to use technology and encourage new literacies without sufficient preparation, the results can be detrimental rather than beneficial to instruction. Even in lessons with exceptional objectives and unit planning, ineffective technology can overwhelm effective instruction. For this reason, teachers must engage in meaningful, collaborative professional development in order to gain practical experience in integrating technology into instruction. Teachers must learn how to use technology in order to implement it (Pasternak et al., 2016), but also must focus on specific pedagogical applications.

Not only do many teachers have insufficient training in integrating technology into the classroom, but they also have limited knowledge of the policies involved in

technology use. One teacher in a case study by Saudelli and Ciampa (2016) avoided

playing videos in her classroom because she was unsure which videos and video

streaming websites she was allowed to use. Further, she avoided letting her students use

the internet because she was unable to monitor all students and was unsure about what

internet content they would encounter. These are both valid concerns, as teachers must be

careful not to accidentally expose their students to inappropriate or simply unproductive

content. Many school already have policies and firewalls in place for these reasons, and

teachers should familiarize themselves with these policies and procedures to help them

integrate technology effectively and ethically.

Technology Self-Efficacy

While practical professional development is an important factor in how

effectively teachers integrate technology into the classroom, teacher beliefs about

technology also have a strong influence on their use of technology. Saudelli and Ciampa

(2016) studied the effect of teacher self-efficacy on their adoption of classroom

technologies. They proposed that teacher beliefs about the functionality of technology

and their own capabilities in using technology influenced their attitudes toward

incorporating technology into their teaching. Through a case study of three teachers

considering the role of TPACK in effective technology integration, these researchers

found that the teacher participant with the least technical knowledge but the most

pedagogical and content knowledge most fully embraced technology in the classroom. In

general, the teachers with the most positive beliefs about technology rather than the most

experience with it were able to integrate the technology must effectively. While this case

study was of a small sample size, these researchers identified important ideas about how teacher beliefs affect how they integrate technology.

Student Roles in Supporting Technology

For teachers who feel poorly equipped to use technology in the instruction, student knowledge of technology can provide a beneficial support. Zoch et al. (2014) noted that many students are involved in using technology outside of the classroom. When teachers are unfamiliar with technology that students understand, students are often willing to help their teachers learn. Additionally, many students are self-motivated to explore technology on their own rather than learning skills directly from a teacher. In Saudelli and Ciampa's (2016) case study involving integrating iPads into the classroom, one teacher noted that she overcame her limited knowledge of technology by embracing her students' knowledge and skills. Noting that many of her students knew more about technology than she did, this teacher approached technology by asking her students what they knew about iPads, inviting them to demonstrate their technological skills, and continually asking for student assistance. In this process, the teacher noted that Vygotsky's zone of proximal development had been reversed as the students became the advanced peers supporting her.

Technology in the Classroom

The development of technology and new literacies has created a need for teachers to be prepared to integrate technology into the classroom. While examining the concept of new literacies, the need for the integrated framework expressed through TPACK, and the technological preparation of teachers is essential, exploring the practical uses of

technology in the language arts classroom is paramount. To provide an overview to the following discussion, teachers can use digital tools to support students' reading and writing skills through scaffolding; they can also expand literacy experiences to include new types of media and digital processes. However, teachers may be hesitant to implement such practices because of concern that technology may harm rather than help literacy. Current research largely discounts such claims and rather suggests that technology can help struggling readers and writers and give students authentic literacy experiences. While technology can enhance instruction, it does not replace traditional instruction strategies. These views will be discussed in more detail in the following sections.

Technology in Reading Instruction

As e-readers and other digital devices with reading applications have become increasingly common, the media which children use to read have changed. While print texts are certainly still the primary means of reading and instruction in the majority of schools, digital texts have also gained importance inside and outside of the classroom. Overall, these texts host numerous similarities to traditional print texts; however, they also offer new features and tools. Opinions on the differences between digital and traditional texts and how those differences affect students vary, as will be discussed in detail in this section. As an overview, while some researchers contend that reading on digital devices inhibits focused reading and harms literacy, educational research overall supports the idea that digital reading provides valuable scaffolding and enrichment for literacy.

Benefits of digital reading. Despite negative beliefs about reading on digital devices, Union, Union, and Green (2015) found that using e-readers in reading instruction can actually improve standardized test performance. In their study, a third grade class of 16 students at an elementary school in Georgia used Nook e-readers as a key intervention in reading instruction, completing tasks at home and in the classroom which aligned with Common Core State Standards. Students who received the e-reader intervention showed improved mean standardized language arts test scores on the Criterion-Referenced Competency Test while the other 65 students at the school who did not receive the e-reader intervention did not show improved scores. In conclusion, the study found that e-readers, when integrated with effective language arts instruction, may improve language arts performance.

In addition to generalizations about e-readers improving standardized test scores, Union et al. (2015) also explained several advantages of e-readers. Technology engages students, and e-readers are no exception; such engagement can lead to improved comprehension, vocabulary, and overall achievement. Additionally, the portable aspect of e-readers supports collaborative learning, as reading can take place in any place and with any person. Not only are e-readers collaborative, but they also allow students to personalize their reading experience by allowing students to make quick digital annotations. Finally, the study also found that the use of e-readers motivated students to complete assignments using their technology skills.

E-readers can not only improve overall language arts performance, but can also provide valuable scaffolding for struggling readers. Union et al. (2015) noted that

students can look up words that they do not understand to improve vocabulary and

highlight important portions of the text to improve comprehension. McKenna (2014) also

explained that e-readers provide valuable scaffolding beyond conventional glossaries

which can help students to read material which they otherwise could not have read on

their own, including increased text sizes for visually impaired students and audio

pronunciations for English language learners. These text supports can ultimately help

struggling students to see themselves as readers. In a study by Saudelli and Ciampa

(2013), one teacher observed that a student with an individualized education plan for

language arts who typically struggled with reading comprehension was more comfortable

when using an iPad to read; as a result, he gained confidence to improve his reading

ability. This study also noted that using e-readers makes it easier to differentiate reading

without drawing attention to differences between children. That is, when all students are

reading on an e-readers, it is more difficult for other students to tell which students are on

higher or lower reading level. This can help all students gain confidence in reading

without embarrassment concerning the level of material they are reading.

The benefits of digital reading does not imply that teachers should replace their

classroom libraries of print books with a set of e-readers; however, teachers can introduce

e-readers into their classroom in additional to print books. E-reading applications are

available for computers, laptops, and tablets which many schools already possess. Many

e-books are available for free, but teacher can also talk to their school librarians or apply

for grants to purchase e-books. While not all schools have the resources to allow all

student to read through digital means simultaneously, teachers might consider rotating

which students use e-readers, using e-readers during guided reading centers, or having

students read digitally in small groups.

     Potential drawbacks of digital reading. Despite the growing potential of new

literacies in the classroom, numerous researchers contend that reading on digital devices

does not enhance literacy, but rather detracts from it. Many researchers suggest that

digital devices prevent children from paying close attention to reading and encourage

skimming habits. While some of this research represents obstacles that teachers must

overcome when using digital reading tools in the classroom, these obstacles do not

completely discount the benefits of using technology to enhance reading skills.

     Negative views of digital reading often focus on how reading on digital devices

result in less deep reading. On this topic, Tufts University professor Maryanne Wolf

observed that when children read on digital devices, the numerous distractions and

multiple stimuli that fight for their attention inhibit reading for deep comprehension (as

cited in Richardson, 2014). She contends that reading on digital screens encourages

reading for speed rather than understanding, while reading print texts can help children

stay in a mindset of reading slowly for meaning. While such a downfall might be more

significant when reading on devices connected to the internet such as iPads or other

tablets, she suggests that reading on devices that simply emulate books, such as Kindles,

can also have such effects. Wolf notes, however, that preliminary research has shown

fifth grade students who already have strong reading skills show little difference in

reading comprehension when reading digital or print texts; additionally, she agrees that

future technological applications could be developed to help students develop reading

skills in a targeted manner.

Similarly, Baron (2015) argued that reading on a screen encourages searching and

skimming strategies which emulate web browsing habits, resulting in surface-level

reading. Digital devices allow the reader to rapidly turn from page to page within a text

and to multitask by looking at other websites or applications. Such capabilities may

discourage reading linearly and continuously. Further, many students grow used to

browsing the internet by skimming pages in only a few seconds. When using digital

devices to read longer texts, students often mirror these same skimming strategies. Baron

(2015), therefore, argued that while digital devices may be sufficient for reading short

texts, they may not be ideal for longer texts.

Going beyond the idea that digital reading harms conventional literacy,

Cavanaugh, Giapponi, and Golden (2015) considered that the reading on digital devices

is so different from reading traditional books that the two are opposing activities. While

these researchers observed that reading on digital devices can harm deep reading, they

also noted that digital reading helps children to develop other skills, especially visual and

multitasking skills. In response to these researchers' study and claim that digital and

traditional reading oppose one another, Williams-Pierce (2016) proposed that reading

linearly, whether on a digital device or book, belongs in one category while less linear

reading activities, such as social media and games, belong in another. This conclusion

alternatively proposes that while reading text on social media and video games may

indeed be surface-level and non-linear, children can distinguish when they need to read a text linearly and can use deep reading skills in those scenarios.

In response to research proposing that reading on digital devices inhibits deep reading, teachers should recognize that teaching reading comprehension strategies and skills for deep reading is vital, whether through a digital or print platform. Additionally, teachers should not solely rely on digital sources for reading, as students must first be familiar with print concepts that encourage slow, careful reading so that they can transfer those strategies to digital media. Finally, while external hyperlinks and content can be useful, teachers should be careful to monitor their students and disable distracting features when possible in order to prevent distracted reading.

Writing Instruction

Just as digital reading has grown in prevalence inside and outside of schools, so has digital writing. Pencil and paper writing is becoming increasingly less common than typing on laptops, tablets, and other mobile devices, especially in upper grades. Although teachers must still take time to teach their students handwriting and other print skills, they now must also take time to teach them about keyboarding and word processing programs. The following sections will discuss how writing using technology allows students to express ideas with supports and tools that are not as easily available through print writing. However, just as some researchers are skeptical about digital reading, some researchers propose that digital writing can harm writing skills. On the contrary, digital writing provides important scaffolding for students and leads to a more authentic writing process, all of which will be discussed in more detail in the subsequent sections.

Benefits of digital writing. Using technology throughout writing instruction can help create a more realistic writing process for students. Unfortunately, many teachers only use technology for classroom writing in order to put writing pieces in a final form (Zoch et al., 2014). Rather than taking this approach, teachers can use technology such as word processing programs on laptops, computers, or even tablets to enhance the writing process by allowing students to write digitally regularly throughout the writing process. Writing digitally can promote a deeper writing process which includes planning, revising, and editing. (McKenna, 2014). When typing digitally, students can more easily revise their writing pieces by cutting and pasting portions of their writing. Additionally, they can quickly access editing features such as dictionaries and thesauri. When students are able to focus more on this writing process and less on conventions such as handwriting, they follow a less linear writing process similar to that of real authors (Zoch et al., 2014). That is, students may write, revise, and edit simultaneously rather than in separate stages. This is not to say that students should never pursue the writing process with a pencil and paper; however, digital writing can help improve students' overall writing ability.

Not only does digital writing foster a more authentic writing process, but it can also allow students to write for a more realistic audience (Morrison & Wilcox, 2013). For example, students can write formal emails to real companies, informal emails to e-pen pals in other classes, or participate in interactive classroom blogs or wikis. Teachers can capitalize on numerous opportunities to provide students with real audiences to write to through digital media which can promote engagement in writing.

Beyond providing general advantages for students in writing, digital devices can also help students with autism spectrum disorder become more successful writers. In a study about supporting children with autism spectrum disorder in writing using technology, Asaro-Saddler, Knox, Meredith, and Akhmedjanova (2015) explained that children with autism spectrum disorder often struggle with fine motor skills which corresponds with poor handwriting. Partnered with the cognitive demand of organizing and presenting thoughts, these difficulties lead many children with autism spectrum disorder to hesitate toward writing long pieces. To aid these students, this team of researchers suggests using digital devices for writing. Typing relieves the cognitive and physical stress of forming letters, allowing students to focus on content rather than writing letters (Asaro-Saddler et al., 2015). Shifting the focus of writing in this way can support struggling writers by providing a bridge for them to work on the content of their writing apart from the physical stress of print writing. Teachers might consider providing autistic and other struggling students with laptops as a regular support during writing instruction. However, Mangen (2016) cautioned against completely ignoring handwriting and the development of such fine motor skills; teachers should include both handwriting and keyboarding in writing instruction for all students and place importance on both.

To best integrate writing with technology, it is important to maintain effective writing instruction. Technology itself must not become the focus of instruction; rather, it should be used as a tool to support and enhance writing. In a study outlining best practices for integrating technology and writing, Coskie and Hornoff (2013) explained that teachers should embed technology into quality writing instruction. Teachers can

integrate technology into traditionally accepted writing practices. For example, teachers

can implement digital or e-portfolios of student writing in place of printed portfolios,

providing an interactive experience through blogs which has been proven to improve

student achievement (Cox, 2013).

Coskie and Hornoff (2013) also noted that teachers should take time to teach their

students technology skills. This does not imply that technology is more important than

writing; rather, it maintains that writing skills are of principal importance, so difficulties

with technology should not be allowed to overwhelm instruction. Teachers can provide

students with mini-lessons in technology skills, such as word processing and

keyboarding, so that they can focus on the writing process while using technology as a

support during instructional time.

Potential drawbacks of digital writing. Just as there are numerous negative

arguments about e-readers, there are also many negative arguments about digital writing.

One common concern is that the use of social media may harm conventional writing

proficiency (McKenna, 2014). Because writing on social platforms often involves brief

status updates and comments that lack traditional grammar, some have proposed that

such habits may carry over into all digital writing and even print writing. Many similarly

worry that texting may harm spelling skills. This concern relates to the prevalence of

abbreviated spellings used in texting and other social media conversations.

In response to these concerns, a principle similar to Williams-Pierce's (2016)

principle that linear and nonlinear reading are separate activitiess can be applied. Though

students may write briefly when using social media, they can distinguish between formal

and informal writing with prompting from teachers. Additionally, teachers can use the

brief nature of social media writing to teach students about expressing their ideas

concisely. For example, teachers might assign students to summarize a story in a status-

update sized writing piece. In response to concerns regarding spelling, Trubek (2012)

asserts that there is no proven negative correlation between texting and spelling. On the

contrary, Trubek found that texting develops phonological awareness and helps improve

reading skills. Students must have a working knowledge of phonology to abbreviate

words, and teachers can capitalize on this to increase phonological awareness.

Conclusion

Just as technology has become an integral part of society, it is also becoming an

integral part of the classroom. Technology has paved the way for traditional literacy to be

augmented by new literacies. These new literacies do not do away with traditional

methods and skills, but rather enrich them. Teachers should take advantage of the

opportunity to engage students in new literacies and use technological pedagogy to

enhance the literacy experience. Though this requires meaningful teacher preparation,

such preparation is vital for using technology to expand literacy in the classroom. With

the use of e-readers and digital writing programs, teachers can improve traditional

literacy and foster new literacies without replacing traditional print texts and instructional

strategies. Teachers should see technology as not just a replacement for paper, but a

world of new opportunities.

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