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Perceptions and Preferences of Digital and Printed Text and Their Role in Predicting Digital Literacy

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Abstract

This study explored the relationships between the reading of digital versus printed text among 1,206 South Korean high school students in grades 9 through 12. The *Test of Silent Contextual Reading Fluency* (2nd ed.), the *Digital Propensity Index*, and the *Reading Observation Scale* were among the instruments used to measure reading proficiency and digital propensity. Statistical analysis was comprised of a paired sample *t* test to compare students' reading perceptions of digital and printed text; independent sample *t* tests were used to explore reading preferences and the relationships between digital and printed text; and a multiple linear regression was used to explore digital propensity based on reading behaviors. Among the results, students were found to have higher positive perceptions of the reading of printed text; reading preference depended on the purpose for reading (e.g., learning versus entertainment); and significant mean differences were found among students' reading scores and digital propensity regarding preferences between the reading of digital and printed text. Although much more research is needed before any definitive conclusions can be drawn, the findings suggest several ways to achieve student literacy competency in the use of digital and printed text, while also pointing to additional factors that influence perceptions and behaviors among these two formats.

Keywords: digital literacy, digital propensity, digital text, perceptions, preferences, predictors, printed text, reading behaviors, reading observation

1. Introduction

Generally and historically, literacy has been viewed, to varying degrees, as: the prerequisite for meaningful inclusion in the advancement of society; a tool in the acquisition of knowledge; the manner in which things are expressed; and a means of public association, civil engagement, and critical decision making (Hilton, 2013; Ntiri, 2009). In recent years, technology has had a significant impact on literacy and the dissemination of information, with ongoing advancements concomitantly altering the field of literacy (Chen, Hwang, & Tsai, 2014; Chu, 2014). In essence, these advancements have changed the way we read, write, attain, act on, use, evaluate, and produce information, not to mention the manner in which we engage in society and socially interact and communicate (Coiro, Knobel, Lankshear, & Leu, 2008; Harnad, 1991; Warschauer & Matuchniak, 2010).

It should not come as a surprise, therefore, that research focused on digital literacy has been steadily increasing in recent years (Goldstein, 2007; Harper & Dunkerly, 2009; Harper, Bean, & Dunkerly, 2010). For example, research on digital literacy implementation in the classroom setting has revealed possible benefits for both students with and without disabilities (Carretti, Caldarola, Tencati, & Cornoldi, 2013; Seok, DaCosta, & Yu, 2015), to include students with English language deficiencies (Hsu, 2013; Hwang & Chen, 2013).

Although this increased interest is promising, several areas of digital literacy are in need of study, such as literacy implementation practices in traditional literacy instruction, that can be leveraged to help guide educators, practitioners, researchers, and policymakers (Burnett, 2014; Collier, Foley, Moguel, & Barnard, 2013; Goodfellow, 2011), in particular, those involved at the secondary level, in applying digital practices in the classroom (Avila & Pandya, 2013; Hilton & Canciello, 2015). For example, there is a lack of research comparing preferences between digital and printed text in the context of youths' propensity towards digital literacy along with their conventional reading levels (Clark, 2012).

This void in the literature is unfortunate, because research focused on the relationship between digital and traditional literacy is extremely important at this point in time, particularly given that 21st-century skills represent a turning point from those of traditional literacy (Mihailidis & Thevenin, 2013). This line of research is also important because it has been proposed that new classroom practices are needed to support today's learners, who are said to demonstrate different learning characteristics as a result of exposure to and experience with technology (Nasah, DaCosta, Kinsell, & Seok, 2010; Thinyane, 2010).

1.1 Purpose of the Research

Given the importance of research focused on the relationship between digital and traditional literacy, the purpose of the current research was to (a) explore youths' reading perceptions of digital and printed text, (b) examine their preferences between the reading of digital and printed text, (c) investigate relationships between the reading of digital and printed text, and (d) identify predictors of digital propensity based on reading behaviors. It is anticipated that the results of this study will help guide educators, practitioners, researchers, and policymakers in applying digital practices in the classroom.

2. Literature Review

Researchers have defined digital literacy based on their academic stance (e.g., Martin, 2008; McKenna, Conradi, Lawrence, Jang, & Meyer, 2012). Although definitions have varied, they share a focus on competence in building knowledge and communication with others using digital technologies. Along with these definitions, the Common Core State Standards Initiative (2010) also emphasizes the importance of meaningful classroom experiences to enhance students' ability to integrate and evaluate information as well as their efficacy of communicating using technology in the curriculum. Combined, current definitions of digital literacy and the Common Core State Standards stress the importance of being able to research, evaluate, and synthesize information from digital resources (Coiro & Putman, 2014; Miller, 2014).

2.1 Studies on Perception toward Digital and Traditional Literacies

However, digital literacy goes beyond student competence and classroom integration. How students perceive their own competence is believed to have an effect on their behaviors, attitudes, and beliefs toward associated work (e.g., Henk & Melnick, 1995; Valentine, DuBois, & Cooper, 2004; Wigfield & Karpathian, 1991). Further, the construction of self-perception of competence involves the collective experiences of prior achievement (e.g., Bong & Skaalvik, 2003). This is important because positive self-perception enhances confidence in one's performance level and fosters motivation to participate in related tasks. This is in contrast to negative self-perception, which tends to undermine opportunities to maximize one's individual growth and, worse yet, acts as a deterrent in motivation to perform a given task successfully (e.g., Chen & Hoshower, 2003; Kim, 2013).

An increasing number of studies have compared perceptions toward digital and traditional literacies, in particular, relationships between reading habits of digital and printed text. Findings to date have identified both differences and similarities between the two formats. For example, Eden and Eshet-Alkalai (2013) examined the reading ability of 93 students in postsecondary education, comparing students' active reading abilities between digital and printed formats. No significant differences were found in readers' average scores on the two formats. However, participants who read the digital format finished their assignments faster and with performance levels that were no worse than those who read the printed format. Stonier (2012) conducted a mixed-methods study in which 100 preservice teachers received a semester of training in digital literacy implementation in K-12 classes. The results indicated that teachers' perceptions increased and were positive toward digital literacy, integrative texts, and the use of tools. More important, these perceptions were retained. That is, the teachers continued to strongly believe that digital text increased reading comprehension.

In another study, Schmidt (2010) surveyed faculty perceptions of students' digital literacy using 56 items. The faculty responded that their students reached a level of proficiency regarding literacy of digital media, perceiving that their students were competent in the use of media access, followed by aptitude in mediated message communication and media analysis. Finally, based on semi-structured interviews with 74 secondary-level students, Kolikant (2010) found that 76% of their sample were in favor of Internet use for reading, describing it as "easy," "interesting," and "fun," whereas they perceived traditional books as "irksome," "unpleasant," and "more work." Additionally, 84% of the interviewees reported that they used the Internet to find materials and initial ideas and to brainstorm respective topics when completing their assignments, and before reverting to traditional books as resources.

2.2 Studies on Reading Comprehension Comparing Digital and Printed Text

In another line of research, studies have compared the results of reading comprehension tests between digital and

printed text, but with mixed results. For example, Sheehy (2007) investigated the outcome of a media literacy implementation plan for the *Florida Comprehensive Assessment Test* (FCAT) at an urban high school in Central Florida. Results indicated that the digital curriculum had a significant, positive impact on students' learning outcomes. Specifically, students who received the digital literacy intervention had higher means on their reading test scores. In contrast, Durwin and Sherman (2008) argued that there was no statistically significant difference in reading comprehension between digital and printed text on the same subject matter at the postsecondary level. Similarly, Beach (2009) found no significant statistical differences in reading comprehension of digital and printed text regardless of sentence length and medium of text. Taylor (2011), on the other hand, showed that digital and printed text were equally effective for students' learning outcomes, arguing that the complexity of the material, interaction with the different formats, and extended memory retention did not make a difference on reading comprehension scores. Finally, Johnson (2013) also reported no statistically significant differences between and within groups, including gender, using digital and printed text.

3. Method

3.1 Setting

The study was conducted in 2014 at seven public high schools in the area surrounding Seoul, South Korea. The schools were chosen because they focused on college entrance examination, placed a strong emphasis on the use of English in their curricula, and have graduated a large percentage of students accepted to prestigious universities.

3.2 Participants

A total of 1,206 students in grades 9 through 12 participated in the study. As shown in Table 1, the majority of students had a reading grade point of 70 and higher (based on a 100-point scale).

Table 1. Student demographics

Items		Freq. (%)
Age	18 and older	807 (66.9%)
	17	374 (31.0%)
	16 and younger	25 (2.1%)
Gender	Male	821 (68.1%)
	Female	385 (31.9%)
Family's Annual Gross Income (in USD):	Under $20,000	75 (6.2%)
	$20,000-$39,000	351 (29.1%)
	$40,000-$59,000	406 (33.7%)
	$60,000-$99,000	247 (20.5%)
	More than $100,000	127 (10.5%)
Grade Level	9th	6 (0.5%)
	10th	172 (14.3%)
	11th	899 (74.5%)
	12th	129 (10.7%)
Reading Grade Point	90-100	256 (21.2%)
	80-89	300 (24.9%)
	70-79	254 (21.1%)
	60-69	193 (16.0%)
	50-59	119 (9.9%)
	49 and under	84 (7.0%)

3.3 Materials

Instruments comprised the *Test of Silent Contextual Reading Fluency* (2nd ed.) (TOSCRF; Hammill, Wiederholt, & Allen, 2006), the *Digital Propensity Index* (DPI; Nasah et al., 2010), the *Reading Observation Scale* (ROS;

Wiederholt, Hammill, & Brown, 2009), and a survey consisting of items designed to compare and analyze students' preferences for digital or printed text. Demographic information was also collected. These instruments were chosen based on their validity and reliability in measuring reading proficiency, digital propensity, and preferences toward the reading of digital and printed text.

3.3.1 Test of Silent Contextual Reading Fluency

The TOSCRF assesses the silent general reading ability of students. Specifically, it measures the rate with which readers can identify distinct words found within a set of texts that increase in difficulty with regard to meaning and syntax (e.g., AYELLOWANDBLUEBIRDSATONMOTHERSPRETTYHAT). Readers are given approximately 10 minutes to draw lines between as many words as they can (e.g., A|YELLOW|AND|BLUE|BIRD|SAT|ON|MOTHERS|PRETTY|HAT). Scoring is based on word count in lines as well as summing all the words.

3.3.2 Digital Propensity Index

The DPI measures how often people use information and communication technology in their everyday lives. Nasah at al. (2010) reported that the DPI was found to be reliable during two pilot studies, with a Cronbach's alpha of .858 and .885. The DPI used in the current study was updated to reflect technology not available at the time the index was conceived, to include the use of blogs; downloading, sharing, and streaming of media; email; instant messaging; online shopping; smartphones and texting; gaming; and social media. This updated version of the DPI was found to be trustworthy with a Cronbach's alpha of .853.

Not all the items in the index were used in this study. Instead 13 items were selected that examined technologies believed most applicable in the context of reading and digital activities for the secondary students. Items were depicted in Likert scale, where 1 indicated the least use and 5, the most.

3.3.3 Reading Observation Scale

The ROS is a teacher rating scale that examines reading behaviors, originally designed for teachers to rate their perceptions of their students' reading of printed text. In the context of the present study, the ROS was adapted for students to rate their own perceptions toward the reading of digital and printed text. Items were depicted in Likert scale, where 1 indicated strongly disagree and 5, strongly agree.

3.3.4 Survey

A survey was also used, designed specifically to compare and analyze students' preferences for digital or printed text. Items were derived from a comprehensive research synthesis concentrating on the measure of digital and printed material. Demographic information was also collected, to include age, gender, family income, and academics.

3.4 Procedure

The principal investigator (PI) met with the principals, vice principals, and a research teacher at each of the participating schools to discuss the research, establish protocols, and obtain necessary permissions. The PI, a homeroom teacher, and an English teacher from each of the schools administered the paper-and-pencil instruments to students in their respective classrooms.

While the TOSCRF was comprised of and administered as its own instrument, the DPI, ROS, and survey (with demographic items) were administered as a single questionnaire represented as four respective parts.

3.5 Ethical Clearance and Informed Consent

Letters of ethical clearance and informed consent were sent to the schools. Each school willingly agreed to participate in the research. Furthermore, informed letters of consent were sent to parents and students, and consent was obtained before students could participate.

4. Results

The findings are reported in the order of the aims of the current research.

4.1 Youths' Reading Perceptions of Digital and Printed Text

Table 2 shows the results of the comparison of each paired item between digital and printed text using the ROS. As illustrated, students held higher positive perceptions toward the printed format, except for the following six items: "I can understand charts and graphs" (printed text, $M = 3.78$, $SD = .84$; digital text, $M = 3.83$, $SD = .85$); "I can read assignments in a timely fashion" (printed text, $M = 3.69$, $SD = .84$; digital text, $M = 3.69$, $SD = .83$); "I can proofread and edit my own writing" (printed text, $M = 3.66$, $SD = .87$; digital text, $M = 3.70$, $SD = .87$); "I

can demonstrate a rich word reading vocabulary" (printed and digital text, M = 3.37, SD = .91); "I can understand the vocabulary of age-appropriate passages" (printed text, M = 3.94, SD = .85; digital text, M = 3.94, SD = .86); and "I can read novels, short stories, magazine articles, and computer-generated material" (printed text, M = 3.92, SD = .81; digital text, M = 3.92, SD = .82).

Table 2. Students' perceptions toward the reading of digital and printed text as measured by ROS

Items		Paired Samples Statistics			
		Mean		SD	
		Print	Digital	Print	Digital
Pair 1	I can retell read materials correctly	3.68	3.60	.83883	.86256
Pair 2	I can easily discuss what has been read	3.63	3.56	.81629	.81312
Pair 3	I can ask appropriate questions about what is read	3.70	3.63	.80853	.80897
Pair 4	I can relate what is read to other events	3.60	3.55	.82901	.82130
Pair 5	I can summarize what the author has written	3.60	3.52	.84069	.82947
Pair 6	I can read at an appropriate rate for comprehension	3.61	3.60	.83687	.82603
Pair 7	I can understand charts and graphs	3.78	3.83	.83815	.85011
Pair 8	I can read orally with appropriate intonation and affect	3.81	3.70	.92038	.91775
Pair 9	I can understand the written directions of reading assignments	3.74	3.71	.82255	.81076
Pair 10	I can read assignments in a timely fashion	3.69	3.69	.84485	.83275
Pair 11	I can read and understand questions on exams	3.83	3.63	.84488	.85668
Pair 12	I can proofread and edit my own writing	3.66	3.70	.87186	.86506
Pair 13	I can associate prior knowledge to text	3.79	3.76	.78945	.80464
Pair 14	I can get the main ideas in reading	3.72	3.62	.81216	.82560
Pair 15	I can draw inferences from context	3.66	3.57	.83669	.80458
Pair 16	I can demonstrate a rich word reading vocabulary	3.37	3.37	.91488	.90919
Pair 17	I can understand the vocabulary of age-appropriate passages	3.94	3.94	.85227	.85849
Pair 18	I can skim assigned materials quickly	3.55	3.49	.83403	.81246
Pair 19	I can read silently with minimal breaks in attention	3.81	3.72	.90096	.92140
Pair 20	I can read text-based school subject matter	3.79	3.71	.81244	.80969
Pair 21	I can read orally in a smooth and error-free manner	3.55	3.49	.92310	.90613
Pair 22	I can understand age/grade-appropriate subject matter and content	3.79	3.78	.80541	.82575
Pair 23	I can answer questions about material read	3.72	3.67	.78785	.77334
Pair 24	I can read novels, short stories, magazine articles, and computer-generated material	3.92	3.92	.81396	.81573
Pair 25	I can reread to clarify meaning	3.91	3.82	.89474	.93905

4.2 Youths' Preferences between the Reading of Digital and Printed Text

A total of 46% (n = 555) of the students reported that they enjoyed reading digital text compared to 54% (n = 651) who enjoyed print. Table 3 shows the preferences between digital and printed text in the context of reading. As illustrated, students preferred digital text when reading for entertainment, reading selectively with certain content, and skimming for information. Conversely, they preferred reading printed text for learning, comprehension of information, and long periods requiring focus.

Only the students who responded "yes" to the item "I enjoy reading digital text more than printed text" also responded to the item "What elements of the Internet- or computer-based learning activities make reading more enjoyable?" These findings revealed that the following elements – pictures (46.5%, n = 258), interacting with others (16.2%, n = 90), hyperlinking to other/additional content (15.5%, n = 86), nonlinear reading (14.6%, n = 81), and content presented in an auditory format (7.2%, n = 40) – were viewed as enjoyable.

Moreover, the students surfed the Internet for fun (26.8%, n = 323), citing video game play (24.5%, n = 295); watching videos, movies, and/or television (14.8%, n = 179); reading (11.9%, n = 143); listening to music (4.6%,

n = 55); social media (3.1%, *n* = 37); writing (e.g., blogging; 2.4%, *n* = 29); speaking on a mobile phone (1.7%, *n* = 21); and posting videos and/or movies, and email (< 1%, *n* = 3) as the most common types of entertainment. Students also reported using the Internet to complete school assignments (5.8%, *n* = 70) as well as engage in other (unspecified) activities (4%, *n* = 48).

Table 3. Students' preferences between digital and printed text

	Freq. (%)	
Items	Print	Digital
When reading for entertainment purposes, I mostly read	282 (23.4%)	924 (76.6%)
When reading for learning purposes, I mostly read	923 (76.5%)	283 (23.5%)
I better comprehend information, when reading	803 (66.6%)	403 (33.4%)
I am more selective with certain content, when reading	497 (41.2%)	709 (58.8%)
I skim for information (non-linear), when reading	395 (32.8%)	811 (67.2%)
I am able to keep focus and read for longer periods of time, when reading	778 (64.5%)	428 (35.5%)

4.3 Relationships between the Reading of Digital and Printed Text

To examine the relationships between digital and printed reading, the sample was divided into two groups – students who preferred reading digital text and students who preferred reading print. This distinction was derived from the item "I enjoy reading digital text more than printed text." An independent-samples *t* test comparing the DPI mean scores between the groups revealed a significant difference, $t(697) = 3.860$, $p<.01$. The mean of the digital text group was significantly higher ($M = 40.71$, $SD = 7.74$; $n = 253$) than that of the printed text group ($M = 38.41$, $SD = 7.44$; $n = 446$). An independent-samples *t* test comparing the mean TOSCRF scores of the groups also showed a significant difference, $t(697) = 4.14$, $p<.01$. The mean TOSCRF scores of the students who preferred printed text ($M = 96.83$, $SD = 85.82$; $n = 446$) were higher than those who preferred digital ($M = 71.26$, $SD = 63.38$; $n = 253$).

4.4 Predictors of Digital Propensity Based on Reading Behaviors

A multiple linear regression was calculated to determine the predictors of digital propensity based on reading behavior, which were measured by the ROS and the DPI. A significant regression equation was found, $F(58,1147) = 2.629$, $p<.001$, with an R^2 of .117 and a confidence interval of 99.9%.

Among the independent variables, the following items were significant positive predictors of digital propensity, with a confidence interval of 95%: "I can understand charts and graphs" (digital text, $\beta = .181$, $p<.01$); "I can draw inferences from context" (printed text, $\beta = .195$, $p<.01$); and "I am able to keep focus and read for longer periods of time when reading" (printed text, $\beta = .077$, $p<.05$).

The items that were significant negative predictors of digital propensity, with a confidence interval of 95%, included "I can understand charts and graphs" (printed text, $\beta = -.120$, $p<.05$); "I can proofread and edit my own writing" (printed text, $\beta = -.101$, $p<.05$); and "I can get the main ideas in reading" (printed text, $\beta = -.141$, $p<.05$).

5. Discussion

In this investigation of the perceptions, preferences, and relationships between the reading of digital and printed text, results from a paired-sample *t* test of youths' perceptions toward these two formats showed that the mean of the printed text was statistically higher than that of its digital counterpart. This finding is not aligned with existing research, such as that of Kolikant (2010), who reported the students in the sample favored reading digital text. This difference might be explained by McKenna et al. (2012), who contended that perceptions of recreational versus academic reading of digital text may differ based on reading purposes and formats. If this is the case, educators, practitioners, and researchers may wish to take this into consideration when leveraging reading techniques presented in digital and printed form, as some formats may be perceived more academic than others. In the current study, for example, students preferred digital text when reading for entertainment, selectively reading certain content, and skimming for information; conversely, they favored reading printed text for learning, comprehension of information, and when long periods of time were required for focus.

Based on these findings, we are not suggesting that teachers refrain from implementing technology into their

instruction to enhance learning outcomes (Angeli & Valanides, 2009; Mishra & Koehler, 2006), especially in social, cognitive, and technical dimensions, to the extent that students feel motivated in both digital and printed text formats. Rather, we are cautioning that teachers may face challenges. That is, printed text may not be viewed as an effective pedagogy for promoting digital literacy because this format hardly catches the non-purported cognitive, social, and technical dimensions of digital literacy practices (Mills, 2010) in classrooms. Consequently, it has been proposed that future investigations focus on how teachers practice and integrate digital technologies (Hutchison & Reinking, 2011).

In addition, in the current study, students had higher positive perceptions toward digital text regarding their understanding of charts and graphs and when proofreading and editing their writing. In addition, the mean of the students' perceptions of digital and printed text was the same on the item "I can read assignments in a timely fashion." This finding adds support to the results reported by Eden and Eshet-Alkalai (2013), that digital readers complete their assignments faster. Given this, we recommend that when students are involved in editing and proofreading, teachers implement digital technology in their instruction, which could include, for example, the track changes feature found in Microsoft Word, and the use of similar tools and features.

The results of the independent-samples *t* test comparing the DPI mean scores of the digital and printed text groups were statistically significant and, thus, consistent with studies examining perception. Students who preferred and held higher positive perceptions toward the reading of digital text demonstrated greater digital propensity, reinforcing the findings of Burgess, Price, and Caverly (2012), that frequent access to digital technology leads to knowledge and skill of digital literacy and that such literacy may be enhanced through education and training.

The independent-samples *t* test, comparing the mean scores on the TOSCRF of the digital and printed text groups, also showed significant differences. Thus, the mean TOSCRF of students who preferred printed text was significantly higher than those who preferred the digital format. These findings are a departure from the literature, to include Durwin and Sherman (2008) and Beach (2009), who reported no such statistical differences. This difference may be explained by the fact that these researchers used samples with similar propensity between the groups, whereas in the present study, the groups were distributed based on reading preference for either digital or printed text, thus underscoring that perception or propensity may be a strong element of learning (e.g., Bong & Skaalvik, 2003; Henk & Melnick, 1995; Valentine et al., 2004; Wigfield & Karpathian, 1991). Finally, the findings presented here are in line with those of Johnson (2013), who concluded that experience is a crucial factor in learning, specifically with regard to digital literacy. In other words, students' skills, knowledge, and use of digitally based technology can be viewed as a matter of digital literacy or access, which can be improved through education and training.

To explore the predictors of digital propensity, a multiple linear regression was conducted. The results were statistically significant. The strongest positive predictors were as follows: "I can understand charts and graphs" (digital text), "I can draw inferences from context" (printed text), and "I am able to keep focus and read for longer periods of time when reading" (printed text). The items "I can draw inferences from context" and "I am able to keep focus and read for longer periods of time when reading" can be said to be related to the cognitive dimension of digital and traditional literacy. The item "I can draw inferences from context" is an interesting predictor, in that it was taken from the observation scale, which is more related to printed text. Yet, it is a strong predictor of digital literacy because drawing inferences involves the ability to search, evaluate, and synthesize information. Both items echo the idea that the attention shift from linear to nonlinear reading might impose an intense cognitive load – a finding that is aligned with existing studies (e.g., Ackerman & Goldsmith, 2011; Bigot & Rouet, 2007). Although more research is needed, we put forth that cognition is a significant factor in reading, regardless of format.

All in all, while these findings are promising, caution should be exercised when generalizing the results, given the sample. Namely, although English was the students' second language, the TOSCRF was used, which is in English. Hence the decision to sample from schools that stressed the use of English in their curricula, and whose students had higher grade points in English than other schools in the area. As a consequence, future study warrants the use of other student populations, to include those attending vocational institutions.

6. Conclusion

Attempts to define literacy have proven difficult because literacy is in a continuous state of transformation. This is especially the case when viewed from sociocultural contexts. This has, in part, led to redefining adolescents' learning characteristics in the digital information age and investigations into identifying pedagogical changes in instruction. To arrive at possible instructional solutions, some researchers have advocated for studies comparing

adolescents' behaviors and perceptions of digital and printed text along with their current performance level in digital literacy and predictors.

The present study attempted to answer this call. Although much more research is needed, the findings suggest several ways to achieve student literacy competency in digital and print text, while pointing to additional factors that influence perceptions and behaviors between these two formats.

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