The Relationship between Display Medium, Comprehension, and Reading Fluency

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Background

- Due to its complex nature, researchers have attempted for decades to determine how to best assess reading comprehension. As a result, assessments are often plagued by unreliability due to a number of factors.
- Due to the abundance of issues with the assessment of reading comprehension, additional measures including oral reading fluency are often sought. Reading fluency is commonly defined as a combination of reading accurately at a normal pace, with proper prosody.
- Although the relationship between reading fluency and comprehension is strong, it is also complex and not considered to be causal (Rasinski, 2004). Despite this understanding, many LEAs have adopted singular measures of fluency (DIBELS) as a means of determining reading proficiency.
- This can lead to instruction that is fluency-centric which divorces the purpose of reading from the act of reading (Allington, 2009).
- Additionally, many assessments offer a means of digital assessment to aid in test administration and progress monitoring.
- Previous research has focused extensively on investigating the differences between reading comprehension abilities when reading digital text. The general consensus is that there are no major differences between the screen-based and hard-copy-based comprehension levels of relatively young individuals.
- However, a review of the literature revealed no investigation into the effects of text medium on oral reading fluency. This is alarming given that an abundance of schools are using digitally-presented oral reading fluency measures as their primary indicator of reading success.

Methods

Participants:
- 40 healthy, graduate students participated (average age = 21.22 years)
- All participants passed pre-experimental vision screenings

Experimental Procedures:
- Each participant read a total of 12 short stories that were compiled from the Gray Oral Reading Tests – 5th Ed. (GORT-V) and the Gray Silent Reading Tests (GSRT)
  - Six of the stories were read aloud from a computer screen
  - Six of the stories were read aloud from a hard-copy
- Following the oral reading of each story, 5 open-ended comprehension questions were asked regarding the text that was read.

Experimental Measures:
- Measures of reading fluency (words correct per second) were obtained from each reading. The average words per second was calculated from the six readings per condition prior to submission to statistical analyses.
- Following each reading, the comprehension questions that accompanied the text were asked in an open-ended format. Each of the five questions were scored according to the test manuals. Measures of comprehension accuracy across all of the six readings per condition were averaged and then arcsine transformed before submitting to statistical analyses.

Analyses and Results

- In order to investigate mean differences between comprehension and fluency abilities as a function of medium, a series of paired samples t-tests were completed on the fluency and comprehension data.
  - No significant differences were found between the two variables as a function of medium.
- In order to investigate the relationship between fluency and comprehension as a function of medium, a correlations analysis was conducted on the comprehension and fluency data. Significant relationships were found between:
  - hard-copy comprehension and hard-copy fluency $r\,(38) = .46$, $p < .01$
  - hard-copy comprehension and digital comprehension $r\,(38) = .51$, $p < .01$
  - hard-copy comprehension and digital fluency $r\,(38) = .43$, $p < .01$
  - digital fluency and hard-copy fluency $r\,(38) = .93$, $p < .01$
  - No significant relationships were found between digital fluency and digital comprehension or between digital comprehension and hard-copy fluency.

Figure 1. Mean comprehension as a function of display medium.

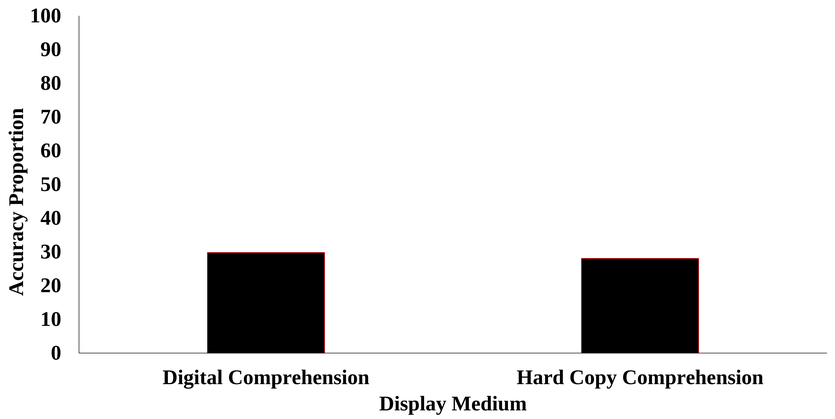
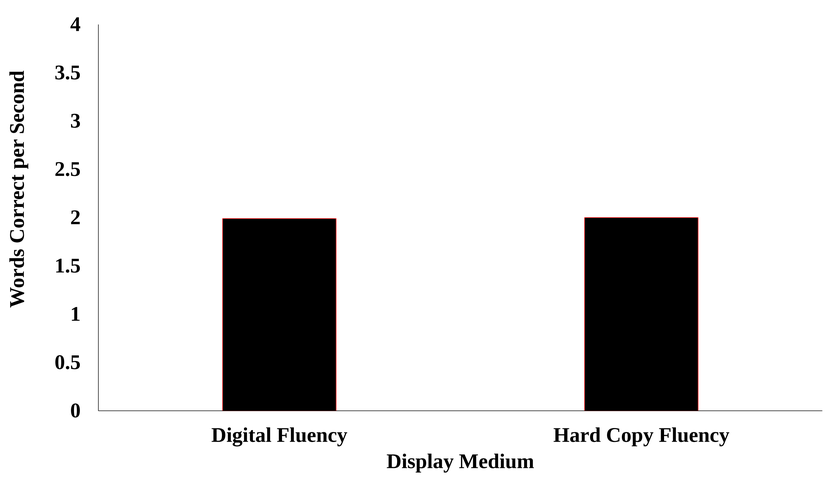


Figure 2. Mean oral reading fluency as a function of display medium.



Correlation Results

	1	2	3	4
Digital comprehension	-			
Hard-copy comprehension	.505*	-		
Digital fluency	.237	.43*	-	
Hard-copy fluency	.103	.46*	.93*	-

Note. $N = 40$. * indicates correlation is significant at the $p < .01$ level, 2-tailed.

Interpretation

- Results indicate that presentation medium during fluency assessment may not have a significant effect on the results. Therefore, if merely trying to isolate fluency abilities, then it is possible that utilizing digital mediums might be an acceptable transformation.
- However, what the current study also indicates is that caution should be utilized if fluency is to be used as a proxy for comprehension. Whereas hard-copy comprehension was related to all experimental measures, digital comprehension was only related to hard-copy comprehension and was unrelated to all measures of fluency. Previous researchers have extended this warning but the current study is the first to extend this additional layer toward the digital medium.
- Mounting evidence supports obtaining multiple measures to appropriately guide considerations regarding reading proficiency. School systems that make academic decisions based heavily upon singular measures of oral reading fluency are at-risk for significantly mis-identifying students which could drastically affect their academic well-being.

Limitations

- The current study utilized individuals who are older than the typical range for obtaining oral reading fluency measures. In addition, results from the current study revealed very low comprehension accuracy percentages.
- Future studies should consider duplicating these experimental procedures with younger participants while using less challenging texts.

Disclosure

No authors had any financial or non-financial conflicts of interest associated with the content of this presentation.