The Correlation between Eye Movement Data and Three Commonly Used Academic Reading Assessments
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Background

Most students develop basic word decoding skills in the early grades, but what plainly distinguishes more competent readers from their less proficient peers is the ability to do so efficiently and with good comprehension. Research has documented an association between reading efficiency and comprehension (e.g., Jenkins, et al., 2003; Rasinski, et al., 2005). This is often ascribed to individual differences in the distribution of cognitive resources between lexical-processing and comprehension. In this view, the ability to decode words and engage in the process of reading with automaticity (i.e., with little conscious effort or attention) serves to free up finite cognitive resources that can instead be devoted to information processing and the construction of meaning (e.g., LaBerge & Samuels, 1974). It follows that reading efficiency, leading to improved comprehension, is an important factor in academic achievement. This research examined the relationship between eye movement measures of reading efficiency and academic achievement in US elementary school students.

Method

The results described here were based on data collected from 292 students in grades 4 (n = 137) and 5 (n = 155), approximately 10 to 12 years old, who participated in a reading efficiency evaluation and completed three academic reading assessments during the spring of the 2015-2016 school year.

Eye Movement Recording

Eye movement recordings were obtained using a low-cost, portable eye movement recording system that uses goggles fitted with infrared emitters and sensors to measure corneal reflections at a sampling rate 60 Hz (Visagraph, Taylor, 2009). Students wore the goggles while reading standardized grade 4 passages from a normed test booklet (Figure 1). Each passage comprised 12 lines of text containing about 120 words. Data from the first and last line were discarded to minimize anomalies while starting and ending a passage. Analyses were based on data from the middle 10 lines, which contained 100 words. Each test passage was followed by a brief comprehension check involving 10 true/false questions.

Figure 1. Student reading text from a normed test booklet while eye movements were recorded using the Visagraph.

Results

There were moderately strong correlations (r > .60) between most measures yielded by the three assessments of academic achievement (Table 1). Only correlations between InSight reading rates and other measures fell just short of this mark. In all cases the correlations were significant (p < .001). As would be expected, the strongest correlations were between summary measures (GRADE Total Test Standard Scores, InSight proficiency) and their sub-components.

Table 1. Relationships between measures included in three assessments of academic achievement. Abbreviations: ELA, English Language Arts; Math; TTSS, Total Test Standard Score; Comp, comprehension; Vocal, vocabulary; Prof, proficiency.

Conclusions

These results show that reading efficiency is significantly related to measures of academic achievement, and are consistent with the view that more efficient reading may contribute to improved academic outcomes. A challenge in evaluating these relationships arises from measurement differences between different academic assessments. Nevertheless, the pattern is clear.

References