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The Relationship between Curriculum-based Measures in Oral Reading Fluency and High-Stakes Tests for Seventh Grade Students

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Abstract

The purpose of this study was to investigate the relationship between oral reading fluency and performance on a statewide reading achievement test for middle grades students. Participants in this study were 75 seventh grade students. One month before the students were administered the state test, each student read three probes from their current basal reader to determine an oral reading fluency rate. The Ohio Grade 7 Reading Test scores were correlated with oral reading fluency rates to determine the extent of the relationship between the results. Results support the use of oral reading fluency assessment as a valid tool for identifying students at risk of not passing the statewide reading achievement test.

Predicting High-Stakes Testing Performance

In an effort to evaluate the effectiveness of instruction, The No Child Left Behind Act of 2001 requires school districts to demonstrate their positive impact on student learning (Ardoin et al., 2004). For example, Ohio students in Grades 3–8 are required to take achievement tests in science, social studies, math, reading, and writing that assess student

learning of the Ohio Academic Content Standards (Ohio Department of Education, 2007). Educators need tools to monitor student progress and make necessary instructional changes for students who are not making sufficient progress or are at risk for not passing statewide achievement tests. This study investigated the relationship between scores on curriculum-based measures (CBM) of oral reading fluency and performance on the Ohio Grade 7 Reading Achievement Test.

Curriculum-based Measurement

Previous research has shown CBM to be a valid method for measuring student reading skills that can be useful for progress monitoring, screening, referrals, and instructional decision making (Madelaine & Wheldall, 1999; Shinn, Knutson, Collins, Good, & Tilly, 1992). Student progress is monitored through frequent CBM administration over weeks, months, or an entire school year to determine if instructional strategies are appropriate and effective.

Students assessed using CBM can use results to set measurable reading goals for themselves; this helps them recognize that their reading success is affected

by the effort they put forth (Davis & Fuchs, 1995). Students can easily monitor or graph their own progress in classrooms using CBM. By reflecting on their own learning processes, students are motivated to set sequential goals that lead to increased academic performance (Shapiro, Durnan, Post, & Levinson, 2002).

CBMs produce quantitative data; they also generate qualitative information. When scoring reading probes, educators can make note of the type of decoding strategies used by the student and can detect error patterns for remediation. Direct observation of students as they complete the probes can also unveil reading processes such as scanning, pacing, and using contexts to make self-corrections (Fuchs, Fuchs, Hosp, & Jenkins 2001). In addition, teachers use the data to monitor the rate of progress and plan effective reading instruction that will lead to higher achievement (Davis & Fuchs, 1995).

Oral Reading Fluency

One of the most common methods for determining oral reading fluency rate is to have students read a passage aloud for one minute and then count and record the number of words read correctly. The time requirements for measuring oral reading fluency are brief, so frequent administration is an acceptable practice for teachers. In addition, CBM data are easily recorded, analyzed, and managed on charts and graphs. Therefore, the results are immediately available, and interventions can be adjusted without delay (Hartman & Fuller, 1997).

Reliability. A number of studies demonstrate the reliability of curriculum-based measures for oral reading fluency (CBM-R). This technique is useful for all students, including low-achieving students. Scores tend to be reliable across readability levels and for random or controlled passage selection, regardless of whether the materials are from literature or basal reading texts.

In a study that compared the use of two different sources of reading passages (*Scribner Reading Series* and the *Macmillan Reading Program*) to measure oral reading fluency, no differences were found in reading progress over time across measures (Powell-Smith & Bradley-Klug, 2001). The authors concluded that each type of probe could be useful for monitoring student progress, especially for students who were not achieving reading success. Passages at different readability levels (present grade level and goal level for next grade) reliably measured progress (Hintze, Daly, & Shapiro, 1998). Similarly, randomly selected

versus controlled CBM-R passages for second through fifth grade students resulted in reliable observations of reading ability (Hintze & Christ, 2004).

Validity. The U.S. Department of Education identified CBM as an acceptable and valid measurement tool for the identification of reading difficulties and for monitoring academic progress (Brown-Chidsey, Davis, & Maya, 2003). A number of studies demonstrate that oral reading fluency is a strong predictor of reading comprehension skills. The results of these studies suggest that the more fluently children read, the better they comprehend what they are reading (Jenkins, Fuchs, Espin, Van Den Broek, & Deno, 2003; Shinn et al., 1992). Oral reading fluency, as assessed by CBM-R, should, therefore, have some relationship to high-stakes tests that require reading comprehension skills. In fact, a number of studies confirm this relationship in elementary school age children (Barger, 2003; Buck & Torgeson, 2003; Hartman & Fuller, 1997; Hintze, Conte, Shapiro, & Basile, 1997; McGlinchey & Hixson, 2004; Shinn et al., 1992; VanderMeer, Lentz, & Stollar, 2005). Overall, research on the relationship between CBM-R and reading comprehension scores typically reveals moderate to high correlations for elementary school students. This is important for targeting potential areas for specialized instruction and intervention. However, the bulk of the literature is limited to elementary student performance, and there is insufficient evidence to show similar relationships for students in upper grades.

Oral reading fluency beyond elementary school.

There are several reasons why there is value in determining the correlation between CBM-R measures and high-stakes tests in middle school. Theoretically, reading development changes in late elementary school and middle school from learning to read to reading to learn (Chall, 1983; Palumbo, 2009). Instructional methods are adapted to this change by focusing on content instead of basic reading skills. Often, the assumption is that, by this time, all students are ready for content learning and have no need for basic reading skills instruction and practice. Unfortunately, there are still those students who have not yet mastered basic reading skills by the time they reach middle school. A 2011 National Assessment of Educational Progress report indicated that up to 68% of eighth graders cannot read at or above grade level proficiency.

Rasinski, Rikli, and Johnston (2009) found that contrary to expectations of normal reading development, seventh grade students' reading fluency

scores were actually below those of fifth grade students' reading fluency scores. This surprising finding suggested to the authors that little if any reading skill development was occurring for students beyond elementary school. Their assumption was supported through classroom observations which revealed that basic reading instruction in the middle grades is virtually absent.

Rasinski and associates (2005) conducted a study of oral reading fluency in which they attempted to determine the importance of oral reading fluency at the high school level. A moderately strong correlation of .53 existed between student performance on the high school graduation test and oral reading fluency scores for the ninth grade students. The results of Rasinski and associates' (2005, 2009) studies suggested that high school students' oral reading fluency rates may have potential for predicting likelihood of passing state and national achievement tests.

Unfortunately, investigations for middle and high school students are limited. Given that previous research demonstrated successful use of CBM-R in the primary grades to predict and monitor reading comprehension and test performance, we believe that CBM-R may also have value for students in the upper grades. According to LaBerge and Samuels' (1974) theory of automaticity in reading, failure to automatize reading recognition detracts from reading comprehension because time and effort typically used for gleaning meaning from the text is diverted to decoding individual words. As a result, struggling readers fall behind in almost every subject and experience difficulty as they advance through the grades. Thus, the purpose of this study is to examine the relationship between oral reading fluency and performance on the Ohio Grade 7 Reading Achievement Test.

Method

Setting and Participants

Seventy-five seventh grade students participated in the study. They were a fairly homogeneous group of students who attended a rural, primarily Caucasian (95.8%) middle school in a middle class section of southwestern Ohio, with a population of 560 students. Twenty percent of the students were considered economically disadvantaged (based on receiving free or reduced-price lunch), and 16.9% of the student population had been identified with disabilities.

Curriculum-based Oral Reading Fluency Measure

During the last two weeks of March and the first two weeks of April, students were asked to read aloud three passages from the seventh grade basal (Beers, 2005). Passages not yet read within the classroom were selected to control for an unplanned variable of familiarity. The passages were at the readability level of the middle of seventh grade, as checked using the Dale-Chall readability formula (Chall, 1995). Each passage was retyped double-spaced on plain paper to reduce distractions caused by the textbook format, which includes pictures. The passages were scored according to procedures outlined by Good and Kaminski (2002).

Students read aloud three passages for one minute each, and the total number of words read correctly served as oral reading scores. The median of the three oral reading scores was used as the oral reading fluency rate. Words omitted, words substituted, and hesitations of more than three seconds were scored as errors. Words self-corrected within three seconds were scored as correct.

Ohio Grade 7 Reading Achievement Test

The students were administered the Ohio Grade 7 Achievement Tests in the areas of reading, math, and writing in May. The Ohio Grade 7 Reading Achievement Test consists of 36 scored items including multiple-choice, short answer, and extended response questions. The test measured four state standards: reading processes, which include concepts of print, comprehension strategies, and self-monitoring strategies; reading applications, which include informational, technical, and persuasive text; reading applications dealing with literary text; and acquisition of vocabulary. The students had a maximum of 2.5 hours to complete the test. Although the students with IEP accommodations were allowed extended time, no student used this accommodation. Of the 75 participants, 16 students received accommodations during achievement testing in accordance with their Individual Education Program (IEP). Test accommodations used by the students included having directions, questions, and answer choices read aloud; having directions broken into steps; prompting to stay on task; and testing within a small group. Four students had a scribe who wrote exactly what the students dictated.

Table 1
 Ohio Grade 7 Reading Achievement Test Performance Level Descriptors
 Adopted by the Ohio State Board of Education in 2006 (Ohio Department of Education, 2006)

Performance Level	Descriptor
Limited	Seventh grade students performing at the Limited level struggle or are unable to perform simple reading tasks and they do not yet have the skills identified at the Basic Level.
Basic	Seventh grade students performing at the Basic level can generally define unknown words or phrases through contextual clues and the use of available resources. They can demonstrate some understanding of textual information.
Proficient	Seventh grade students performing at the Proficient level use their fundamental understanding of word structure, context clues, and text structures to determine the meaning of unknown words and/or phrases. They typically show an overall understanding of literary elements and informational features and structures.
Accelerated	Seventh grade students performing at the Accelerated level use their understanding of word structure, context clues, text structures, and author’s style to determine the meaning of unknown words and/or phrases. They can analyze literary elements and informational features and structures to show a complete understanding of a variety of text.
Advanced	Seventh grade students performing at the Advanced level apply their understanding of word structure, context clues, and text structures to determine the meaning of unknown words and/or phrases. They have a concrete understanding of the methods used by the authors to communicate meaning and can make sound judgments about literary and informational text.

Results from the achievement tests were reported using scaled scores. Students needed to achieve a score of 400 for their scores to be rated Proficient. Scores above 432 were rated Advanced, scores between 415 and 431 were rated Accelerated, scores between 385 and 399 were in the Basic range, and scores below 385 were in the Limited range (see Table 1).

Research Design and Procedures

A correlational design was used in this study. For each student, the median of three oral reading fluency scores from CBM-R probes was compared with his or her score on the Ohio Grade 7 Reading Test. The primary researcher administered the CBM passages to the 75 participants. For every tenth student, a teacher also scored the passages to obtain inter-rater reliability.

Results

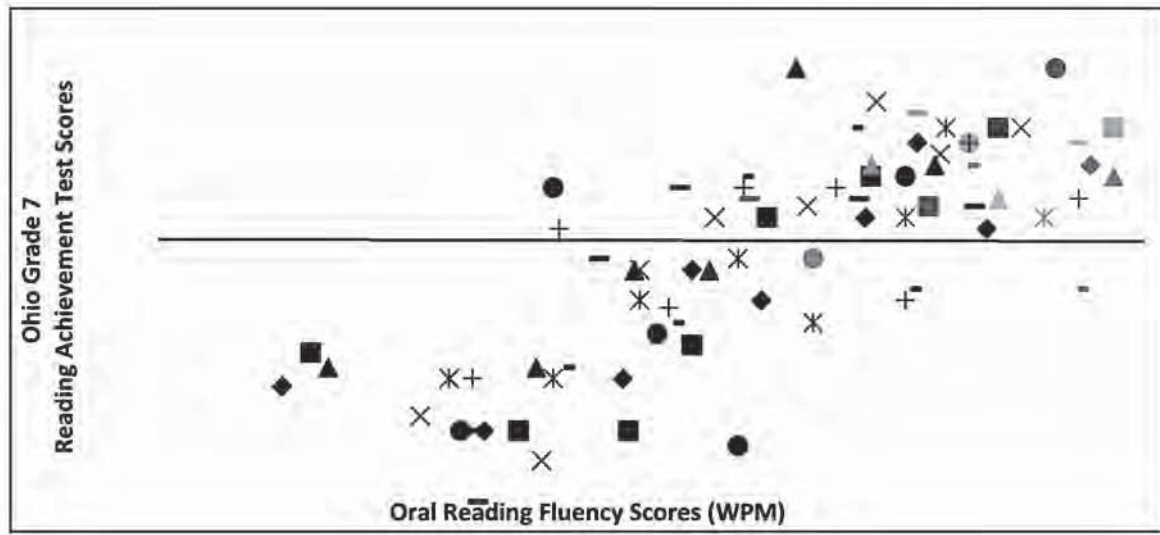
The mean oral reading fluency score of the 75 participants was 131 words per minute (wpm) with a range of 47 wpm to 191 wpm, with inter-rater agreement within 5 words of 100%. The sample size of

75 participants provided sufficient power ($1 - \beta > .99$) to interpret the results from the Pearson Correlation Coefficient given a moderate effect size of .50, which was suggested by previous studies (Runyon, Coleman, & Pittenger, 2000). The mean score on the Ohio Grade 7 Reading Achievement Test was 414, with a range of 348 to 464 (see Table 2). Correlation coefficients were computed between oral reading fluency scores and performance on the Ohio Grade 7 Reading Achievement Test scores. The correlation between the two measures was strong, $r(73) = .76, p < .001$ (see Figure 1 for the distribution of scores).

Table 2
 Mean Performance for Ohio Grade 7 Reading Achievement Test Scores and Oral Reading Scores

Scores	<i>M</i>	<i>SD</i>	<i>n</i>
Oral Reading Fluency	130.9	36.6	75
Ohio Grade 7 Reading Achievement Test	414.1	28.5	75

Figure 1
Distribution of Ohio Grade 7 Reading Achievement Test Scores



Oral reading fluency explained 58% of the variance among students’ scores on the Ohio Grade 7 Reading Achievement Test. The large effect size in this study ($r = .76$) using 75 participants, accounted for acceptable power of .80 at the alpha level of .01. Hasbrouck and Tindal (2006) published norms of 150 wpm as the average expected oral reading rate for seventh grade students. Of the 75 students tested, 27

students read 150 wpm or higher, and 100% of those students scored Proficient or better on the Ohio Grade 7 Reading Achievement Test. Fifty-eight students read 100 wpm or higher; and 88% of those students scored Proficient or better on the Ohio Grade 7 Reading Achievement Test. Of the 75 students tested, 17 students read below 100 wpm, and 12% of those students scored Proficient or better (see Table 3).

Table 3
Number of Students Scoring at Each Level of the Ohio Grade 7 Reading Achievement Test

WPM	Students Scoring Limited 384 or below	Students Scoring Basic 385–399	Students Scoring Proficient 400–415	Students Scoring Accelerated 416–431	Students Scoring Advanced 432 or above
40–60	2	1	0	0	0
61–80	5	0	0	0	0
81–100	7	0	0	1	1
101–120	2	3	6	0	1
121–140	1	1	4	4	3
141–160	0	0	2	4	9
161–180	0	0	0	4	7
181–200	0	0	1	1	5

Discussion

Results of this study suggest that oral reading fluency measures (CBM-R) have a relationship with performance on state assessments for seventh grade students. A moderately strong correlation of .76 was found between oral reading fluency and performance on the Ohio Grade 7 Reading Achievement Test. One hundred percent of students who read 150 wpm passed the Ohio Grade 7 Reading Achievement Test, which supports the recommendation by Hasbrouck and Tindal (2006) that seventh grade students should be expected to read 150 wpm. However, we found that scores of 100 wpm correlated with whether or not a student passed the Ohio Grade 7 Reading Achievement Test. Eighty-eight percent of students reading at least 100 wpm scored Proficient or better while only two of the 17 students, or 12%, who read below 100 wpm passed the Ohio Grade 7 Reading Achievement Test. Thus, the current research extends results from studies conducted with elementary-age populations and indicates that CBMs also correlate with high-stakes reading tests for middle grades students.

Gaps in reading development and instruction can have dramatic effects on middle and high school student performance. Performance pressure increases as students move through the grades, culminating, in many states, with “high-stakes” tests that determine student graduation status. If reading fluency impacts test performance beyond elementary school, lagging oral reading fluency skills for individual students could have a devastating impact on both individual students and schools in general. In addition, student ability to graduate from high school and be prepared for college in math, science, and social studies has been shown to be related to literacy skills (ACT, 2005). The implementation of research-based reading interventions for middle school students with low CBM scores may help to improve reading skills, thereby improving test scores. Further, CBMs can be administered frequently to monitor student progress and determine whether intervention needs to increase in frequency or intensity or be changed altogether.

Limitations and Future Research

One limitation of this study was the small, rural sample population used. The fact that there were only 75 students with fairly homogenous cultural backgrounds and socioeconomic statuses may limit the generalization of the study results. Furthermore, several of the students were provided testing

accommodations, which were not accounted for in the data analysis. Accommodations were not used in the administration of the CBM-R probes but were present for 21% of the sample. It is conceivable that the accommodations artificially raised the achievement test scores for those students. If that were the case, it would likely have had a negative impact on the study results; for example, the lower CBM-R scores earned by students with IEPs would correlate with the higher achievement test scores at a lower level. Thus, the result of the accommodations may have depressed a positive correlation, and in essence, the accommodations likely strengthened the findings of the investigation. Future studies with larger, more diverse populations that also account for students who have accommodations for test taking may ensure that oral reading fluency is truly associated with success on state assessments at the seventh grade level.

Another limitation is that the Ohio Grade 7 Reading Achievement Test content changes from one year to the next. Although the test measures the same concepts each year, the passages on which the questions are based vary. It may be necessary for future research to be conducted longitudinally to ensure that a relationship exists from year to year. Finally, this study used fictional passages from one reading series. Future research in which oral reading scores are derived from the use of nonfiction and fictional passages from various reading series may further validate the use of oral reading performance as a predictor of success on state assessments.

Conclusion

This study is one of the first of its kind to investigate the relationship between CBM-R and performance on state achievement tests for seventh grade students. Given the increasing importance that achievement tests have for students and schools, risk indicators such as low CBM-R scores have great value in schools. Periodically, the notion of teaching to the achievement test becomes an issue. The current study has identified that lack of oral reading fluency is an important consideration as students and teachers prepare for achievement tests. CBM-R is a quick and relatively easy way to measure basic reading skills and monitor reading comprehension. Early and frequent CBM-R administration allows for development and implementation of reading intervention strategies to assist students at risk of not passing the Ohio Grade 7 Reading Achievement Test.

References

- ACT. (2005). *Average national ACT score unchanged in 2005: Students graduate from high school ready or not*. Retrieved from <http://www.act.org/activity/autumn2005/readyornot.html>
- Ardoin, S. P., Witt, J. C., Suldo, S. M., Connell, J. E., Koenig, J. L., Resetar, J. L., Slider, N. J., & Williams, K. L. (2004). Examining the incremental benefits of administering a maze and three versus one curriculum-based measurement reading probes when conducting universal screening. *School Psychology Review, 33*, 218–233.
- Barger, J. (2003). *Comparing the DIBELS oral reading fluency indicator and the North Carolina end of grade reading assessment*. Asheville, NC: North Carolina Teaching Academy.
- Beers, K. (2005). *Elements of literature 2005: First course/Grade 7: Holt reading solutions*. Austin, TX: Holt, Rinehart, & Winston.
- Brown-Chidsey, R., Davis, L., & Maya, C. (2003). Sources of variance in curriculum-based measures of silent reading. *Psychology in the Schools, 40*, 363–377.
- Buck, J., & Torgesen, J. (2003). *The relationship between performance on a measure of oral reading fluency and performance on the Florida Comprehensive Assessment Test (FCRR Technical Report #1)*. Tallahassee, FL: Florida Center for Reading Research.
- Chall, J. S. (1983). *Stages of reading development*. New York, NY: McGraw-Hill.
- Chall, J. S. (1995). *Readability revisited: The new Dale-Chall readability formula*. Cambridge, MA: Brookline Books.
- Davis, L. B., & Fuchs, L. S. (1995). “Will CBM help me learn?” Students’ perception of the benefits of curriculum-based measurement. *Education and Treatment of Children, 18*, 19–32.
- Fuchs, L. S., Fuchs, D., Hosp, M. K., & Jenkins, J. R. (2001). Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis. *Scientific Studies of Reading, 5*, 239–256.
- Good, R. H., & Kaminski, R. A. (Eds.). (2002). *Dynamic indicators of basic early literacy skills* (6th ed.). Eugene, OR: Institute for the Development of Educational Achievement.
- Hartman, J. M., & Fuller, M. L. (1997). The development of curriculum-based measurement norms in literature-based classrooms. *Journal of School Psychology, 35*, 377–389.
- Hasbrouck, J., & Tindal, G. A. (2006). Oral reading fluency norms: A valuable assessment tool for reading teachers. *Reading Teacher, 59*, 636–644.
- Hintze, J. M., & Christ, J. (2004). An examination of variability as a function of passage variance in CBM progress monitoring. *School Psychology Review, 33*, 204–217.
- Hintze, J. M., Conte, K. L., Shapiro, E. S., & Basile, I. M. (1997). Oral reading fluency and authentic reading material: Criterion validity of the technical features of CBM survey-level assessment. *School Psychology Review, 26*, 535–553.
- Hintze, J. M., Daly, E. J., III, & Shapiro, E. S. (1998). An investigation of the effects of passage difficulty level on outcomes of oral reading fluency progress monitoring. *School Psychology Review, 27*, 433–445.
- Jenkins, J. R., Fuchs, L. S., Espin, C., Van Den Broek, P., & Deno, S. L. (2003). Sources of individual differences in reading comprehension and reading fluency. *Journal of Educational Psychology, 95*, 719–729.
- LaBerge, D., & Samuels, S. A. (1974). Toward a theory of automatic information processing in reading. *Cognitive Psychology, 6*, 293–323.
- Madelaine, A., & Wheldall, K. (1999). Curriculum-based measurement of reading: A critical review. *International Journal of Disability, Development and Education, 46*, 71–85.
- McGlinchey, M. T., & Hixson, M. D. (2004). Using curriculum-based measurement to predict performance on state assessments in reading. *School Psychology Review, 33*, 193–203.
- National Assessment of Educational Progress. (2011). *The nation’s report card: Reading assessments*. Retrieved from <http://nces.ed.gov/nationsreportcard/pdf/main2011/2012457.pdf>
- Ohio Department of Education. (2006). *Family Report Interpretive Guide Spring 2006*. Retrieved from http://www.ohiodocs.org/OGT_2006_2007/2006_OGT_Family_Report_Interp_Gd.pdf
- Ohio Department of Education. (2007). *Achievement tests*. Retrieved from http://www.ode.state.oh.us/proficiency/Diagnostic_Achievement/achievement-default.asp
- Palumbo, A., & Sanacore, J. (2009). Helping struggling middle school literacy learners achieve success. *Clearing House, 82*(6), 275–280.

- Powell-Smith, K. A., & Bradley-Klug, K. L. (2001). Another look at the “C” in CBM: Does it really matter if curriculum-based measurement reading probes are curriculum-based? *Psychology in the Schools, 38*, 299–312.
- Rasinski, T. V., Padak, N. D., McKeon, C. A., Wilfong, L. G., Friedauer, J. A., & Heim, P. (2005). Is reading fluency a key for successful high school reading? *Journal of Adolescent & Adult Literacy, 49*, 22–27.
- Rasinski, T. V., Rikli, A., & Johnston, S. (2009). Reading fluency: More than automaticity? More than a concern for the primary grades? *Literacy Research and Instruction, 48*, 350–361.
- Runyon, R. P., Coleman, K. A., & Pittenger, D. J. (2000). *Fundamentals of behavioral statistics* (9th ed.). Boston, MA: McGraw-Hill.
- Shapiro, E. S., Durnan, S. L., Post, E. E., & Levinson, T. S. (2002). Self-monitoring procedures for children and adolescents. In M. R. Shinn, H. M. Walker, & G. Stoner (Eds.), *Interventions for academic and behavior problems II: Preventive and remedial approaches* (pp. 433–454). Bethesda, MD: National Association of School Psychologists.
- Shinn, M. R., Knutson, N., Collins, V. L., Good, R. H., III, & Tilly, D., III. (1992). Curriculum-based measurement of oral reading fluency: A confirmatory analysis of its relation to reading. *School Psychology Review, 21*, 459–479.
- Vander Meer, C. D., Lentz, F. E., & Stollar, S. (2005). *The relationship between oral reading fluency and Ohio proficiency testing in reading*. Eugene, OR: University of Oregon.