

# USING READING CURRICULUM-BASED MEASUREMENTS AS PREDICTORS FOR THE MEASURE ACADEMIC PROGRESS (MAP) STANDARDIZED TEST IN NEBRASKA

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**Abstract. Background.** Research studies have examined CBMs as predictors of standardized test performance; however, no studies have examined the possible predictive relationship between CBMs and the MAP test with a diverse population in the state of Nebraska. **Purpose.** This study measures the efficacy of using curriculum-based measurements, oral reading fluency and maze, as predictors of performance on the Measures of Academic Progress (MAP) in the state of Nebraska. **Methods and Results.** Archival data were collected from a public elementary school in Nebraska, which enrolls diverse students from many cultural backgrounds. The participants of this study were 376 elementary students in 2<sup>nd</sup> through 5<sup>th</sup> grade. The participants took the CBM oral reading fluency, maze, and MAP reading assessments in the Spring and Fall Semesters of the year 2009. The findings of this study indicated that the oral reading fluency and the combination of oral reading fluency and maze scores significantly predicted MAP reading scores ( $p < .05$ ) in both semesters. **Conclusions.** The evidence obtained in the present study suggests the idea of using oral reading fluency to monitor students' progress and to use it to target students who are at-risk of failing high-stakes reading tests.

**Keywords:** Curriculum-Based Measurement, Standardized Tests, Measures of Academic Progress.

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## **USING READING CURRICULUM-BASED MEASUREMENTS AS PREDICTORS FOR THE MEASURE ACADEMIC PROGRESS (MAP) STANDARDIZED TEST IN NEBRASKA**

Testing, also called assessment, has always been a part of public education. Educators have utilized the results of tests to assess students' knowledge of reading, writing, and math. However, since the No Child Left Behind Act (NCLB) was enacted in 2001, the purpose for standardized assessments across the nation changed. No Child Left Behind requires all public schools to administer a state-wide standardized test annually to students in both reading and math in grades 3 to 8 and at least once in grades 10-12 (McLeod, D'Amico, Protheroe, 2003). At the elementary level, most of these tests do not have individual student consequences, however, schools which receive Title 1 funding through the Elementary and Secondary Education Act of 1965 must make Adequate Yearly Progress (AYP) in test scores (Botzakis, 2004). Schools that fail to show that 95 % of students are meeting annual measurable objectives will be labeled as not making adequate yearly progress. After two years in a row of not making any progress,

the parent is allowed to move a student into a school that has shown progress, with transportation expenses being charged to the school that failed. On top of that payment, the school loses part of its population and the accompanying funds that are received to teach those students. (Botzakis, 2004, p. 8)

This has brought pressure for public schools to monitor students' academic performance in an effort to ensure AYP is being accomplished.

The new federal reauthorization of the Individuals with Disabilities Educational Improvement Act (IDEIA) of 2004 has also had an impact on the assessment practices within the education system. Under IDEIA, the United States Department of Education offers schools the opportunity to remove themselves from the intelligence quotient discrepancy model (IQ) in terms of special education identification (U.S. Department of Education, 2004). This law specified that creating an intervention system in which students are offered supplemental instruction, would serve as a buffer to special education referral. In order to meet the requirements of NCLB, AYP, and IDEIA, an effective academic intervention approach

needed to be developed and implemented, especially for those students who may be “at-risk.” One model being developed and implemented in the educational setting is Response to Intervention (RtI).

RtI utilizes a problem-solving approach to identify, monitor and provide interventions to children who are not meeting academic goals with instruction from the general curriculum alone.

Response to Intervention is a multi-tiered approach to help struggling learners. Embedded at each tier is a set of unique support structures and instruction that help teachers implement evidence-based curricula and instructional practices designed to improve student’s achievement. Each tier is essential to determine a student’s proficiency on critical academic and/or behavioral skills. Through this model, students’ progress is closely monitored at each stage of intervention to determine the need for further research-based instruction and/or intervention in general education, or both.

(Response to Intervention Action Network, 2008, p. 1)

The RtI approach requires universal screenings approximately three times a year for all students. Many schools districts utilize curriculum-based measurement (CBM) to screen and monitor students’ academic progress. CBM is helpful to continuously monitor students’ progress and aid teachers in making formative decisions. It is also useful because it is efficient, can be frequently administered, and is sensitive to student growth (Deno, 1985). The two reading curriculum-based measurements commonly used in many schools districts across the nation are AIMSweb Oral Reading Fluency and Maze. In the oral reading fluency CBM, students read three one-minute probes aloud while an examiner records correct and incorrect responses. The maze CBM involves students silently reading a passage with every fifth or seventh word deleted. Students have three choices from which they circle the word that best fits the sentence. Basically, oral reading fluency is a measure of reading accuracy and speed while maze is a measure of vocabulary and reading comprehension (Shinn, Good, Knutson, Tilly, Collins, 1992).

Today, both federal and state regulations have placed great emphasis on standardized testing as a measure of the quality of schools and teachers. In Nebraska, many school districts are choosing to use the Measures of Academic Progress (MAP) standardized test to measure the

quality of their schools and some school districts have adopted curriculum-based measurements to guide their improvement plans. Many schools in Nebraska have adopted AIMSweb Oral Reading Fluency and Maze curriculum-based measurements to help monitor students' academic growth which may be linked to the AYP on the state test.

Numerous research studies (Deno, Mirkin, Chiang, 1982; Espin & Fiegen, 1996; Fuchs, Fuchs, Hosp, Jenkins, 2001; Shinn, Good, Knutson, Tilly, Collins, 1992; Marston, 1989), have examined a wide variety of curriculum-based measurements and their reliability and validity, while other research studies have recently begun using these CBMs to predict success on state standardized assessment. Studies conducted in Oregon (Crawford, Tindal, Stieber, 2001; Good, Simmons, Kameenui, 2001) found a direct relationship that existed between CBM oral reading fluency and success on the Oregon state assessment. Stage and Jacobson (2001) reported that the CBM oral reading fluency predicted success or failure on the Washington Assessment of Student Learning (WASL) state test for fourth graders while another study completed by Sibley, Biwer, and Hesch (2001) reported that CBM oral reading predicted performance on the state standardized test in Illinois. Finally, McGlinchey and Hixon (2004) found that CBM oral reading fluency predicted performance on the Michigan Educational Assessment Profile (MEAP). As seen above, an examination of the literature supports the idea that there is a relationship between students' performance on CBM oral reading fluency and their performance on state standardized assessments.

A study conducted by Wiley and Deno (2005) examined CBM oral reading fluency and maze as they relate to performance on a state standardized test based on English language development. They found that the oral reading fluency measure was a better predictor for third and fifth grade English Language Learner (ELL) students who took the Minnesota Comprehensive Assessment (MCA), while the maze measure had significantly contributed to performance for third and fifth grade non-ELL students who had also taken the MCA (Wiley & Deno, 2005). In this study, Wiley and Deno explained that the maze "appears to access aspects of reading by native English speakers that are not reflected in their oral reading performance" (p. 212), thus for ELL students, who have a more limited English vocabulary, the maze measure did not predict performance on the standardized assessment.

Many studies have demonstrated that CBM oral reading fluency is a significant predictor of performance on high-stakes assessments in reading. However, there are a limited number of studies reported in the literature that have used the CBM maze measure as a predictor of performance on standardized assessments. Furthermore, currently, there are no studies that have specifically looked to see if both curriculum-based measurements, oral reading fluency and maze, can predict performance on the Measures of Academic Progress (MAP) test in the state of Nebraska. Therefore, the purpose of this study was to measure the efficacy of using curriculum-based measurements, oral reading fluency and maze, as predictors of reading performance on the Measures of Academic Progress (MAP). The fact the current research has ignored this area, has prompted this investigator to explore the following research questions:

1. To what extent do oral reading fluency scores predict MAP scores?
2. To what extent do maze scores predict MAP scores?
3. To what extent do curriculum-based measurements, oral reading fluency and maze scores, combined predict MAP scores?
4. Do the results of the multiple regression differ at each grade level?
5. Can oral reading fluency, maze, and MAP scores in the spring of 2009 predict oral reading fluency, maze and MAP scores in the fall of 2009?

It was hypothesized that both CBMs are strong predictors of MAP scores because of the commonality of the test contents. It was also hypothesized that both curriculum-based measurements would consistently predict MAP scores throughout 2<sup>nd</sup> through 5<sup>th</sup> grades in both semesters; spring and fall of 2009.

## **METHOD**

### **Participants**

The participants of this study were 376 elementary students, grades 2<sup>nd</sup> through 5<sup>th</sup>, from a Nebraska public school, which enrolls diverse students from all backgrounds, i.e. 39 % English Language Learners (ELL), 15 % students with disabilities, 20 % Caucasian, 4 % African, 74 % Hispanic, 1 % Asian, and 1 % American Indian Students. These students were

administered the oral reading fluency, maze, and MAP reading composite tests in the spring and fall of 2009.

### **Instrumentation**

**AIMSweb.** The Oral Reading Fluency and Maze tests were administered. In accordance with administration instructions for oral reading fluency from Shinn, et al. (1992), three one-minute probes are administered individually to the students. Each student was presented with a reading probe and instructed to read aloud for one minute while an examiner recorded correct and incorrect responses. Repetitions, and self-corrections made within 3 seconds were counted as correct. Mispronunciations, substitutions, omissions, and words on which the student paused longer than 3 seconds were counted as incorrect. Students read three probes and the score is the number of correct words read in one minute. The median scores were used for this analysis.

The maze test was administered in accordance with administration instructions from Shinn, Deno, and Espin (2000). This involved having students silently read a passage with every fifth or seventh word deleted. In place of the deleted word were three choices from which the student circled the word that best fit the sentence, only one of which is correct. Students read three one-minute passages and the score is the number of correct word choices made in one minute. The median scores were used for this analysis. Accurate reliability and validity data have been reported for the oral reading fluency and maze assessments in previous studies (Shinn, et al., 1992 & Shinn, et al., 2000).

**Measures of Academic Progress (MAP).** MAP reading composite was also administered to these students. This is a high-stakes assessment published by the Northwest Evaluation Association (NWEA). The reading composite of this test measures word recognition and decoding, literal comprehension, interpretive comprehension, and evaluative comprehension. This is an individualized multiple-choice assessment that is administered on the computer. Specific requirements of the students are dependent upon the child's reading level; some examples of reading tasks include reading a story and answering a question, matching a sentence to a picture or diagram, etc. The assessment adjusts itself to each child's performance based on correct and incorrect responses. Most students

complete 25 to 30 items during this assessment, which typically takes 20 to 40 minutes. Test-retest reliability correlations were found in 39 states in the spring 2007- fall 2007, to range from 0.689 to 0.879 in grades 2-10 and particularly in Nebraska, from 0.767-0.841 in grades 2-4 and 6-8. Also, test-retest reliability correlations were found, in 42 states in the fall 2007- spring 2008, which ranged from 0.691 to 0.866 in grades 2-10 and specifically in Nebraska, from 0.785 to 0.801 in grades 2-10. Finally, test-retest reliability correlations were found, in 39 states in the spring 2007- spring 2008, to range from 0.628-0.856 in grades 2-10 and particularly in Nebraska, from 0.757-0.821 in grades 2-4 and 6-9. Coefficient Alpha reliability was found to range from 0.799-0.969. Predictive validity was found to range from 0.631-0.763 in grades 2–10 in only 3 states, Florida, Georgia, and North Dakota. The MAP uses the RIT (Rasch unIT) scale, developed by NWEA for use in all MAP tests (Northwest Evaluation Association, 2009). The students' Reading MAPs RIT score was used for the analysis conducted in this study. All scores from all assessments were entered into an excel data recording form created by the researcher.

### **Procedure**

After receiving approval by the Institutional Review Board (IRB) committee, the archival scores of all three assessments from all participants were collected from the administrators and school psychologists of the elementary school where the participants attended. The researcher entered all scores into an excel data recording form and analyzed all scores on a multiple regression program to find if any correlations among the scores of these tests existed.

### **RESULTS**

To determine whether the oral reading fluency scores alone, the maze scores alone, and/or the combination of the oral reading fluency and maze scores predicted MAP reading composite scores in the spring of 2009 (see research questions 1, 2, and 3); the multiple regression program was utilized. The standardized weight predictors (Beta), *t* statistics,  $R^2$ , and *F* statistics by grade are listed below in Table 1. Statistics indicate that oral reading fluency alone and the combination of maze and oral

reading fluency scores do significantly predict MAP’s reading composite scores ( $p < .05$ ) in all grades (2<sup>nd</sup> through 5<sup>th</sup>). However, the maze scores alone do not significantly predict MAP’s reading scores in any of the grades in the spring of 2009 ( $p > .05$ ).

**Table 1.** Multiple Regression Summary Analysis for Two Predictors (Independent Variables) of MAP Scores for Spring Semester 2009, 2<sup>nd</sup> Grade through 5<sup>th</sup> Grade

Grade Level	Standardized weight (Beta) (Reading)	<i>t</i>	Standardized weight (Beta) (Maze)	<i>t</i>	<i>R</i> <sup>2</sup>	<i>F</i>
2 <sup>nd</sup> Grade (N = 67)	0.649	5.489*	0.086	0.728	0.508	35.081*
3 <sup>rd</sup> Grade (N = 61)	0.423	2.769*	0.162	1.062	0.299	11.926*
4 <sup>th</sup> Grade (N = 58)	0.461	2.980*	0.202	1.310	0.387	16.725*
5 <sup>th</sup> Grade (N = 53)	0.476	3.591*	0.038	0.281	0.478	6.529*

\*  $p < .05$ .

Secondly, to determine whether the oral reading fluency scores alone, the maze scores alone, and/or the combination of the oral fluency and maze scores predict MAP reading composite scores in the fall of 2009 (see research questions 1, 2, and 3); the multiple regression program was utilized as well. The standardized weight predictors (Beta), *t* statistics, *R*<sup>2</sup>, and *F* statistics by grades are listed below in Table 2. Statistics indicate that oral reading fluency alone and the combination of maze and oral reading fluency scores do significantly predict MAP’s reading composite scores ( $p < .05$ ) in all grades (2<sup>nd</sup> through 5<sup>th</sup>). However, contrary to the results from the spring of 2009, the maze scores do also significantly predict MAP’s reading scores, but only in 4<sup>th</sup> grade for the fall of 2009. Maze does not significantly predict MAP’s reading scores ( $p < .05$ ) in the rest of the grades (2<sup>nd</sup>, 3<sup>rd</sup>, and 5<sup>th</sup>) for fall 2009.

To determine whether the results of the multiple regression differ at each grade level (see research question 4), statistics in Table 1 and Table 2 were examined. It was found that the oral reading fluency is a better

**Table 2.** Multiple Regression Summary Analysis for Two Predictors (Independent Variables) of MAP Scores for Fall Semester 2009, 2<sup>nd</sup> Grade through 5<sup>th</sup> Grade

Grade Level	Standardized weight (Beta) (Reading)	t	Standardized weight (Beta) (Maze)	t	R <sup>2</sup>	F
2 <sup>nd</sup> Grade (N = 85)	0.858	12.383*	-0.007	-0.112	0.729	03.802*
3 <sup>rd</sup> Grade (N = 71)	0.650	5.489*	0.086	0.728	0.508	35.080*
4 <sup>th</sup> Grade (N = 77)	0.527	5.440*	0.346	3.568*	0.654	69.023*
5 <sup>th</sup> Grade (N = 65)	0.538	5.610*	0.106	0.806	0.688	67.105*

\*  $p < .05$ .

**Table 3.** Correlation Matrix for One Predictor (Independent Variable) of Each Test Scores for Spring and Fall Semester 2009

Predictor Variable	Predicted Variable								
	3 <sup>rd</sup> Grade Fall			4 <sup>th</sup> Grade Fall			5 <sup>th</sup> Grade Fall		
	MAP	Reading	Maze	MAP	Reading	Maze	MAP	Reading	Maze
<b>2<sup>nd</sup> Grade Spring</b>									
MAP	0.786*	0.624*	0.469*	-	-	-	-	-	-
Reading	0.679*	0.913*	0.552*	-	-	-	-	-	-
Maze	-	-	-	-	-	-	-	-	-
<b>3<sup>rd</sup> Grade Spring</b>									
MAP	-	-	-	0.754*	0.659*	0.610*	-	-	-
Reading	-	-	-	0.720*	0.927*	0.762*	-	-	-
Maze	-	-	-	0.503*	0.667*	0.661*	-	-	-
<b>4<sup>th</sup> Grade Spring</b>									
MAP	-	-	-	-	-	-	0.771*	0.659*	.678*
Reading	-	-	-	-	-	-	0.697*	0.877*	.727*
Maze	-	-	-	-	-	-	0.627*	0.710*	.807*

\*  $p < .05$ .

Note. Second grade spring students became 3<sup>rd</sup> grade fall students; 3<sup>rd</sup> grade spring students became 4<sup>th</sup> grade fall students; 4<sup>th</sup> grade spring students became 5<sup>th</sup> fall students; also 2<sup>nd</sup> grade spring maze scores were not available (this test was not administered to this group of students.)

predictor of the MAP test in both semesters, spring and fall 2009 in all grades, 2 – 5, but more so in 2<sup>nd</sup> grade (see Standardized weight or Beta for Reading in Table 1 and Table 2). Maze only predicted performance on the MAP test in the fall 2009 for 4<sup>th</sup> grade only, and still when comparing the oral reading fluency and the Maze in the Fall 2009 in 4<sup>th</sup> grade, the oral reading fluency was a better predictor of performance of the MAP test.

Finally, to determine whether the oral reading fluency, maze, and MAP scores (grades 2<sup>nd</sup> through 4<sup>th</sup>) in the spring predict oral reading fluency, maze, and MAP scores (grades 3<sup>rd</sup> through 5<sup>th</sup>) in the fall of 2009 (see research question 5); the Pearson correlation analysis was utilized. The correlations found are listed below in Table 3. All correlations found were significant ( $p < .05$ ).

## **DISCUSSION**

Curriculum-based measurement procedures are increasingly being utilized across the nation to assess student academic skills for educational decision-making, including screening, progress monitoring, entitlement, and intervention planning. At the same time, school districts are compelled by NCLB to administer local and state standardized achievement tests to gather student performance data. With the limited amount of time and funding that schools have, districts are trying to find faster, easier, and inexpensive ways to improve local and standardized test scores. Schools are also in need of measures that could predict students' performance for such important assessments, in particular reading assessments, so they can intervene early and prevent their schools from being labeled as not making adequate yearly progress.

Curriculum-based measurements are one method many schools are selecting to use to monitor individual student progress. The validity and reliability of CBMs have been evaluated within numerous research studies (Deno, et al., 1982; Espin, Foegen, 1996; Fuchs, et al., 2001; Shinn, et al., 1992; Marston, 1989). Other research studies (Crawford, et al., 2001; Good, et al., 2001; Stage, Jacobsen, 2001; Sibley, et al., 2001; McGlinchey, Hixon, 2004; Wiley, Deno, 2005) have examined CBMs as predictors of standardized test performance; however, no studies have examined the

possible predictive relationship between CBMs and the MAP test in the state of Nebraska. Therefore, the purpose of this study was to measure the efficacy of using CBMs, oral reading fluency and maze, as predictors of reading performance on the MAP test. Approval was received by the IRB committee; then the archival scores of the oral reading fluency, maze, and MAP assessments were collected from 376 elementary students, grades 2<sup>nd</sup> through 5<sup>th</sup>, in Nebraska.

The results from this study provide evidence that curriculum-based measurements assessing oral reading fluency alone and the combination of oral reading fluency and maze skills are predictive of performance on the MAP reading test. It appears that the oral reading fluency measure is a significantly better predictor of MAP reading scores than the maze measure in 2<sup>nd</sup> grade through 5<sup>th</sup> grade, but more so in 2<sup>nd</sup> grade in both semesters, fall and spring. Our initial hypothesis was that both curriculum-based measurements, oral reading fluency and maze, would be strong predictors of MAP reading scores in 2<sup>nd</sup> through 5<sup>th</sup> grades in both semesters because of the commonality of the test contents; however, this hypothesis was rejected.

The results of this study contribute to the literature and practice in several ways. First, the evidence obtained in the present study supports the idea of using oral reading fluency alone to monitor students' progress and to use it to target students who are at-risk of failing high-stakes reading tests. This information could also be utilized by schools to determine the possible need for interventions which would be based on student performance on the oral reading fluency. These results also suggest that if interventions are successfully implemented based on oral reading fluency scores, then standardized assessment results will potentially improve.

The results of this study cause one to question the need to administer the maze CBM since it appears that the oral reading fluency is a better predictor of performance on the MAP reading test. Since many of the participants in this study were ELL students (39 %), one cannot help to point out that this study supports the study done by Wiley and Deno (2005), in Minnesota, where they found that for English Language Learner (ELL) students, the oral reading fluency measures were a better predictor of performance on a state standardized assessment than the maze.

Several limitations in this study should be noted. First, the sample size of this study was very limited, only 376 students from one elementary school in the state of Nebraska. Future studies should be done using larger sample sizes with different populations in various states. Also, the MAPs predictive validity was only tested in three states, which did not include the state of Nebraska. A final limitation of this study is the limited ability to generalize these results to schools that may use a standardized test different from the MAP.

Although the results from the present study are promising, future studies need to be conducted to further examine the predictive relationship between reading CBM scores and the MAP or other standardized tests. Additional studies also need to be done to examine the relationship between CBM scores and other standardized assessments based on community, school, and student demographics, i.e. socioeconomic status, ethnicity, language, special education, etc. A final recommendation for future research involves the need for future studies to examine if math CBM scores can predict the MAP math composite scores and if reading and math CBM scores can predict academic performance on standardized tests districts and states use to examine student progress and adequate yearly progress.

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## STANDARTIZUOTO AKADEMINIO PROGRESO MATAVIMO TESTO REZULTATŲ NUMATYMAS TAIKANT MOKYMO PROGRAMA PAGRĮSTĄ SKAITYMO GEBĖJIMŲ VERTINIMĄ NEBRASKOJE

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**Santrauka. Problema.** Mokyimo programa pagrįsto gebėjimų vertinimo ir standartizuotų testų atlikimo sąsajos nagrinėjamos gana plačiai, tačiau šio vertinimo prognozinė vertė, numatant standartinio akademinio progreso matavimo testo rezultatus, apimant didelę populiacijos įvairovę Nebraskos valstijoje, nėra tyrinėta. **Tyrimo tikslas.** Įvertinti mokyimo programa pagrįstų skaitymo gebėjimų rodiklių (garsaus skaitymo sklandumo ir labirinto užduočių) efektyvumą, numatant akademinio progreso testo rodiklius Nebraskos valstijoje. **Metodika.** Tyrimui buvo panaudoti archyviniai duomenys iš valstybinių pradinėjų Nebraskos mokyklų, kuriose mokosi įvairaus kultūrinio pagrindo mokiniai. Iš viso tyrime dalyvavo 379 pradinės mokyklos mokiniai, besimokantys 2–5 klasėse. Mokyimo programa pagrįsti gebėjimų rodikliai, garsaus skaitymo sklandumas ir labirintas bei akademinis progresas buvo įvertinti 2009 metų pavasario ir rudens semestruose. **Rezultatai.** Tyrimo rezultatai atskleidė, kad garsaus skaitymo sklandumas ir skaitymo bei labirinto užduoties įverčių sąveika reikšmingai prognozavo akademinio progreso rodiklius ( $p < 0,05$ ) per abu semestrus. **Išvada.** Gauti rezultatai atskleidžia garsaus skaitymo sklandumo testo vertę mokinių pasiekimų progreso stebėsenai bei galimybes pritaikyti šį matą mokiniams, kuriems gali kilti sunkumų atliekant kitus skaitymo testus, atpažinti.

**Pagrindiniai žodžiai:** mokyimo programa pagrįsti rodikliai, standartizuoti testai, Akademinių progreso matas.

*Received: 07 10 2010*

*Accepted: 10 10 2010*