Running Head: CBM Predictors of Reading Achievement.

THE PREDICTORS IN CBM TESTING AND READING ACHIEVEMENT IN ELEMENTARY STUDENTS

By

JANIE R. EINERSON

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The Educational Leadership Faculty

Northwest Missouri State University Missouri

Department of Educational Leadership

College of Education and Human Services

Maryville, MO 64468

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ABSTRACT

This study was conducted in order to determine if there are any progress monitoring probes through Curriculum Based Measurement that are predictors of reading achievement on the Development Reading Assessment. The reading probes include; Letter Naming Fluency (LNF), Letter Sound Fluency (LSF), Phoneme Segmentation Fluency (PSF), Nonsense Word Fluency (NWF), and Reading Fluency (RCBM). The data was retrieved from a rural school district in Missouri. It consisted of four first grade classrooms of about 100 students total. Though no studies have been identified that measure reading probes as predictors for reading achievement, some current literature and research indicates that word reading and reading fluency has a strong relationship to overall reading ability.

The Results of a Regression Analysis performed with the group of first graders indicates that the Reading Fluency (RCBM) probe is both very strong and accurate, with high relative value, making it a significant predictor of reading achievement. The other probes consisting of Letter Naming Fluency (LNF), Letter Sound Fluency (LSF), Phoneme Segmentation Fluency (PSF), and Nonsense Word Fluency (NWF) also showed to be predictors of reading achievement with less significance.

INTRODUCTION

Background, Issues and Concerns

Curriculum Based Measurement (CBM) is a standardized formative assessment used in progress monitoring students, as well as for placement of Tier groups in many Response to Intervention programs. The CBM consists of four different probes that include; Letter Sound Fluency, Phoneme Segmentation Fluency, Word Identification Fluency, and Passage Reading Fluency all of which target first graders. Each of these four probes is given to students three times a year; fall, winter, and spring. It is the intent of this study to determine if any of these four probes is a predictor for reading achievement at the end of first grade according to the Developmental Reading Assessment (DRA).

The Development Reading Assessment (DRA) is a research-based assessment used to determine the child's independent reading level. It allows teachers to systematically observe, record, and evaluate change in student reading performance and to plan for and teach what each student needs to learn next. The DRA helps teachers pinpoint students' strengths and reading abilities in a one-on-one conference.

Practice Under Investigation

Currently in the selected school, all four probes are given to every student in the fall, winter, and spring. If one of these probes is a predictor for reading achievement, classroom teachers could administer only those probes to determine students who are most in need for Response to Intervention, as well focus instruction in on the skills that truly help support reading achievement.

School Policy to be Informed by Study

Currently the school studied, uses Curriculum Based Measurement (CBM) probes three times a year, fall, winter, and spring. Each of the four probes; Letter Sound Fluency, Phoneme Segmentation Fluency, Word Identification Fluency, and Passage Reading Fluency. The Development Reading Assessment (DRA) is also used three times a year to monitor reading achievement and drive instruction for classroom teachers. By using the data collected from each of these scores, CBM probes were studied to determine if there is a predictor for reading achievement on the DRA.

Conceptual Underpinning

Reading achievement is an essential skill for all first graders. Teachers can better guide instruction when they are able to focus in on the skills that help most in overall reading achievement. It also can eliminate unnecessary use of assessments when no correspondence in made in reading achievement. By using only the CBM probes identified with high predictive power, it would result in less testing, an increase in instructional time, and overall efficiency of student achievement.

Statement of the Problem

The selected school currently uses four probes to determine students who need more focused instruction through Response to Intervention. In addition to the four CBM probes administered three times a year, students also are given the DRA. The intent of this study is to determine which CBM probes are predictors for achievement on the DRA.

Purpose of the Study

The purpose of this study is to determine if any of the Curriculum-Based Measurement (CBM) probes, including Letter Sound Fluency, Phoneme Segmentation Fluency, Word Identification Fluency, and Passage Reading Fluency are indicators of reading achievement in the Development Reading Assessment (DRA) according to the end of year proficiency guidelines (DRA Independent Level 16).

Research Question

Is there a predictor of CBM scores and reading achievement determined by the end of the year DRA?

Null Hypothesis

There is no predictive power of CBM probes to reading achievement on the DRA.

Anticipated Benefits of the Study

The results of this study could help teachers focus in on the skills that make the greatest impact with overall reading achievement. This could also help to reduce the number of probes given to students who are progress monitored by using only those probes that help predict end of the year reading achievement.

Definition of Terms

Table 1

A representation of key terminology used throughout the research study.

Term	Definition

CBM: Curriculum Based measurement is a reliable and valid from of standardized measurement used to screen students or monitor progress in both reading and mathematics.

Development Reading Assessment (DRA): An individual researched-based reading assessment given to determine a student's individual reading level.

Letter Naming Fluency (LNF): Grade level reading probe given that consists of only letters to be named by student in a one minute timed test.

Letter Sound Fluency (LSF): Grade level reading probe given that consists of only letters that represent sounds to be named by student in a one minute timed test.

Nonsense Word Fluency (NWF): Grade level reading probe given that consists of various consonant vowel consonant (cvc) words that are to read by student in a one minute timed test.

Phoneme Segmentation Fluency (PSF): Grade level reading probe given that consists of read words that are to be segmented by student in a one minute timed test.

Reading Achievement: A student's overall level of attainment in any or all reading skills/ability, which is usually determined by the performance on a reading test.

Reading (RCBM): Grade level reading probe given that consists of a passage reading that is to be read by student in a one minute timed test.

Reading Fluency: The ability to read accurately, quickly, effortlessly, and with appropriate expression and meaning

Response to intervention (RTI): A researched- based program that integrates assessment and intervention within a multi-level prevention system to maximize student achievement and reduce behavior problems.

Tiered Instruction: Tiered instruction describes levels of instructional intensity within a multi-tiered prevention system.

Summary

The intent of the study was to determine the predicting power of CBM probes to reading achievement based off the Spring DRA level. First grade students were assessed using the CBM probes that include; Letter Sound Fluency, Phoneme Segmentation Fluency, Word Identification Fluency, and Passage Reading Fluency. The benefit of knowing which CBM probes predicts reading achievement will teachers to guide their instruction to focus on best predictor for reading achievement, as well as discontinue the use of probes that have no predictive power to eliminate unnecessary testing of students. With more direction of what skills help achievement overall reading time can be spent on instruction.

REVIEW OF LITERATURE

Curriculum based measurement procedures are being used more frequently across the United States to assess students' academic skills. These results are used for a variety of purposes such as, driving instruction, progress monitoring, entitlement, intervention planning, and other educational decision making (Merino & Beckman, 2010). With limited amount of funding and time it is important that districts find faster, easier, and inexpensive ways to use these Curriculum based measurements to help students be more successful with overall achievement.

Schools are also in need of measures that can predict students' performance on important assessment, such as state achievement tests, but also important assessments such as in areas of reading to provide early interventions for overall reading achievement (Merino & Beckman, 2010). No specific studies were found that measure predictive power of CBM probes (LNF, LSF, PSF, NWF, and RCBM) to reading achievement on the DRA. A study done by Michelle K. Hosp and Lynn S. Fuchs (2005) examined the predictive power of CBM probes and total reading scores on formals tests, such as the Woodcock Johnson Reading Mastery (WRMT-R). Research like this provides useful insight and supports many studies of CBM probes predictive relationship of proficiency on the MAP test and other like achievement tests. Throughout all the research identified with CBM probes as predictors for achievement on any of these various assessments, reading fluency probes provide the most predictive power to overall achievement (Hosp & Fuchs, 2005)

Reading is a critical academic skill students learn, which makes it crucial to find assessments that allow educators to efficiently and accurately screen, diagnose, and

monitor the progress of students' reading skills (Martinez, Aricak, & Jewell, 2008). When students are provided with early interventions to help with reading achievement as first graders, they will then have better opportunities for success on MAP testing proficiency in later graders.

Though Curriculum based measurement of reading is both valid and an excellent measure, some questions have been raised by educators on rather or some error might occur with students who are "word callers" (Hamilton & Shinn, 2003). This study by Chad Hamilton and Mark R. Shinn (2003) examined "word callers", students who read fluently but do not comprehend, compared to students who read more fluently with comprehension and their overall reading achievement. Another piece of this study examined whether or not professional judgment proved to be a better predictor for students overall reading achievement because of students who are simply reading the words fluently but not comprehending (Hamilton & Shinn, 2003). The study found that the CBM probe R-CBM remains the most accurate with predicting reading achievement in the classroom. Students who were "word callers" still tested lower than the students who read fluently but with comprehension. The R-CBM also remained to be a better predictor then professional judgment (Hamilton & Shinn, 2003).

Though all of these studies vary in purpose, each one resulted in R-CBM probe being the strongest predicator for overall proficiency in reading and other state assessments. This type of measurement provides a strong body of evidence that is valid and a very useful tool for all educators (Hamilton & Shinn, 2003).

RESEARCH METHODS

Research Design

The design method used in this study is a Multiple Regression Analysis. The independent variable is the CBM probes including; Letter Sound Fluency, Phoneme Segmentation Fluency, Word Identification Fluency, and Passage Reading Fluency, which is the predictor. The dependent variable is the estimated DRA Levels used to determine reading achievement.

Study Group Description

The study includes approximately 85 first graders in a rural, Midwestern school.

Data Collection and Instrumentation

Data in the study was collected through AIMS Web and the Developmental Reading assessment.

Statistical Analysis Methods

This study consists of a Regression Analysis of CBM probes and the ability to indicate reading achievement from reading scores on the Development Reading Assessment.

FINDINGS

Table 1: Regression Analysis for LNF vs. Fall DRA

Model: DRA = 0.183 LNF + -0.841 CNST

Source	Beta Coef.	R^2	SEE	F	p-value
Constant	-0.841				
LNF	0.183	23.34%	5.290	25.886	0.214E-5

Alpha = < 0.25

A simple linear regression was calculated predicting student's DRA score based on their LNF reading probe. The null hypothesis states that there is no predictive power of CBM probes to reading achievement on the DRA. The SLR Model shows that the DRA increases 0.183 points with every 1 point increase of the LNF, making the Beta Coefficient 0.183. The R^2 is 23.34% of the variance. The Standard Error of Estimate (SEE) is 5.290. This shows accuracy at + or – 5.290 points. The Model Power has less strength and accuracy. A significant regression equation was found. The p-value of 0.214E-5 is significantly less the Alpha level of 0.25. The F was 25.886, a relative value when compared to zero. The null hypothesis is rejected. The LNF probe is a predictor, though less power, in reading achievement.

Table 2: Regression Analysis for LSF vs. Fall DRA

Model: DRA = 0.139 LSF + 2.403 CNST

Source	Beta Coef.	R^2	SEE	F	p-value
Constant	2.403				
LSF	0.139	12.56%	5.605	12.207	0.758E-3

Alpha = < 0.25

A simple linear regression was calculated predicting student's DRA score based on their LSF reading probe. The null hypothesis states that there is no predictive power of CBM probes to reading achievement on the DRA. The SLR Model shows that the DRA increases 0.139 points with every 1 point increase of the LSF, making the Beta Coefficient 0.139. The R^2 is 12.56% of the variance. The Standard Error of Estimate (SEE) is 5.605. This shows accuracy at + or – 5.605 points. The Model Power has little strength and accuracy, though a significant regression was found. The p-value of 0.758E-3 is significantly less the Alpha level of 0.25. The F was 12.207, a relative small value when compared to zero. The null hypothesis is still rejected. The LSF probe is a predictor, though less power, in reading achievement.

Table 3: Regression Analysis for PSF vs. Fall DRA

Model: DRA = 0.122 PSF + 0.788 CNST

Source	Beta Coef.	R^2	SEE	F	p-value
Constant	0.788				
PSF	0.122	13.96%	5.606	13.792	0.364E-3

Alpha = < 0.25

A simple linear regression was calculated predicting student's DRA score based on their NWF reading probe. The null hypothesis states that there is no predictive power of CBM probes to reading achievement on the DRA. The SLR Model shows that the DRA increases 0.122 points with every 1 point increase of the PSF, making the Beta Coefficient 0.122. The R^2 is 13.96% of the variance. The Standard Error of Estimate (SEE) is 5.606. This shows accuracy at + or – 5.606 points. The Model Power has little strength and accuracy. A significant regression equation was found. The p-value of 0.364E-3 is significantly less the Alpha level of 0.25. The F was 13.792, a relative small value when compared to zero. The null hypothesis is still rejected. The LSF probe is a predictor, though less power, in reading achievement

Table 4: Regression Analysis for NWF vs. Spring DRA

Model: DRA = 0.158 NWF + 7.181 CNST

Source	Beta Coef.	R^2	SEE	F	p-value
Constant	7.181				
NWF	0.158	38.21%	6.571	52.549	1.791E-10

Alpha = < 0.25

A simple linear regression was calculated predicting student's DRA score based on their NWF reading probe. The null hypothesis states that there is no predictive power of CBM probes to reading achievement on the DRA. The SLR Model shows that the DRA increases 0.158 points with every 1 point increase of the NWF, making the Beta Coefficient 0.158. The R^2 is 38.21% of the variance. The Standard Error of Estimate (SEE) is 6.571. This shows accuracy at + or – 6.571 points. The Model Power is only somewhat strong and accurate. A significant regression equation was also found. The p-value of 1.791E-10 is significantly less the Alpha level of 0.25. The F was 52.549, a high relative value when compared to zero. The null hypothesis can be strongly rejected. The NWF probe is a relatively strong predictor in reading achievement

Table 5: Regression Analysis for RCBM vs. Spring DRA

Model: DRA = 0.166 RCBM + 7.415 CNST

Source	Beta Coef.	R^2	SEE	F	p-value
Constant	7.415				
RCBM	0.166	65.59%	4.904	162.017	2.159E-21

Alpha = < 0.25

A simple linear regression was calculated predicting student's DRA score based on their RCBM reading probe. The null hypothesis states that there is no predictive power of CBM probes to reading achievement on the DRA. The SLR Model shows that the DRA increases 0.166 points with every 1 point increase of the RCBM, making the Beta Coefficient 0.166. The R^2 is 65.59% of the variance. The Standard Error of Estimate (SEE) is 4.904. This shows accuracy at + or – 4.904 points. The Model Power is moderately strong and accurate. A significant regression equation was also found. The p-value of 2.159E-21 is significantly less the Alpha level of 0.25. The F was 162.017, a high relative value when compared to zero. The null hypothesis can be strongly rejected. The RCBM probe is a strong predictor in reading achievement

CONCLUSIONS AND RECOMMENDATIONS

The result of this study showed that with all five CBM probes, the null hypothesis is rejected. This concludes that each of these CBM probes; Letter Naming Fluency, Letter Sound Fluency, Phoneme Segmentation Fluency, Non-Sense Word Fluency, and Reading Fluency are all predictors in reading achievement.

When looking at each probe individually it is important to consider the significance, power and accuracy. The R-CBM probe showed to be the strongest predictor among any of the other CBM probes. It was both strong and accurate within the regression model. The NSW probe was also significant. It was fairly strong and accurate when examining the model power. LNF, LSF, and PSF all rejected the null but with much less strength and accuracy. Though they do have predictive power in overall reading achievement it is significantly less.

The recommendations for this school would be to predict reading achievement overall with less testing would be for just two of these CBM probes to given in the fall and spring. These probes would include Non-Sense Word Fluency and Reading Fluency. Both of these probes are conclusive and would have clear results that could be used to drive reading instruction. This would also result in less probes be given overall making testing time from over five minutes to just over two minutes for each student. This would be a considerable amount of time that a teacher could use to build in more instruction and guided practice of reading, instead of using it to administer CBM probes that have little predictive power.

As educators continue to become more efficient with CBM testing, further studies with CBM probes and their predictive power would provide more evidence to what probes should be used when predicting overall reading achievement. When looking at predictive power of CBM probes it would also be beneficial to expand research to across the grade levels. If each grade level could find the probes with the best predictive power for reading achievement, early intervention could occur, with instruction that could be more focused on that student's needs.

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