Predicting Performance on the Tennessee Comprehensive Assessment for Third Grade Reading Students using Reading Curriculum Based Measures

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The purpose of this study was to investigate the relationship between three predictor variables (Fall R-CBM, Winter R-CBM, and Spring R-CBM) and the Tennessee Comprehensive Assessment Program third grade reading and language arts assessment. The population selected for this study included all third grade students from an East Tennessee school district. The third graders attended 13 schools and included 770 students. Approximately 47% of the students were economically disadvantaged.

Each data set included three R-CBM scores expressed in words read correctly and TCAP reading language arts scale scores. The results reflected a strong predictive relationship between the AIMSweb R-CBM and TCAP reading/language arts measure for third grade students. Zero order correlations in the multiple regression analysis ranged from r = .70 to r = .74 for the three predictor variables.

Introduction

Educators, researchers, politicians, and the public have debated the reform of our nation's public education system for several decades. Several reform models have been implemented in public schools to address this concern (Shores & Chester, 2009). Our nation has set the lofty goal in the reauthorization of the Elementary and Secondary Education Act (ESEA) of 2001 that all students will read on grade level by 2014 (No Child Left Behind [NCLB], 2002). In September of 2011 the United State Department of Education, with the looming requirement that all students read on grade level by 2014, offered state educational agencies the opportunity to propose alternative reform models. This was intended to be a temporary measure until Congress passed a reauthorization of the ESEA that could address weaknesses of the previous legislation. In exchange for adopting educational reforms states were permitted relief from the three key provisions of the NCLB Act. A significant problem with the continued implementation of NCLB was the number of states, districts, and schools that faced penalties because of the rigid pass/fail nature of performance benchmarks that were set to reach 100% proficiency of all students in the 2014 school year. This led to the realization that almost all schools and districts would fail to meet adequate yearly progress (AYP). This was coupled with the progressively rigid penalties for failing to move a sufficient number of students in each identified subgroup to proficiency in the areas of reading/language arts, mathematics, and graduation rate. State flexibility waivers were designed to address what are viewed as

shortcomings of the 2001 reauthorization of the ESEA.

In exchange for relief from NCLB requirements states were required to raise expectations in their academic standards and were encouraged to adopt the rigorous Common Core State Standards (CCSS) published by the National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). If the rigorous CCSS English and language arts standards are to be realized, schools will need to change current practices to achieve the desired results. A National Research Council study cited by Heller, Holtzman, and Messick (1982) was credited as the source for the response to treatment model. This model evolved into what is commonly known as Response to Intervention (RTI) or Response to Instruction (Gerber, 2005). The National Reading Panel Report (National Institute of Child Health, 2000) recommended a three-tiered intervention model based on the principals of RTI.

The participating school district in this study used a three-tiered intervention model similar to that used in Tennessee Reading First Schools (Tennessee Department of Education, Tennessee Reading First, 2006). This intervention model followed the recommendation of the National Reading Panel and operated as a general education intervention model that required 90 minutes of high quality research based instruction was provided to all students. The classroom teachers were given universal screening or benchmark R-CBM data three times per year on each student assigned to their classroom. If a student scored below the pre-established cut score measured in words read correctly (WRC), weekly individual R-CBM progress monitoring probes would be given for 6 weeks and differentiated instruction was provided by the classroom teacher in a small group during reading instruction. If insufficient progress was made during the 6-week period, the student would enter tier two intervention. The student would continue the weekly progress monitoring established in tier one, as well as an additional 30 minutes of reading intervention provided by the classroom teacher or a trained paraprofessional. If the student was not successful with this level of support as measured by R-CBM progress monitoring data, after 12 weeks the student would progress to tier three. In tier three the student would be provide an additional 60 minutes of small group instruction in combination with the 90-minute differentiated core reading curriculum.

Vaughn and Roberts (2007) identified effective leadership as an essential factor in RTI implementation. According to Vaughn and Roberts leaders must be "committed to prevention –oriented practices" and "curriculum leaders who are willing to assure that scientifically based practices are implemented" (p.45). Sindelar, Shearer, Yendol-Hoppey, and Liebert (2006) found that teachers were more likely to embrace school reform when instructional changes targeted that hardest to educate students, and teachers received ongoing support and training. For teachers and administrators to become more data driven the authors cited a need for timely evaluation that was then used to inform instruction. It may also benefit schools to have a meaningful predictor of student achievement as measured by the NCLB mandated high stakes summative assessment (Sindelar et al., 2006).

Statement of the Problem

The purpose of this study was to investigate the relationship between a formative reading curriculum based measure (R-CBM) and the Tennessee Comprehensive Assessment Program third grade reading/language arts assessment. If a correlation between the two assessments is found, it would provide teachers and administrators an assessment that requires little time to track students' progress in the critical skills of reading. The RTI process could be more closely tied to student proficiency and the adequate yearly progress (AYP) students and schools must

show in annual high stakes assessment. NCLB requires schools and school districts to meet AYP goals for all students as well as all subgroups. This was a concern because some groups have been historically low performing on state-wide assessments. It was important to assess how well the RTI (three tiered intervention model and R-CBM scores) identify the students at risk of not achieving state proficiency standards. Identifying how well R-CBM scores identified students who are at risk of not meeting AYP as measured by TCAP reading and language arts scores was the goal of this study. While similar studies have been conducted in other states, the relationship between Tennessee's TCAP reading and language arts assessment and R-CBM has not yet been established.

Significance of the Study

The No Child Left Behind Act (NCLB) required that students demonstrate proficiency on state academic standards as measured by annual criterion-referenced state assessment in reading (Standerfer, 2006). In 2012 Tennessee was granted a flexibility wavier by the U.S. Secretary of Education that granted relief from key provisions of the NCLB act in exchange for creating ambitious goals for students in achievement on state mandated assessments in reading and language arts and mathematics and adopting more rigorous CCSS and corresponding assessments. Many public school teachers feel pressure to increase students' academic growth in reading and mathematics and the number of students achieving proficiency as measured by students' proficiency on high stake assessment. As the required proficiency level increases each year, it becomes more important to identify students who are not progressing as soon as possible to maximize students' outcomes. This research seeks to build on the body of knowledge in reading assessment by providing educators a better understanding of critical information regarding the predictive values of a widely used, commercially available standardized reading assessment (R-CBM). A review of the literature did not yield any widely published studies that examined the predictive value of R-CBM to the T-CAP reading and language arts assessments. The population in this research was significantly robust to offer utility in predicting which students were at-risk of scoring below the proficient level on the state mandated reading and language arts assessment (Baker et al., 2008; Cummings, Atkins, Allison & Cole, 2008; Foorman et al., 2006; Fuchs, 2004; Hintze & Silberglitt, 2005; McGlinchey & Hixson, 2004; Stage & Jacobsen, 2001; Wood, 2006; Zimmerman & Dibenedetto, 2008).

Delimitations and Limitations

This research was conducted in a school district located in East Tennessee. The participating school district has a student population of 10,761 and 712 teachers (Tennessee Department of Education, 2011). This largely rural, growing suburban, district included 55.1% of students identified as economically disadvantaged and 13.3% of students identified as students with disabilities. This study was delimited to all third grade students in 13 elementary schools. Therefore, this research may not be generalizable to other locations, groups or grades.

The population consisted of all third grade students in an East Tennessee public school district during the 2010-2011 school year. The data analyzed in this study were archival data of 911 third grade students who participated in the TCAP reading assessment and three R-CBM assessments (fall, winter, and spring). Some students were eliminated from the study because they did not complete all four assessments.

Research Method

Four research questions were developed to investigate the relationship between a formative reading curriculum based measure (R-CBM)

and the Tennessee Comprehensive Assessment Program (TCAP) third grade reading/language arts assessment. A multiple regression analysis was conducted to determine the predictive relationship between fall, winter, and spring R-CBM scores and the TCAP reading assessment for the student population based on gender and socioeconomic status (Gall, Berg, & Gall, 2007). All calculations were performed using the statistical software package IBM-SPSS with an alpha level of .05. Archrival data were received with student identifiable information redacted. Each data set included three R-CBM scores expressed in words read correctly (WRC) and TCAP reading language arts scale scores, with gender and free and reduced price meal lunch eligibility information for all third graders. Table 1 displays the distribution of third grade students participating in the study by gender and economic status as determined by students qualifying for free or reduced priced meals.

Data Analysis

Research Question 1: Is there a significant relationship between a linear combination of the predictor variables (fall, winter, and spring R-CBM score) and the criterion variable TCAP reading proficiency scores?

A multiple regression analysis was conducted to evaluate how well the (fall, winter, spring, and median R-CBM score) predicted TCAP reading proficiency scores. The predictors were the three R-CBM scores, while the criterion variable was the TCAP reading proficiency score. The linear combination of R-CBM scores was significantly related to the TCAP reading score, $F(3, 766) = 288.13$, $p < .001$. The sample multiple correlation coefficient was .73, indicating that approximately 53% of the variance of the TCAP reading score in the population can be accounted for by the linear combination of R-CBM scores.

In Table 2 the indices indicate the relative strength of the individual predictors. All the bivariate correlations between the R-CBM scores and the TCAP reading score were positive and all three indices were statistically significant. On the basis of these correlational analyses, it appears that all three indices are equally predictive of TCAP reading scores. However, judgments about the relative importance of these predictors are difficult because they are strongly correlated. The correlations among the R-CBM scores ranged from .91 to .93.

Research Question 2: For males, is there a significant relationship between a linear combination of the predictor variables (fall, winter, and spring R-CBM score) and the criterion variable TCAP reading proficiency scores?

A multiple regression analysis was conducted to evaluate how well the (fall, winter, and spring R-CBM score) predicted TCAP reading proficiency scores for male third grade students. The predictors were the three R-CBM scores, while the criterion variable was the TCAP reading proficiency score. The linear combination of R-CBM scores was significantly related to the TCAP reading score, $F(3, 368) = 147.50$, $p < .001$. The population multiple correlation coefficient was .74, indicating that approximately 54% of the variance of the TCAP reading score in the population of male students can be accounted for by the linear combination of R-CBM scores.

In Table 3 the indices indicate the relative strength of the individual predictors. All the bivariate correlations between the male students' R-CBM scores and the male students' TCAP reading and language art score were positive and all three indices were statistically significant. The partial correlations between fall R-CBM scores and spring R-CBM scores and TCAP reading and language art scores were significant. On the basis of these correlational analyses, fall is about as predictive of boys' TCAP reading scores as winter and spring. However, judgments about the relative importance of these predictors are difficult because they are strongly correlated. The

correlations among the R-CBM scores ranged from .89 to .93.

Research Question 3: For females, is there a significant relationship between a linear combination of the predictor variables (fall, winter, and spring R-CBM score) and the criterion variable TCAP reading proficiency scores?

A multiple regression analysis was conducted to evaluate how well the female students' (fall, winter, spring, and median R-CBM score) predicted TCAP reading proficiency scores for female third grade students. The predictors were the three R-CBM scores, while the criterion variable was the TCAP reading proficiency score. The linear combination of R-CBM scores was significantly related to the TCAP reading score, $F(3, 360) = 132.90$, $p < .001$. The population multiple correlation coefficient was .73, indicating that approximately 53% of the variance of the TCAP reading score in the population of female students can be accounted for by the linear combination of R-CBM scores.

In Table 4 the indices indicate the relative strength of the individual predictors. All the bivariate correlations between the female students' R-CBM scores and the female students' TCAP reading score were positive and all of the indices were statistically significant. The partial correlations between fall R-CBM and winter R-CBM scores and TCAP reading scores were significant. On the basis of these correlational analyses, fall is about as predictive of girls' TCAP reading scores as winter and spring. However, judgments about the relative importance of these predictors are difficult because they are strongly correlated. The correlations among the R-CBM scores ranged from .91 to .93.

Conclusion

The findings of the study suggest that there is a significant relationship between a linear combination of predictor variables (fall, winter, and spring R-CBM scores) and the criterion variable TCAP reading/language arts scores. R-CBM and TCAP reading/language arts scores are likely correlated because they share a common cause, such as basic reading fluency skills.

As a result of the analyses, it was determined that R-CBM scores were strong predictors of TCAP reading/language arts scores for third grade students in this population. This finding was in agreement with Roehrig, Petscher, Nettles, Hudson, & Torgesen (2008) who found a strong relationship r =.66 to .71 between R-CBM and the Florida Comprehensive Assessment Test (FCAT) reading assessment. The result also supported the findings of Hintze and Silberglitt (2005) that found a strong correlation between R-CBM (fall, winter, and spring) and the Minnesota Comprehensive Assessment (MCA) in reading subtest. This study will contribute to the growing body of research that seeks to evaluate the ability of R-CBM to predict student outcomes on group administered standardized measures of reading, reading comprehension and standards based criterion measures of reading (Baker et al., 2008; Crawford et al., 2001; Hintze & Silberglitt, 2005; McGlinchey & Hixson, 2004; Roehrig, Duggar, Moats, Glover, & Mincey, 2008; Sibley, Biwer, & Hesch, 2001; Stage & Jacobsen, 2001; Wood, 2006).

A significant finding was that fall R-CBM scores were about as good as winter or spring R-CBM scores at predicting TCAP reading and language arts scores. The results of this study support the use of R-CBM in measuring global reading skills as measured by the TCAP reading/ language arts assessment. The fall R-CBM offers teachers and schools the timeliest data to make changes to improve student reading outcomes as measured in the TCAP reading and language arts assessment. The strength of the R-CBM predictive relationship for TCAP reading and language arts scores was similar for all students despite gender or economic status.

The strength of the positive linear relationship between R-CBM (fall, winter, spring, and median) and the TCAP reading and language scale score made it possible to develop linear equations. This equation predicts TCAP reading/ language arts scores with a reasonable level of confidence (approximately 50%, of the variation). A fall R-CBM score of 99 words read correctly predicts a TCAP reading and language arts score of 760.36. The cut score for proficiency on the TCAP reading and language arts was 760. The R-CBM results for predicted proficiency on the TCAP reading and language arts assessment for third grade students in this study was in agreement with Fountas and Pinnell's Recommended Oral Reading Rates (2009) for third grade students which suggested that third grade students should earn a R-CBM score of 100 – 140 words read per minute. A winter R-CBM score of 116 words read correctly predicts a proficient TCAP reading and language arts score of 760.51. A spring R-CBM score of 133 words read correctly predicts a proficient TCAP reading and language arts score of 760.40.

The use of this equation may allow teachers to determine appropriate instructional goals for students in the area of reading and periodically monitor a student's progress using commercially available R-CBM 1-minute assessments. Using the fall R-CBM scores a teacher may be able to identify students at risk of not reaching proficiency while sufficient time exists to change the intensity, duration, and methods of reading instruction to prevent the student from achieving a less than proficient score on the high stakes assessment.

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Tables

Table 1: Demographics

Economic Status	Male	Female	Total	%
Economically disadvantaged	169	196	364	47.4
Not economically disadvantaged	203	202	406	52.6
Totals	372	398	770	100

Table 2: The Bivariate and Partial Correlations of Predictors with TCAP Reading/Language Arts Score

R-CBM	Beta	t	p	Zero order correlations	Partial correlations
Fall R-CBM	0.23	3.23	.001*	0.71	0.12
Winter R-CBM	0.26	3.04	.002*	0.71	0.11
Spring R-CBM	0.26	3.56	.001*	0.71	0.13

*significant

Table 3: The Bivariate and Partial Correlations of Predictors for Males with TCAP Reading/ Language Arts Score

R-CBM	Beta	t	p	Zero order correlations	Partial correlations
Fall R-CBM	0.26	2.66	.008*	0.72	0.14
Winter R-CBM	0.20	1.80	.073	0.72	0.09
Spring R-CBM	0.31	3.36	.001*	0.72	0.17

*significant

Table 4: The Bivariate and Partial Correlations of Predictors for Females with TCAP Reading/Language Arts Score

R-CBM	Beta	t	p	Zero order correlations	Partial correlations
Fall R-CBM	0.21	2.14	.042*	0.69	0.10
Winter R-CBM	0.34	2.71	.007*	0.70	0.14
Spring R-CBM	0.17	1.46	.146	0.69	0.07

*significant

Table 5: The Bivariate and Partial Correlations of Predictors for Economically Disadvantaged with TCAP Reading/Language Arts Score

R-CBM	Beta	t	p	Zero order correlations	Partial correlations
Fall R-CBM	0.22	2.05	.041*	0.70	0.11
Winter R-CBM	0.27	2.24	.031*	0.71	0.11
Spring R-CBM	0.26	2.65	.014*	0.70	0.13

*significant

Authors' Note:

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