Research Article

Superintendent Longevity and Student Achievement in North Carolina Public Schools

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Abstract

Researchers examined the relationship between superintendent longevity and district variables on standardized test scores for students in North Carolina. The authors used hierarchical multiple regression to understand if superintendent-specific variables explained variance in student performance over and above district-based variables documented in the research literature. The continuous predictors were the percentage of students who receive free or reduced lunch (FRL), school size, and superintendents' levels of experience. This study illustrates that the issue of whether superintendents affect student achievement is not an all or nothing proposition. While superintendents can influence student achievement, particularly as their in-state experience increases, there are district predictors that must be considered.

Key Words

superintendent, student achievement, superintendent longevity, free and reduced meals

Role expectations for school superintendents have changed since the Buffalo, New York Common School Council appointed the first superintendent in 1837 to ensure the system operated effectively (Carter & Cunningham, 1997). At that time, the position included responsibilities such as "advisor to the board, the leader of reforms, the manager of resources, and the chief communicator to the public" (p. 24). The role was largely managerial in nature throughout the 19th and much of the 20th century (Thomas & Moran, 1992), with success defined in terms of system efficiency (Andero, 2001).

Reform efforts of the late 1980's broadened the role of the superintendent to include instructional leadership and student academic achievement (Hoyle, Bjork, Collier, & Glass, 2005; Kowalski, 2013), thereby making the job more challenging (Sharp, Malone, & Walter, 2001).

In addition to improving student achievement and being accountable for students achieving specific results (Bredeson & Kose, 2007), superintendents are expected to address an array of societal issues, including diversification of students and staff, increased governmental mandates, the explosion of technology, and the globalization of society (Kowalski, McCord, Petersen, Young, & Ellerson, 2011). Ashbaugh (2000) reported this to be a change from "building construction, business management, personnel, and publications to the main business of education—instruction" (p. 9). Along with superintendents being accountable for academic results, the managerial functions for which the position was originally created must still be handled effectively; in fact, school boards often cite managerial deficiencies as a reason for superintendent turnover (Sharpe et al., 2001).

Even as the role evolves, superintendents remain responsible for the success or failure of schools within their districts (Rammer, 2007), a challenge that has been heightened by financial constraints that have led to lawsuits over school funding throughout the country (LaMorte, 2011).

While past measures of success were largely based on the extent to which local communities were pleased with their schools, the introduction of No Child Left Behind shifted success norms to student performance on standardized tests (Rammer, 2007). Chingos, Whitehurst, and Lindquist (2014) noted that superintendents receive tremendous credit when student scores on standardized tests are high and just as much blame when they are not, with this emphasis on test outcomes resulting in some superintendents being forced out of their jobs.

These added stressors have contributed to superintendent turnover, thereby decreasing the length of superintendent tenure. While increased accountability through high stakes testing has heightened pressure on superintendents (Alborano, 2002), the greatest challenge they face is that superintendents are highly visible people charged with negotiating through bitterly competing political interests (Glass, Bjork, & Brunner, 2000).

As a result, many school districts find it difficult to retain their superintendents (Kowalksi, 2003; Lamkin, 2006); the typical superintendent has assumed his or her position for three to four years (Chingos et al, 2014). Consequently, the superintendency is increasingly viewed as a temporary position, with boards of education and superintendents expecting a lack of longevity among superintendents (Clark, 2001).

Limited superintendent longevity is consequential for a variety of reasons. First, Kamrath (2015) argued that superintendent turnover created frustration within school districts due to ever-shifting priorities among school leaders, resulting in improvement efforts that are often not sustained. School personnel consistently reported that they wanted to see their superintendent remain in the position longer, believing that leadership stability was helpful for schools' success.

Second, substantiating this belief is Whittle's (2005) research indicating that highly successful corporations had CEO's with much longer tenure than their school superintendent counterparts, suggesting that the same organizational stability that benefitted corporations would benefit schools.

Third, researchers have suggested that leadership stability contributes to organizational success while superintendent turnover creates academic instability and organizational dysfunction (Grady & Bryant, 1989; Marzano & Waters, 2009; Yee & Cuban, 1996).

If district and superintendent success are measured largely by standardized test results, and if districts struggle to keep superintendents long-term, analyzing the relationship between superintendent longevity and the academic achievement of students is a salient issue. Extant research on this matter consists largely of case studies about superintendents who have been perceived to be successful without answering the empirical question about their impact on student achievement (Chingos et al., 2014).

In addition, meta-analyses have found a statistically significant relationship between specific superintendent behaviors and student achievement. For example, student success improved when superintendents established non-negotiable student performance goals, developed principals as instructional leaders, facilitated staff development, evaluated the instructional program, and monitored student academic success (Marzano & Waters, 2009; Peterson & Barnett, 2005). Support of these contentions was Myers (2011) research, indicating that the length of a superintendent's tenure significantly affected 3rd grade reading scores in Kansas, with a positive correlation between the total number of years as a superintendent and these test scores.

Meier and O'Toole (2001) also reported that the amount of time a superintendent served in Texas districts in any capacity was positively correlated with student outcomes on the Texas Assessment of Academic Skills (TAAS), a high stakes test used to rate school districts in that state.

However, Alsbury (2008) found that in smaller, rural districts (comprised of less than 500 students), the length of superintendent tenure was negatively correlated with student test scores. More recently, Chingos et al. (2014) found that district and community factors affected achievement much more than superintendent variables.

For example, the relationship between poverty and lower achievement has been well established (Institute for Public Policy and Economic Development, 2016; Levin, 2007), and some research suggests that district size may also impact student outcomes (Howley, 1996; Leithwood & Jantzi, 2008). Therefore, Chingos et al (2104) asserted, "The transformative school district superintendent who single-handedly raises student achievement through dent of will, instructional leadership, managerial talent, and political acumen may be a character of fiction rather than life" (p.14).

Due to the inconclusive nature of superintendent-specific variables such as retention in the job and district-specific variables, such as the percentage of students receiving free and reduced lunch on student performance, this study investigated the impact of school superintendent experience on student achievement. To that end, 2016-17 North Carolina Accountability and Testing results for all of the state's 115 school districts were used to demonstrate student achievement.

Specifically, North Carolina annually administers End-of-Grade (EOG) standardized tests in reading and mathematics in grades 3 - 8 and an EOG in science in grades 5 and 8. The state also administers End-of-Course (EOC) standardized tests in English II, Mathematics I, and Biology high school classes. A student EOG or EOC score of "3" or higher on a 5-point scale is deemed "proficient." The percentage of students who meet proficiency is reported for federal, state, and local accountability purposes.

In this study, researchers examined the relationship between superintendent and district predictive variables on student academic achievement in 2016-17. Student academic achievement measures included each district's performance composite score, defined as the number of proficient scores on all EOG and EOC tests divided by the number of all scores from those tests. The performance composite was selected because it reflects all EOG and EOC tests, includes multiple grade levels, and is often used to describe overall district performance.

Other student achievement outcome variables included the percentage of students who scored a "3" or higher on each of the following EOGs: (1) 5th grade reading, (2) 5th grade mathematics, (3) 5th grade science, (4) 8th grade reading, (5) 8th grade mathematics, (6) 8th grade science. The 5th and 8th grade tests were used because those grade levels typically represent the end of the elementary and middle school grade spans (North Carolina Department of Public Instruction, 2000). Specifically, the researchers sought to answer the following questions:

- What is the relationship between the superintendent's total number of years of experience as a superintendent in any school district and student academic achievement as measured by the district's performance composite score, percent proficient on 5th grade reading, mathematics, and science EOG tests, and the percent proficient on 8th grade reading, mathematics, and science EOG tests in the 2016-17 school year?

- What is the relationship between the number of years the superintendent has served as the leader of the North Carolina school district and student academic achievement as measured by the district's performance composite score, percent proficient on 5th grade reading, mathematics, and science EOG tests, and the percent proficient on 8th grade reading, mathematics, and science EOG tests in the 2016-17 school year?

- What is the relationship between the number of years of experience the 2016-17 superintendent had in education prior to becoming a superintendent and student academic achievement as measured by the district's performance composite score, percent proficient on 5th grade reading, mathematics, and science EOG tests, and the percent proficient on 8th grade reading, mathematics, and science EOG tests in the 2016-17 school year?

- What is the relationship between the percentage of students in the district who qualify for free or reduced meal prices and student academic achievement as measured by the district's performance composite score, percent proficient on 5th grade reading, mathematics, and science EOG tests, and the percent proficient on 8th grade reading, mathematics, and science EOG tests in the 2016-17 school year?

- What is the relationship between the total student enrollment of a North Carolina school district and student academic achievement as measured by the district's performance composite score, percent proficient on 5th grade reading, mathematics, and science EOG tests, and the percent proficient on 8th grade reading, mathematics, and science EOG tests in the 2016-17 school year?

Five predictive variables (three dealing directly with the superintendent and two dealing with demographic factors of districts) were recorded for each district. The superintendent-specific predictors used in this study from the 2016-17 school year included:

- each superintendent's total years of experience as a superintendent in any district;

- each superintendent's total years of experience as superintendent in the 2016-17 North Carolina district; and

- each superintendent's total years of experience in education prior to becoming a superintendent.

The predictors used in this study that were related to district demographics were chosen to help define the districts' financial situation. These included each district's percentage of 2016-17 students eligible for free or reduced lunch and each district's total number of students.

Methods

The authors used hierarchical multiple regression to understand if the addition of superintendent-specific variables explained variance in student performance—assessed by standardized test scores—over and above district-based variables documented in the research literature. The continuous predictors were the percentage of students who receive free or reduced lunch (FRL), school size, superintendents' level of experience (total years of experience as a superintendent [anywhere in the country], total years of experience as a superintendent in North Carolina, and total years of experience in education prior to having served as a superintendent).

Findings from peer-reviewed journals indicate that school districts with a higher percentage of students eligible for free or reduced lunch (FRL), are also districts that have a lower percentage of students who score at or above "proficient" on North Carolina's standardized test scores (Sass, Hannaway, Xu, Figlio, & Feng, 2012; Southworth, 2010 Sass). Thus, the authors took the percentage of students eligible for FRL, as well as another district-specific variable – school size – to discern the percentage of variance in student success explained by superintendent-specific characteristics.

In total, the authors conducted seven sequential regression analyses, each with a different outcome measure, which was the superintendents' district-level standardized test results. Specifically, the outcome metrics were the percentage of students who scored at the

level of proficient or better for: North Carolina's 5th grade Reading EOG, 5th grade Math EOG, 5th grade Science EOG.

Additional outcomes included the same percentages on the 8th grade Reading EOG, 8th grade Math EOG, 8th grade Science EOG, and the performance composite for all EOG and EOC tests.

Results

Assumptions for each of the seven Hierarchical Regression equations were met: these data were linear as per an assessment of partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals according to Durbin-Watson statistics. Visual inspection of a plot of studentized residuals versus unstandardized predicted values also indicated these data were homoscedastic. Collinearity diagnostics indicate that tolerance values did not exceed 0.1 and correlations between predictors were all below 0.5. In one instance, a studentized deleted residual was greater than ±3 standard deviations, suggesting the possibility of a data entry or other error. No such issues were evident; thus these data were retained. Also met, as per the Q-Q Plot, was the assumption of normality.

Not strongly correlated with the outcome variable was the size of the district in which each superintendent worked, and as such, this variable did not add to the predicted variance in student success. As a result, the only district-specific variable retained in the models were the percentage of students eligible for FRL.

Predictors of 2016-17 NC accountability and testing results performance composite

R^2 for the overall model was 53.8% with an adjusted R^2 of 52.1%, a large effect size according to Cohen (1988). FRL and superintendent-based variables statistically significantly predicted the 2016-17 NC Accountability and Testing results performance composite of standardized test scores over multiple grades, $F(1, 96) = 40.059$, $p < .0005$. Two of the four variables—FRL and the total years of experience as a superintendent in North Carolina superintendents'—added statistically significantly to the prediction, $p < .05$.

Predictors of fifth grade reading, math and science proficiency

Reading. R^2 for the overall model was 40.5% with an adjusted R^2 of 38.4%, a medium effect size according to Cohen's guidelines (1988). FRL and superintendent-based variables statistically significantly predicted the standardized test scores for 5th grade Reading Proficiency, $F(4, 110) = 18.753$, $p < .0005$. One of the four variables—FRL—added statistically significantly to the prediction, $p < .05$.

Math. R^2 for the overall model was 27% with an adjusted R^2 of 24.4%, a small to medium effect size (Cohen, 1988). FRL and superintendent-based variables statistically significantly predicted the standardized test scores for 5th grade Math Proficiency, $F(4, 110) = 98.618$, $p < .0005$. Again, one of the four variables—FRL—added statistically significantly to the prediction, $p < .05$.

Science. R^2 for the overall model was 23.3% with an adjusted R^2 of 20.5% and effect size similar to the ones noted above. FRL and superintendent-based variables statistically significantly predicted the performance of 5th grade Science Proficiency, $F(4,110) = 8.351$, $p < .0005$. One of the four variables—FRL—added statistically significantly to the prediction, $p < .05$.

Predictors of eighth grade reading, math and science proficiency

Reading. R^2 for the overall model was 48.9% with an adjusted R^2 of 47.1%, a moderate to large effect size (Cohen, 1988). FRL and superintendent-based variables statistically significantly predicted the standardized test scores for 8th grade Reading Proficiency, $F(4, 110) = 26.332$, $p < .0005$. Again, one of the four variables—FRL—added statistically significantly to the prediction, $p < .05$, however, years of experience as a superintendent in North Carolina was almost statistically significant, $p = .07$.

Math. R^2 for the overall model was 43.8% with an adjusted R^2 of 41.8%, and, much like above, a moderate to large effect size (Cohen, 1988). FRL and superintendent-based variables statistically significantly predicted the performance of 8th grade math proficiency, $F(4,110) = 21.443$, $p < .0005$. One of the four variables—FRL—added statistically significantly to the prediction, $p < .05$, however, years of experience as a superintendent, overall, was almost statistically significant, $p = .09$.

Science. R^2 for the overall model was 44.1% with an adjusted R^2 of 42.1% -- again, a moderate to large effect size (Cohen, 1988). FRL and superintendent-based variables statistically significantly predicted the performance of 8th grade science proficiency, $F(4,110) = 21.702$, $p < .0005$. One of the four variables—FRL—added statistically significantly to the prediction, $p < .05$, however, years of experience as a superintendent, overall, was almost statistically significant, $p = .09$ as was years of experience as a superintendent in North Carolina.

Discussion

The results of this study indicate how explaining variance in student achievement is not a monolithic pursuit; the degree of variance explained by a model, as well as the statistical significance of superintendent-level predictors differs by outcome measure—in this case, by grade level and by metric. For example, a statistically significant predictor of proficiency on the 2016-17 NC Accountability and Testing results performance composite score, over and above the percentage of students' eligible for FRL, was the district superintendent's experience in North Carolina.

This was not the case for 5th grade Reading, Math or Science standardized test scores. Yet, the re-emergence of moderate to strong effect sizes, as per the coefficient of determination or explained variance in the outcome variable, was evident for 8th grade Reading, Math and Science standardized test scores. Additionally, superintendent-specific variables such as years of experience as a superintendent as well as years of experience as a superintendent in North Carolina approached statistical significance in predicting student success in 8th grade—as per standardized test scores. The only superintendent-specific variable that was reliably non-statistically significant was the amount of experience in education superintendents had prior to assuming their role as superintendent.

These findings were mirrored in another study, which found that the percentage of students eligible for FRL and the superintendents' years of experience as a superintendent in New Jersey were statistically significant predictors of 3rd grade scores on the New Jersey Assessment of Skills and Knowledge (NJ ASK) test in Language arts (Plotts & Gutmore, 2014). However, this North Carolina study contributes to extant research about superintendent longevity and student success by using multiple student achievement outcome measures from multiple grade levels.

Several implications arise.

First, this study supports that superintendents can influence student achievement and that they become more effective in doing so as they gain in-state experience. While FRL remains a significant obstacle, the superintendent's in-state experience can help offset this challenge.

These findings also suggest that policies and practices that encourage superintendent longevity may also support student achievement. Superintendents with more in-state experience are likely to have a thorough understanding of the state's curriculum and testing programs, and according to Meier & O'Toole (2001), the organizational stability and professional relationships needed to provide effective leadership.

Second, this study illustrates that the issue of whether or not superintendents affect student achievement is not an all or nothing proposition. While we concluded that superintendents do have some influence on student achievement, particularly as their in-state experience increases, there are district predictors that must be considered. Attempts to explain variation in achievement must include multiple factors, such as superintendent experience (particularly in-state experience), FRL, multiple grade levels, and various measures of achievement. Our findings suggest that the notion that superintendents can dramatically affect achievement though heroic measures is overstated. However, our findings also suggest that they are not completely captive to district variables that are largely beyond their control.

There are some limitations to this study that suggest future work. This study used data from one state, thereby limiting the generalizability of findings. While superintendent jobs are similar across states (Kowalski, 2013), the external validity of these findings will depend upon cross-state replications. The use of one year's data, while informative, also suggests the need for replication using additional years' data.

Given the importance of superintendents' longevity in predicting students' success, beyond that which is explained by the percentage of students who qualify for FRL, exploring the leadership behaviors of experienced superintendents is also a worthwhile pursuit for future study.

As Marzano and Waters (2009) have identified broad district-level leadership actions that predict student success, understanding how experienced superintendents operationalize these actions can provide insight to other superintendents about how their behaviors and longevity can positively impact student achievement.

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