Taking a Closer Statistical Look at the Interplay of Student Demographic and Educational Input Variables on Standardized Achievement: An Exhaustive Statewide Approach

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Abstract

This study seeks to test, by means of measurement modeling and Structural Equation modeling, the relationship between Missouri public schools' racial and socioeconomic composition, school culture proxies, and standardized student achievement levels. Incorporated in this paper is a population sample that encompasses the state's education system in its entirety. Obviated, therefore, is any need for guarded claims and empirical qualifiers currently required of similarly targeted research projects. The study's findings validate both researcher intuition and the decades-long research efforts dedicated to interrogating the relationship between student race, socioeconomic standing, and the culture of the building in which students are educated. In short, variables at the school building level appear to be inextricably linked to standardized test performance levels.

It is commonly thought that the simultaneous objectives of providing students with adequate and appropriate test preparation, while also teaching students critical thinking and learning skills, cannot both be coherently incorporated into a single curriculum (Weast, 1996). Such perceptions are not groundless, as the NLCB legislation, and the accompanying accountability fervor, has constrained the curricular options of school administrators. While it is the case that pre-packaged curricula that are tightly aligned with accountability standards leave less slack for incorporating new curricular initiatives, teaching students critical thinking skills can compliment test preparation practices.

It is important that research on school effectiveness distinguish between controllable variables and those that cannot be easily manipulated, especially in an exhaustive statewide study. Teacher pedagogy that fosters student engagement is one such controllable input, and the nature and quality of such instruction can lead to enhanced educational output. Influential input characteristics in education production functions often include teacher characteristics. Phelps and Addonizio (2006) found, for instance, that teacher salary has unambiguously positive effects on student achievement, whereas teacher age and experience yielded mixed results (Phelps & Addonizio, 2006).

Literature Review

Intangible School Input Variables

While school leaders are largely unable to control financial expenditures, they can directly affect the organizational health of their buildings. Certain building-level planning goals that have been found to be positively correlated with student achievement can be effected by administrative foresight. Indeed, those students enrolled in schools where high test achievement is an expectation that is cultivated in an orderly environment conducive to learning, enjoy higher achievement performance (Henderson et al., 2005). This is not to suggest that all schools should be singularly focused on student test performance. Rigid and exacting standardized test performance expectations might overwhelm very young students, for example (Cotton et al., 1989).

A school's faculty is ultimately responsible for undertaking and sustaining school change and improvement initiatives. Faculty perceptions of their ability to effect change within the school can impact the actual extent to which change is realized (Hoy, Tarter, & Hoy, 2006). Consequently, it is important that such faculty perceive themselves as stakeholders who must act cooperatively with others within the school (Leithwood, Menzies, & Jantzi, 1994; Miles & Darling-Hammond, 1998). This faculty cooperation and collective self efficacy is enhanced when the school personnel possess knowledge of their performance and are subjected to positive verbal reinforcement (Leithwood, Menzies, & Jantzi, 1994). Faculty's perceptions of the effectiveness and efficaciousness of their reform attempts are captured, if only partially, by these variables.

Controllable School Input Variables

No conclusive empirical evidence exists to demonstrate a nexus between educational inputs and student performance (Rice, 2004). Resource variables, such as teacher salaries and

student-teacher ratios, have, in some studies, been demonstrated to exact significant effects on achievement (Rumberger & Palardy, 2005). While this might facially appear to be inconsistent with Hanuschek's (1986; 1995; 1996) and Rice's (2004) work, it suggests that resource allocation, rather than the magnitude of absolute funding levels, influences school performance levels.

The school effectiveness movement has been a reaction to resource and student input models of education. (Caldas & Bankston, 1999). There is value in using multiple indicators to assess school performance, as some schools perform better on some such indicators than on others (Rumberger & Palardy, 2005). Studies have found, for instance, that effective schools are often the site of team learning (Thornton, Shepperson, & Canavero, 2007). Effective schools also appear to be equipped with leadership that is able to "successfully convert information into action" (Thornton, et al., 2007, p. 54).

The components that comprise effective schools are both pecuniary as well as nonfinancial in nature. Beach and Lindahl (2007) suggest as much, as they cite Fullan (1991), who noted that "those organizations whose cultures are compatible with change and those who have sufficient facilities, equipment, materials and supplies to implement the change, and those who are not undergoing other major change efforts or crises are more likely to be successful in implementing the desired change" (p. 32). This is not to suggest, however, that nonfinancial factors do not greatly impact the quality of schools (Clemmitt, 2007).

School Administrators

According to Rumberger and Palardy (2005), school processes include building administrators' evaluation of how their schools' inputs are organized and managed, the

consideration of the practices that are used within their schools, and the climate that permeates the schools' learning environments. Principals are highly influential actors within the school building, and the extent to which they affect the operations of their schools is largely dictated by the level of autonomy that they are able to exercise. (Moe & Chubb, 1990). As such, the importance of the principal in clearly expressing academic goals can be highly influential in defining the mission of a school (Moe & Chubb, 1990). Furthermore, principals directly influence the extent to which teachers in the building are treated like professionals and the extent to which schools are organized effectively, both of which can affect student learning (Moe & Chubb, 1990). Unquestionably, school leaders oftentimes find it difficult to maintain measured responses to the frenzied pressures of the No Child Left Behind (NCLB) Act.

Standardized Performance

While a positive relationship exists between a student's performance level and subsequent academic growth (Zvoch & Stevens, 2003), it is, in fact, easier to extract growth gains from lower-performing students who have greater growth potential. The differences in the growth rate of individuals were found to be relatively trivial as compared to the disparity of initial abilities among various segments of the student population (Ding & Davison, 2005). Furthermore, higher-ability students are less likely to improve than lower-ability students, especially low SES students (Ding & Davison, 2005; Weast, 1996). Hence, such a pronounced achievement gap might be the result of the substantial initial differences between students that are not bridged over time (Ding & Davison, 2005). This suggests that the deleterious effects that result from the practice of tracking might be overcome by introducing those students in the lower-track classrooms to a curriculum that incorporates higher-order thinking objectives. In sum, while it can useful to study student achievement by delineating the broad "pass/fail"

percentages according to more specific categories, these classifications must not be manipulated to misrepresent the true impact that input variables exhibit on test score levels.

Socioeconomics and School Finance

Focusing on those variables that schools can control adds credibility and desirability to modeling school effectiveness and improvement efforts (Ding & Davison, 2005; Druian & Butler, 1987; Lee & Weimer, 2002; Phelps & Addonizio, 2006). Indeed, school leaders cannot control student background demographics, which account for a greater proportion of the variability of dropout/transfer and test passage rates. Indeed, the uncontrollable variables consistently outmatch the influence of those measures indicative of school instructional quality.

Empirical studies which control for the demographic variables that remain uncontrollable by school administrators, while adequately accounting for student growth, represent an important research undertaking. The socioeconomic status of a student population, for instance, can account for as much as 71% of the variance in student achievement (Phelps & Addonizio, 2006). The founding premise of high-stakes standardized tests was the desired outcome of enhancing student motivation and achievement. Not only has such an objective thus far appeared to have failed, but it has also had the perverse incentive of compelling many students to drop out of school (Amrein & Berliner, 2003).

Many education researchers argue that the differences in school test performance could be attributable to the many demographic variables associated with a student population rather than the quality of education provided to such students. It is important, therefore, to consider the socioeconomic status (SES) of the student population when "…measuring the possible independent effect of per student educational expenditures and size of enrollment because

numerous studies show that children from families of high SES generally do better on achievement tests than children of lower SES" (Walberg & Fowler, 1987, p. 5). The relationship between a student's family structure, the student population's family structure, and student achievement have been found to be highly correlated (Caldas & Bankston, 1999). It should also be noted that the proportion of students who receive free and reduced lunch (FRL) has also been found to be significant determinant of student test performance in the expected direction (Boscardin, Aguirre-Munoz, Stoker, Kim, Kim, & Lee, 2005; Witte & Walsh, 1990).

As mentioned, an underlying assumption of the school reform movement is that a fundamental alteration of a school's operating practices can affect the quality of a school's educational provision. It is not uncommon, however, for researchers to find that 75% of the school level variance rests outside the control of schools. Indeed, socioeconomic factors typically dwarf other school performance variables (Heck, 2001). This seems to suggest that school leaders' abilities to dictate test performance might be largely uncontrollable. Indeed, Rumberger and Palardy (2005) stress that the most influential school input, the characteristics of the student body, was the least equitably distributed among schools.

Methods

Structural Equation Modeling

Structural Equation Modeling (SEM), and the LISREL 8.8 software that performs such modeling, enables relational interactions to be considered not simply in pictorial form, but in a manner that allows for guarded causal postulations to be advanced. While the methodology itself may be of little interest to school leaders or policymakers, the interactions of the many

complex and oftentimes confounding building level variables may prove to be of far greater salience to such an audience.

The statistical relationship between the demographic and cultural composition of a school, as measured by the indicator variables associated with the latent factors constructed within the SEM models, can offer an insightful investigation of the interplay between the more mechanical processes of public schooling educational inputs with the uncontrollable racial and socioeconomic composition of the schools' student populations. These latent factors were subjected to SEM to determine if such factors were directly correlated with, and mutually influential upon, one another. LISREL 8.8 software was employed to perform path analysis on basic measurement models in an effort to determine whether the relationships between the latent and measurable variables were sufficiently strong to enable causal inferences to be postulated. Explored in depth, then, is whether the measurable and observed school input factors, when grouped according to a postulated relationship under individually designated demographic and cultural latent factors, effect standardized achievement levels to a statistically demonstrable extent.

The import of the SEM methodology for the purposes of the present study involves its statistical power, which enables the researcher to infer causal relationships while testing the relationship of variables to one another simultaneously, as opposed to running multiple analyses (Byrne, 1998; Conley, Muncey, & You, 2005; Kline, 2005). The latent factors in the measurement models included the racial and socioeconomic composition of schools ("Dems"), distinctive school inputs and practices that serve as proxies for the cultural health of the school

("Culture"), and the various standardized achievement performance categories, quantified according to the DESE designations of advanced, proficient, and below basic ("Achieve").

Data Collection Source

The Missouri Department of Education's (DESE) Web Site served as the principal source of secondary data collection for this study (Department of Elementary and Secondary Education, 2008). School districts' and school buildings' demographic, as well as other pertinent teacher and administrator characteristics, are available from the state education department's Web Site. The availability of these data allow for the pairing of the IPI schools with non-treatment schools (which were entirely devoid of the IPI practices) schools that are representative of the typical Missouri public school (DESE, 2008).

Latent Factor Variance

The extent to which the measurable indicator variables explain the variation of their respective latent factors (which are unobservable and not directly measurable) can serve to both validate the construction of the model and suggest the relative influence that these measurable indicator variables exhibit on the designated latent factors. All such factors are theorized to be instrumental components of schools' standardized achievement profiles.

Achievement

Variables: M_Advpct; C_Adv Pct; M_below; C_below; M_profpct; C_profpct

Variable Definitions:

"M_Advpct" is defined as the percentage of students within a schools population that score advanced on the mathematics portion of Missouri's standardized test (the MAP test).

"C_Advpct" is defined as the percentage of students within a schools population that score advanced on the Communication Arts portion of Missouri's standardized test (the MAP test).

"M_below" is defined as the percentage of students within a schools population that score below basic on the mathematics portion of Missouri's standardized test (the MAP test).

"C_below" is defined as the percentage of students within a schools population that score below basic on the Communication Arts portion of Missouri's standardized test (the MAP test).

"M_profpct" is defined as the percentage of students within a schools population that score proficient on the mathematics portion of Missouri's standardized test (the MAP test).
"C_profpct" is defined as the percentage of students within a schools population that score proficient on the communication arts portion of Missouri's standardized test (the MAP test).

Rationale for inclusion in SEM Models: Student achievement on standardized testing instruments comprises the outcome variable of interest for this study. For the more intrepid school leaders and policymakers, considering the percentage of student who perform proficiently, the principal metric in determining Adequate Yearly Progress, can be supplemented by advanced and below basic performance passage rates to better illuminate which school input and student demographic variables impact these more discrete student achievement categories.

Computed Variance: The "Achievement" latent factor variable was accompanied by the proficiency rates of communication arts and mathematics. The below basic and advanced proficiency rates were also tested. While models incorporated both proficient and advanced outcomes performance categories, they did not include advanced and below basic performance measures (which would essentially serve as offsetting manifest variables which would render the "achievement" latent factor more nebulously interpretable). The proficient and below basic indicator variables manifest a high explanatory capacity with the corresponding "achievement" latent factor. Between 81-93% of the variance associated with these indicator variables was accounted for by the "Achievement" latent factor, while 83-92% of the below basic

communication arts and mathematics indicator variables' variance was accounted for by the "Achievement" factor. These findings are nearly indistinguishable from the similarly-constructed Structural Equation models. The advanced communication arts and mathematics manifest variable variance accounted for between 42-88% of the "Achievement" latent factor's variance. The wider band of variance is not a product of statistical fluctuation, but was structural in nature: when advanced achievement variables were combined with their proficiency counterparts, they were, not surprisingly, found to have been accounted for to a considerably diminished extent by a singular latent factor.

Racial and Socioeconomic Demographics ("Dems")

Variables: "FRL"; "Discp"; "Blackpt"; "Hisp_pt"

Variable Definitions: "FRL" is defined as the percentage of students who receive free and reduced lunch (FRL). This key statistical variable that informs the study was furnished by Missouri's DESE. "Discp" is defined as the rate of disciplinary infractions within a school's student population. "Blackpt" and "Hisp_pt" are variables that account for the percentage of African American and Hispanic students within a school's population of students, respectively.

Rationale for inclusion in SEM Models: The free-and reduced lunch, discipline, and percentage of minority student variables have, over the decades, been painstakingly documented and found to be determinative of standardized student achievement levels within schools. Accordingly, these variables were extensively tested across the SEM models to ascertain the nature of the relationship between these measurable demographic variables with standardized student achievement levels.

Computed Variance: The percentage of free and reduced lunch ("FRL"), percentage of African American (black") and percentage of Hispanic ("hisp") students principally comprised the indicator variables assigned to the student demographics latent factor ("Dem"). The FRL indicator variable evidenced a considerable range in the extent to which its variance was explained by the "Dems" latent factor (11-89%). Similarly, the percentage of African American students ("black") indicator variable's variance explained by the "Dems" latent factor ranged from 28-90%, as did the Hispanic manifest variable, where .01-60% of its variance was accounted for by the "Dems" latent factor. Not surprisingly, the ranges of the variance accounted for by the Structural Equation models largely mirrored the findings of the measurement models. Three notable exceptions in the Structural Equation Models were the Hispanic ("hisp"), discipline ("discp"), and student-teacher ("stu_tchr") indicator variables, all of which accounted for that was conspicuously less of the model variance than was the case for their counterparts in the measurement models.

School Culture

Variables: Teacher Certification ("Tch_Cert"); Teacher Master's Degrees ("tch_mast"); percentage high quality teachers ("pct_Hiqal" Average Teacher Salary ("Tch_Sal"); Average Student-Teacher ratio ("stu_tchr"); Teacher experience ("Tch Exp"), "Stu-Adm".

Variable Definitions:

"Tch sal" represents the average annual salary of teachers within a school's faculty.

The "tch_exp" variable is the average years of teaching experience of a school's faculty, as reported by Missouri's Department of Elementary and Secondary Education (DESE).

"Stu_tchr" is defined as the percentage of school faculty that possess a master's degree.

The "tch_cert" variable represents the percentage of a school's faculty that is certificated.

"Tch_mast" is defined as the percentage of school faculty that possesses a master's degree.

"High_qual" is defined as the percentage of school faculty who are deemed to be "high quality" instructors, as prescribed by state standards.

The "stu_adm" ratio is defined as the ratio of full-time building level administrators within a school in relation to the number of students within that school.

Rationale for inclusion in SEM Models: The average teacher salary and teacher experience, as well as the student-teacher ratio, can serve as proxies for school input variables that can be manifestly influenced by the level of school funding. Hence, these variables serve as proxies for controllable school inputs that are not expressly financial, but that are nevertheless predicated on school finance factors. The quality, foresight, and competence of a school's faculty are difficult to measure. Nevertheless, the percentage of teachers who are certificated and who possess master's degrees might serve as a meaningful proxy of a faculty's competence and capability in effecting substantive and substantial changes in schools' curricula and educational practices.

The "stu-adm" variable was included in the SEM models to test the relationship between the number of student administrators in relation to schools' student populations with standardized achievement. It is conjectured that as schools' administrators are taxed with the many building level responsibilities that comprise their daily responsibilities, untenably large student-administrator ratios will be so ineffective as to divert their attention away from constructing learning environments whereby students excel both within the classroom and on standardized tests.

Computed Variance*:* The "School Culture" latent factor can best be thought of as a confluence of site-level happenings, the interactions of which constitute a learning environment that can be impactful in dictating the standardized achievement levels of schools. Discipline levels ("Disc"),

the proportion of certificated teachers ("Cert"), student-teacher ratios ("stu-tchr"), student-administrator ratios ("stu-adm"), the proportion of high quality teachers ("Hiqual"), average years of faculty experience ("tch_exp") and the proportion of teachers with master's degrees ("tch_mast") comprised the indicator variables used to constitute the School Culture latent factor ("Culture"). The proportion of the discipline indicator's variance accounted for by "Culture" ranged from 6-89%, while the variance of teacher certification ("tchr_cert") and the percentage of teachers who possessed masters degrees ("tchr_mast") accounted for by the Culture latent factor also ranged markedly, from 15-97% and 6-90% respectively. The "High qual" and "tch_ exp" latent factor variance exhibited almost identical ranges for the proportion of their variance explained by "Culture", ranging from 11-60% and 9-60%, respectively. Finally, both "stu-tchr" and "stu-adm" ratios exhibited very low proportions of their variance explained by the "Culture" factor (.002-3% and 14%, respectively).

Finally, as the Structural Equation models contained Achievement as the Dependent regression variable, the R-squared value ranged from 45-89%, depending on the indicator variables incorporated into a given SEM model. Tables One and Two, provided directly below, provide the high and low R-squared values, indicating the proportion of variance explained by the respective latent factor constructs contained within the measurement and Structural Equation Models.

Results

Standardized Achievement "Achieve" – Building-Level Demographics ("Dems)

Basically configured structural models were first tested to determine the relationship between the standardized achievement latent factor ("Achieve") and the latent factor

incorporating racial and socioeconomic compositions of the student populations ("Dems"). The findings of these measurement models were in the expected direction, and yielded magnitudes that ranged from rather weak to considerably robust in strength. It is important to briefly underscore the several directional relationships that are expected based on the SEM runs:

1) Below basic standardized achievement is expected to be positively correlated with the proportion of racial minority and free-and-reduced lunch students that comprise schools' student populations

2) Proficient standardized achievement levels are expected to yield mixed, weak correlational relationships with the proportion of Caucasian and free-and-reduced lunch students that are contained within schools' student populations

3) Advanced standardized achievement levels are expected to yield mixed, weak correlational relationships with the proportion of Caucasian and free-and-reduced lunch students that comprise schools' student populations

While these directional relationships were largely found to exist across the twenty eight SEM models that were tested, the correlational magnitudes associated with the relationships between the achievement and demographic latent factors varied considerably. As depicted in Table Three below, none of the models exhibited a weak relationship between the achievement and demographic latent factors, while only 4% exhibited a moderate relationship. Remarkably, the remaining 96% of the models manifested either strong or very strong correlation values between the achievement and demographic latent factors.

Insert Table 1 approx. here

Insert Table 2 approx. here

Insert Table 3 approx. here

Achievement - Culture

The relationship between student achievement and the measureable school inputs that serve as indicators of the school's culture were also tested. Broad in scope, the relationship between desirable (proficient and advanced) achievement levels and desirable building-level cultural attributes (those indicators that create constructive educational settings) and undesirable building-level cultural attributes (those manifest variables associated with cultures that deleterious impact student achievement) was tested. Again, several directional patterns were expected to be evidenced based upon the relationships of these broadly defined "achievement" and "culture" latent factors:

1) A positive relationship between proficient standardized achievement levels and the constructive school culture indicator variables
2) A positive relationship between advanced standardized achievement levels and the constructive school culture indicator variables
3) A negative relationship between advanced standardized achievement levels and the undesirable school culture indicator variables
4) A negative relationship between below basic standardized achievement levels and the constructive school culture indicator variables

Again, the expected relationships were evidenced in the LISREL runs. The strengths of such correlational relationships, provided in Table Four below, were much more muted for the twenty eight SEM models, however. More specifically, 11% of the models revealed a weak relationship between the achievement and culture latent variables, while 71% of the models

manifested moderate correlational values between these latent factors. Accordingly, and in bright contrast to the relationship between achievement and demographic latent factors, only 18% of the models contained achievement and culture latent factors that were shown to be strongly or very strongly correlated with one another.

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Insert Table 4 approx. here

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Demographics-Culture

Finally, the relationship between student demographics ("Dems") and school culture ("culture") were tested. Again, the expected directional relationships (enumerated below) were borne out by the empirical findings yielded from the 28 SEM models. The postulated relationships, enumerated below, were found to be harmonious with the SEM output:

1) A negative relationship is expected between racial (percent minority) and socioeconomic variables (free and reduced lunch) and the positive school culture latent factor, as measured by manifest variables known to be vital in comprising school cultures conducive to academic success and heightened levels of standardized achievement.
2) A positive relationship is expected between racial (percent minority) and socioeconomic variables (free and reduced lunch) and the negative school culture latent factor (as measured by manifest variables known to impede school leaders' efforts to attain academic success and heightened levels of standardized achievement.
3) Mixed results (weak findings) are expected between the "Dems" latent factor within which the proportion of FRL students is matched with the percentage of Caucasian students ("pct_white") and the cultural latent factor, "culture." Intuitive is the aforementioned postulation, as the detrimental influence of FRL, already demonstrated to be strong, is offset by the percentage of non-minority students (a factor which is positively correlated with student achievement).

While the results were found to be in the expected direction, the correlation magnitudes were considerably weaker than the relationship between the achievement-culture and achievement-demographic latent factor constructs. Furnished in Table Five below are compiled results which reveal that fully 54% of the SEM models yielded findings which suggested the correlation between Demographics and culture latent factors were weak, while only 8% of the findings suggested that strong or very strong correlational relationships exist between these factors. While this is likely attributable to a more tenuous nexus between schools' demographic compositions and its measurable cultural attributes, it is also likely that incorporating the percentage of white students and FRL into latent factor, unlikely diluted the strength of the relationship between the "Dems" and Culture" latent factors. Stated differently, when compared with prior "Dems" models that included percentage of African American students and FRL (two indicator variables demonstrated to be highly destructive on schools' standardized achievement levels), the results assumed an expectedly different form.

Insert Table 5 approx. here

As revealed in Table Six below, the rate with which the Achievement and Demographic latent factors were strongly/very strongly correlated (90%) to one another within the more complex Structural Equation Models is almost identical to the corresponding measurement models (86%). The moderate cases are also a bit more common here as opposed to the measurement models. More specifically, only 4% of runs yielded moderate correlation strength between the Achievement and the Demographic latent factors.

Insert Table 6 approx. here

Similarly, the findings provided in Table Seven below very nearly approximate those in the measurement models, more so than the Achievement-Demographics measurement and Structural equation models' relationships.

Insert Table 7 approx. here

The Culture-Demographic latent factor findings associated with the structural models, the output of which is provided in Table Eight below, once again very closely approximate the results of the measurement models. Indeed, 95% of the Structural Equation models evidenced a weak or moderate relationship between Culture and Demographic latent factor constructs, whereas this value was computed to be 92% in the measurement models considered in the study.

Three SEM models are now considered in greater depth in an effort to quantify the extent to which advanced, proficient, and below basic standardized test achievement levels fluctuate as a result of changes to the demographic, socioeconomic, and cultural aspects of the public school setting . In selecting three cases to compute the achievement dependent variables, the measurement models that evidenced considerable achievement-demographics relationships were chosen. The factor loadings and estimated beta regression coefficients for the three models are provided below(see Tables Nine, Ten, Eleven, and Figure One). Also provided are brief explanations of the model computations that demonstrate the relationship that the independent

indicator variables associated with the Demographic and school culture latent factors exhibit on the dependent variable, the standardized student achievement levels.

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Insert Table 8 approx. here

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Insert Table 9 approx. here

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Insert Figure 1 approx. here

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With beta regression estimates of 7.42 for communication arts and 9.79 for math, a two standardized increase in Dems and 3 standardized unit decrease in latent culture (a 2.27 standardized unit effect) would lead to a 16.84 point decline in Communication Arts and 22.22 percentage point decline in mathematics.

Conversely, under the theoretically devised “better-case scenario”, a 1 unit decrease in Dems, 3 unit increase in culture (a 1.45 standardized unit effect) would result in a 10.76 point gain in Communication Arts and 14.20 percentage point gain in mathematics.

An undeniable deduction can be made from the model provided in Figure One: Communication Arts and Mathematics proficiency rates are substantially impacted by the

demographic and cultural components contained within public schools on a scale that can demonstrably effect the AYP trajectories of public schools across Missouri and like states.

Insert Table 10 approx. here

Insert Table 11 approx. here

Figure Two provides the Structural model that incorporates the demographic ("Dems") and Cultural ("Culture") latent factors. The percentage of students who performed at an advanced level on the MAP test are designated at the dependent variables in the SEM model.

Insert Figure 2 approx. here

With estimates of 7.51 for communication arts adv and 6.93 for math, a two standardized in Dems and 3 standardized unit decrease in latent culture (a 1.79 standardized unit effect) would lead to a 13.44 point decline in Communication Arts and a 12.40 percentage point decline in mathematics achievement.

Conversely, under a better-case scenario, a 1 unit decrease in "Dems" and a 3 unit increase in culture (a 1.27 standardized unit effect) would generate a 9.54 point gain in communication arts and a 8.17 percentage point gain in mathematics. Such computational

findings, while not immensely great, are sufficiently substantial to allow the researcher to conclude that advanced standardized achievement levels are considerably impacted by student demographic and schools' cultural elements. Important output data from these models are included in Tables Twelve, Thirteen, and Fourteen.

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Insert Table 12 approx. here

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Insert Table 13 approx. here

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Insert Figure 3 approx. here

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With estimates of 9.34 for communication arts adv and 12.85 for math, a one standardized unit increase in Dems and a 4 standardized unit decrease in the latent factor "Culture" (a 1.15 standardized unit effect) would lead to a 10.74 point increase in below basic Communications Arts and a 14.78 percentage point increase in below basic mathematics. However, under a best-case scenario, a 1 unit decrease in "Dems" and a 4 unit increase in "Culture" (a 2.13 standardized unit effect) would yield a 19.89 point decrease in below basic comm. Arts and a 27.37 percentage point decrease in below basic mathematics. Tables Fourteen and Fifteen offer a richer inclusion of the output associated with these findings. Figure Three again reveals a highly compelling Structural model that demonstrates the actualization of very large achievement level fluctuations in below basic standardized achievement based upon the demographic and cultural makeup of public schools.

Insert Table 14 approx. here

Insert Table 15 approx. here

Insert Figure 3 approx. here

In today's accountability era, it has become popular to discuss, and eventually undertake, sweeping state-level attempts at instructional reform. While uniform goals can lead to enhanced policy coherency, the statistical models constructed in this study serve as a clear reminder that the demographic and school input variance across districts is also sure to produce stark achievement discrepancies. While student race, socioeconomic standing, and other building-level inputs based on district wealth are known to impact achievement, few studies reduce the relationship to quantifiable terms at the statewide level. This study was designed with that very purpose in mind. Turning to the key quantitative findings of the paper allows the reader to further digest what has been appreciated in theoretical principle for quite some time now. Large swings in a school's demographic compositions and cultural health of the buildings produce vastly diminished levels of student achievement. In extreme instances of destabilization, 29.72 point increase in below basic in communication arts and a 43.14 point increase in below basic math are attributable to the socioeconomic composition of student bodies and the erosion of healthy school cultures.

Alternatively, under the better-case hypothetical scenario, a one unit decrease in these same attributes is very much plausible for most schools across the nation. The results, show the findings, include a 4.54 point decrease in below basic communication arts and a 6.59 percentage point decrease in below basic mathematics. While these findings represent elevated outcome values, it should be stressed that the magnitudes by which they are manipulated, three and four standardized units, are quite considerable.

The standardized accountability categories included in this study, designated as dependent variables in the Structural Equation Models, can serve as meaningful guideposts for school leaders in assessing the current state of the schools achievement environment. To become so transfixed with these testing categories that school leaders shelve other educational initiatives is an educational policy problem which instructional leaders must consciously and aggressively avoid. In short, an overabundance of caution is advised of school leaders if they are to successfully combat an over reliance on standardized test results.

School leaders would be advised to revisit several compelling conclusions from the study. First, building-level demographics were confirmed to be the most impactful component that affects standardized achievement levels. This finding serves as a stark reminder that the racial and socioeconomic composition of students within schools exacts a remarkable impact on student achievement levels. As such, school leaders who serve communities with high levels of impoverished and minority students must demonstrate the sustained resolve needed to confront this formidable long-term challenge.

Additionally, school culture proxy variables and student demographic compositions were also found to be negatively correlated to one another. While this finding was entirely expected,

it should not be glossed over: rigorous and appropriately-tailored initiatives to address the institutional health of the schools' cultures, and not solely bottom line achievement, must become and remain fixtures within impoverished districts. The culture of a school can be positively impacted by aggressive leadership. In the event that public schools are not outfitted with such administrative teams, however, the empirical findings of the present study demonstrate that standardized achievement levels are likely to be negatively impacted.

Finally, while cure-alls for AYP deficiencies will remain elusive in public education, it is incumbent upon school leaders and policymakers to "control the controllable" with aggressive vigor. The considerable relationship evidenced between school culture and standardized achievement levels provides compelling empirical evidence that an investment in school culture initiatives that are appropriately designed and implemented will represent a desirable educational policy initiative.

The findings from this study place instructional reform efforts into a more pragmatic, on-the-ground context. As not all schools are situated equally, not all reform plans can be constituted identically, either. Instead, schools with either resource deficiencies and/or socioeconomic conditions that accompany impoverished communities will face heightened challenges as they seek to bolster achievement levels. The findings show that though the challenges in impoverished schools remain greater, they are not so impactful on scores as to make the reform attempts fruitless. Instead, public schools saddled with the greatest challenges will most appreciably benefit from school leadership who appreciates these heightened obstacles as they design improvement plans that are more rigorous in both breadth and longevity.

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