Abstract: *This study employs data from 242 schools that have used the Instructional Practices Inventory (IPI) within their schools with "match" schools that have not employed the process but contain very similar standardized achievement, socioeconomic, and educational input levels. The findings from the study were highly compelling on several counts. The non-treatment match schools outfitted with educational inputs explained far greater proportions of the achievement variance than was the case for the IPI schools. Also, large differences in the magnitudes of the free and reduced lunch rate (FRL) coefficient emerged between IPI-treated schools and their non-treatment counterparts. This suggests that the IPI might have a mitigating influence on the otherwise pernicious impact that FRL rates exhibit on standardized achievement levels.*

All of the nation's public schools share the goal of producing standardized achievement outcomes that meet ambitious national AYP requirements. Still, today's educational environments can look vastly dissimilar from one another. Because the obstacles faced by school leaders differ, school effectiveness efforts can demand similarly variable levels of time and energy across buildings. This paper explores achievement in the context of those schools that undertake instructional improvement plans with others that do not. When key educational inputs and building-level factors are controlled for, the differences unearthed in schools where these initiatives are adopted can help to determine whether teacher pedagogy, broader school effectiveness goals, and resulting test score outcomes are more impacted by the presence of these

programs than in the absence of such improvement strategies. Structured around three broad theoretical tenets (elaborated upon below), the relationship between instructional improvement programs and resulting test scores is broached in full detail in the pages that follow.

Review of the Literature

1a: Retooling Pedagogical Practices

At its core, instructional improvement entails a process that is internal to the school building. Nevertheless, the external demands that penetrate the building level cannot be disregarded or otherwise discounted. In the accountability era, a flurry of state and federal mandates is coupled with enhanced public scrutiny. As such, school leaders' goal setting must be more ambitious, multipronged, and highly adaptive to these educational settings. All told, this current accountability regime places a stress and strain on public educational systems across the nation to an extent that has been unparalleled in American history.

An appreciation of such external processes to the organization, and its internal processes, is vitally important to the present research undertaking. Gunzenhauser and Hyde (2007) note that "often 'accountability' itself is not contested as an educational ideal, but high-stakes accountability is" (p. 493). While the high-stakes accountability environment may subject school leaders to frenzied pressure, the urgency associated with NCLB compliance can serve as a stimulus on both the individuals within the organization as well as act as an impetus to effect meaningful change at the wider organization level. Gunzenhauser and Hyde (2007) suggest that "the distinction between the individual and the collective" should not be overlooked in considering accountability (p. 495). Strong internal accountability schools seem to contain educators who "work together to develop a coherent vision for the school. Schools with weak internal accountability are characterized by atomization varied and incoherent notions of what is

of value for students to know and learn" (Gunzenhauser & Hyde, 2007, p. 495). In sum, schools which undertake instructional reform are not expected to post large test score gains by the mere virtue of adopting such programs. Instead, in environments where the full set of instructional methods that optimize faculty skills and resources are placed at their most potent use, these schools can only be expected to outperform similarly situated buildings where educators are not geared to developing their capabilities as effectively.

1b: Current Study: Testing the Impact of Pedagogy

Instructional quality is a direct product of the nature of day to day educational provision. Indeed, classroom instruction can largely dictate students' educational experiences of the duration of their tenure in the K-12 school system. Investigating how, and to what extent, pedagogy can be transformed by the conscientious reform efforts of educational leaders who adopt instructional improvement plans becomes a useful means of measuring school reform progress. Admittedly, the Instructional Practices Inventory (IPI) represents only one method of reform. That is, the non-treatment public school population in this study may have adopted other improvement plans. Nevertheless, when IPI-treated schools are compared alongside their non-IPI treated counterparts, the relative impact of the IPI in particular, along with the holistic instructional improvement efforts in general, is better understood. As a result, faculty efforts to appreciably enhance the nature and quality of instruction can be quantified to better inform the instructional improvement discussion.

2a: Enhancing Instructional Effectiveness

Competition among public schools today comes principally in the form of individual schools competing with their prior achievement levels. The ramped up and revamped operations of public schools result from demands upon school leaders to do more with less. Furthermore,

schools' administrative teams are increasingly pressured to demonstrate instantaneous growth, productivity, and organizational effectiveness. As it pertains to public schools, some pressure associated with these organizational demands is mitigated due to absence of the cutthroat, survival of the fittest environments that their counterparts in the private sector are forced to confront. In appropriate forms and magnitudes, such competition may also be healthy for organizations such schools, as "competition puts pressures on the public sector companies to exhibit higher levels of agility and to constantly improve their performance thereby enhancing their productivity" (Bharadwaj, Mohamed, & Falcone, 2003, p.55).

Testing the extent of performance differences relative to schools that forgo instructional reform can be captured according to raw, bottom-line performance rate disparities. Bharadwaj, Mohamed and Falcone (2003) additionally note that "One of the key lessons learned from this experience is that participants should play an active role in designing the content and pedagogy of the training program and should be allowed to volunteer into the program" (p. 68). Such an observation was not lost on the researcher, as its applicability to the incorporation of instructional reform programs within today's public schools is potentially quite considerable.

2b: Current Study: Quantifying School Effectiveness

In today's accountability era, school leaders must invariably search for ways to enhance instructional quality and standardized outcomes as quickly and as inexpensively as possible. Whether prudent or not, educational quality is measured predominantly by test performance levels. But facilitating test score growth over time is considerably more complex than most researchers and administrative teams wish to concede. As pedagogical quality is targeted, and student engagement behaviors are altered, schools can be expected to show promising signs of

instructional improvement. Moreover, it is likely the case that students are then best positioned to perform to their fullest potential on standardized tests. As school leaders employ instructional improvement plans as a front-line method of promoting educational effectiveness, the results of the program comprise the central focus of this study. That is, an awareness of the importance of classroom pedagogy in enhancing educational quality and outcomes is an important first step in full-scale instructional reform. By manipulating these instructional practices in ways that fully engage students, school leaders are likely to foster enhanced learning, achievement, and consensus. As a consequence, instructional leaders are better situated to provide an excellent education for all students.

3a: Smarter Schools

Schools, like firms in the public and private sectors, can fail to learn (Fenwick & McMillan, 2005), causing static growth in their educational effectiveness and productivity. It is the case that public schools might also manifest organizational stagnation in the form of diminishing or negative growth on standardized test proficiency pass rates. In the schools included within the present study's population sample, the "capacity to learn" (Fenwick & McMillan, 2005, p. 47) might be evidenced by faculty engaging in pedagogical practices that help galvanize student engagement levels, a process that often conspicuously manifests itself and is highly amenable to quantitative interrogation. In the public school setting, instructional initiatives that focus not only on the wider organization, but also on educators' individual learning can disperse a wider assembly of change agents across classrooms. Although organization-wide learning does not ensure individual learning, it is a prerequisite to organizational learning (Senge, 1990). Standardized test performance, an objective metric that is

detached from any direct association with the present study, can ultimately be used as a proxy to gauge the extent to which answers are consistent with outcomes, however.

Like any public sector organization, public schools must also learn to innovate and adapt to the rapidly and radically changing external environment if they are to be deemed successful by policymakers, and more importantly, the wider public. Public schools could profoundly benefit from the effective internal organizational learning borne of instructional improvement initiatives. Probing the extent of organizational learning evidenced by schools' faculties and administrative teams is especially important in the current No Child Left Behind Accountability era. Determining the impact of instructional reform on educational quality can be a less-than-straightforward enterprise. Ascertaining who is responsible for bringing about improvement classroom quality and standardized achievement is no less tricky.

3b: Current Study: Linking Test Scores to Various Inputs

For today's school leaders, it has become impossible not to remain concerned with standardized performance progress. In the wake of the accountability era, the worth of a school is principally measured by these bottom-line performance levels. During cash-strapped funding cycles, and in an age when time is equally scarce, school leaders naturally search for cost and time-effective means of boosting scores. Mindful of the importance of test scores as a barometer of school improvement, this paper designates standardized achievement outcomes as the variable of interest in the study's models. Should those public schools that are treated with the IPI demonstrate test score growth, the desirability of the IPI (and like programs) is affirmed. Additionally, whether the impact of inputs such as race or SES becomes altered as a consequence of IPI adoption will spell the underlying value of the improvement program. School leaders in

many districts are, after all, highly desirous of creating more level reform playing fields in public schools which currently evidence wide variance in the composition of their student bodies. The resources at their disposal are, not surprisingly, also dissimilar in many instances.

Methods

Statistical Model Configurations

The structurally and spatially nested nature in which student learning and school processes are configured can be duly accounted for by HLM Modeling. The empirical consideration of the site-level variables and their contemporaneous interactions with one another in a more holistic manner is made possible according to the HLM methodology.

Level-One School Variables: Level-One of the HLM models employed in the study contained the resource variables shown by the research to impact the nature of both student learning and achievement. The data associated with such variables that are linked with each school setting can be introduced into the multilevel statistical study at Level One of the HLM models. Several building-level school inputs are also imbedded in this level of the HLM models. The racial composition (pct_min), teacher salary (tchr_sal), the proportion of teachers with masters degrees (tchr_mast), the proportion of students eligible for free and reduced lunch (FRL1), the student teacher ratio (stu_tchr), and the average years of teacher experience (tchr_exp), are accounted for at Level One. Each of these variables, to varying degrees, coincide with student engagement behaviors in dictating both the nature of student learning in the classroom and on standardized tests.

Level-Two School District Variables: The racial composition of the districts' student populations (Pct_min2), the free and reduced lunch rate at the district level (FRL2), the student teacher ratio (stu_tchr), the teaching experience of a faculty (tchr_exp), the dropout rate of the student body (Drop), the proportion of families that remained with the district the preceding five years (Pct_not), the proportion of married households (now_marr), average ACT scores (ACT), the discipline rate (disc.), and poverty levels (pct_pov) are included at Level Two. These variables, both in isolation and acting in concert, can govern both student engagement and standardized achievement levels with considerable impact at times.

Level-Three Regional Professional Development Center Variables: Not unlike many states across the nation, Missouri is comprised of several distinctive regions. The geography and economic makeup of these areas are disparate, providing meaningful across-region differences to be methodologically captured. Here, the FRL rates of region were included in Level Three of each model.

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 compositions, 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).

Findings

The descriptive output associated with all non-treatment schools, school districts, and regions are provided in Tables One, Two and Three below. In all, 225 schools were included in the non-treatment population sample.

Insert Table 1 approx. here

The entire non-treatment sample, Provided in Table Two, contained data for 154 school districts within which the schools were nested.

Insert Table 2 approx. here

The regional output provided in Table Three does not appreciably deviate from the school and district-level findings. The output is provided for the reader below.

Insert Table 3 approx. here

Statistical Findings: Model Variance

Level one of the non-treatment models, when specified with either socioeconomic independent variables or the more fully specified educational input predictors, explained relatively little of the level one variance (4-10%). The district-level variance (level two) was accounted for to a considerably greater extent by school input variables that were included within

the models. More specifically, between 64-90% of district level variance was accounted for in the models. The FRL rate and the percentage of minority students, as uncontrollable school inputs, explained very little variance at the school level in these models (between 1-6%), but very large amounts of district-level variance (59-88%). Finally, regional level variance, while not exhaustively accounted for in the models, was explained robustly in one instance (0-50%).

Insert Table 4 approx. here

When the model variance explained was considered for the IPI-tested models, the results were interesting. The percentage of teachers with master's degrees, student-teacher ratio, and the proportion of FRL students did not account for any of the building-level variance.
When the socioeconomic inputs, FRL and percentage minority students, were included in the models, only 0-4% of the variance was explained at the building level. The variance explained by the school level IPI models was 4-9 percentage points less than in the non-treatment models for key input variables. With the exception of two level IPI math model, the district level educational input variables accounted for between 13-26% less variance than in the non-treatment models. The district level variance explained was similar to non-treatment schools, although still substantially less in many of the models (59-81%). On the other hand, the district-level variance explained by the uncontrollable socioeconomic inputs was considerably closer in explanatory power to the non-treatment models tested (60-80% of the variance explained). Finally, the regional level variance explained by IPI models was similar to those of the non-treatment schools tested (50-100%).

Insert Table 5 approx. here

When the variance explained is investigated in models that separately tested across elementary, middle, and high school building types, the explanatory power appears to differ considerably from the wider sample of non-treatment schools. The building-level (level one) variance was accounted for to a considerably greater extent than in the individual school type models. More specifically, between 16-71% of the level one variance was explained by models outfitted with several influential educational input variables. These findings differs considerably from the IPI models, including all IPI-treated schools, where the educational input variables at the building-level did not account for any variance at level one. Similarly, the uncontrollable socioeconomic inputs (FRL and pct min) explained an impressive 38-71% of the level one variance, a far greater proportion that for the IPI models. Level two of the model (regional level) were conspicuously less predictive, oftentimes accounting for none of the variance. All told, the match input variables accounted for 0-100% of the regional variance while uncontrollable input variables accounted for 0-82% of the variance.

Insert Table 6 approx. here

Uncontrollable Factors

Provided in Table Seven below is the output for the two and three-level IPI school models, as well as the two and three-level non-treatment schools and individual non-treatment schools by sector type. The findings include the output from all non-treatment school models, as well as the findings associated with distinctive building types. The coefficient for the slope associated with the proportion of students receiving free-and- reduced lunch ("FRL") varied

considerably based upon the model employed, but was linked impactfully with test scores in all models tested.

The FRL coefficient magnitudes vary considerably based upon the model employed. The IPI models tested were the only models that did not display a statistically significant association between FRL rates and standardized achievement levels. The FRL rates for the two-and three level non-treatment schools, as shown previously, vary markedly from individual school type magnitudes. Such a finding suggests that the relationship between FRL rates and standardized achievement by school type warrants further consideration. Indeed, elementary and high school FRL rates appear to impact standardized achievement levels to a lesser extent than the FRL rates in middle schools across Missouri. The percentage of minority students ("pct_min") was found to be statistically significant only within IPI schools, although the magnitude of the relationship between "pct_ min" and standardized achievement is not considerable. The district-level FRL rates were found to statistically significant for two and three level IPI and non-treatment schools. The magnitude of the district–level FRL variable was also quite uniform across model-types that were tested. The per-pupil expenditure rate was found to be significant in two and three level non-treatment models, although the magnitude was inconsequentially slight. Finally, the proportion of teachers with master's degrees was only found to be statistically significant in two and three level non-treatment school models.

Wider societal structural factors appear to affect Communication Arts achievement levels, as well. Within the schoolhouse, the proportion of faculty who possessed master's degrees was statistically related to both Communication Arts and Mathematics achievement.

The relationship was found to be to a lesser extent. In high schools, however, a negative relationship was evidenced between the proportion of faculty with master's degrees and Mathematics achievement. Finally, per pupil expenditures were found to be negatively related to both Communication arts and Mathematics achievement although to a very unsubstantial extent.

Insert Table 7 approx. here

The percentage of minority students ("pct_min") within a school population was found to be statistically significantly related to both Mathematics and Communication Arts achievement, although the magnitude is unremarkable. Finally, regional level FRL rates were found to be statistically significant in two instances. Two important points are to be made from this finding: the coefficients are positive, which greatly diminish the FRL rate's effect on standardized achievement when aggregated. The FRL rate for the region is not as great as on the few schools within that region, thereby making the level one and two slopes more predictive than the level three coefficient magnitude.

All non-treatment building types (elementary, middle and high schools) were also tested by including FRL and the percentage of minority students ("pct_min") as the independent variables at the school, district, and regional levels. Table Eight provides the output associated with these models. The findings were again statistically significant in many instances, as the building level FRL coefficient magnitudes for all non-treatment schools were highly uniform in impact. School type level-one FRL rates ranged more considerably. The district level FRL

coefficients for all non-treatment schools were also relatively similar in degree. Again, the regional level FRL values were found to be positive for the middle school non-treatment sample. Additionally, the three-level model that incorporated all non-treatment schools also evidenced a positive FRL coefficient value. For reasons previously explained, the level one and two values are more likely to capture the effect of FRL than at the regional level. The percentage of minority students was found to be significant at the school level when the school types were separately tested. Only when elementary schools were tested was the percentage of minority students found to be statistically significant, and to a considerably positive extent. Such a finding suggests that differences in student achievement and racial composition varies based upon the school type in question.

Insert Table 8 approx. here

Findings from IPI schools that incorporated uncontrollable FRL and percentage minority independent variables in both two and three IPI schools are provided in Table Eight, as well. While the percentage of minority students was statistically significant for Communication Arts in both two and three level models, the school-level FRL variable was not found to be statistically significant in any of the IPI models. Conversely, the percentage of minority students at the district level was not found to be statistically significant in any of the IPI models, while the FRL rate was found to be statistically significant in all IPI models. The coefficient magnitudes of the district-level FRL within the IPI models were comparable to the two and three level non-treatment schools. The school type district level FRL predictor was found to be insignificant in the elementary and high school models, while the middle school coefficient was found to be positive for both Mathematics and Communication Arts. Finally, the regional level FRL rate for

the three-level IPI Mathematics outcome variable model yielded a similar result to the non-treatment Communication Arts three level model.

Certain HLM models within the study were also more fully specified to account for the wider panoply of educational inputs that might be related to standardized achievement levels. Table Nine below provides the output for the fully specified models associated with all non-treatment schools. District-level FRL predictors were not found to be statistically significant, however. Finally, the regional level FRL rate was found to be positively related to standardized achievement. Depending on the magnitude of the FRL at the district level, such a finding suggested that elevated building-level FRL rates might not be as impactful as they facially appear in the more parsimoniously constructed models. Teacher salaries and teacher experience were found to be statistically significantly related to achievement rates. Additionally, and as expected, a strong positive relationship exists between a school's average ACT scores and standardized achievement rates. Surprisingly, the student-teacher ratio was also positively related to standardized achievement levels. The percentage of married families was found to impact achievement to a positive extent that mirrored findings in other studies. Contrastingly, the percentage of minority students, the extent of regional poverty, district-level teacher experience, discipline, dropout and transient rates were not found to be statically related to standardized achievement levels to a statistically significant extent.

The fully specified HLM models for building types yielded findings disparate from the entire non-treatment set. More specifically, the building level FRL rate was the only level where the FRL predictor was found to be statistically significant. The FRL rates all were negatively related to standardized achievement, but to a considerably greater extent in middle schools as

opposed to elementary and high schools. Unlike in other models, the percentage of minority students ("pct_min") was found to be statistically significant. Additionally, the student teacher ratio was found to be statistically significant for Mathematics gains in middle schools and high schools. The remaining district-level FRL, percentage of student's families in poverty, teaching experience, discipline rates, and dropout rates were all found to be statistically insignificant.

Insert Table 9 approx. here

Table Ten below provides comparisons of the free and reduced lunch rates ("FRL") on Communication Arts and Mathematics achievement levels in non-treatment schools. Furthermore, the standardized achievement levels of IPI schools by their building type were also considered in relation to not only the FRL independent variable, but also to the higher and lower-order achievement levels within schools. Interestingly, while the non-treatment and IPI middle schools evidenced the greatest FRL coefficient magnitudes, the greatest discrepancies that emerged in FRL magnitudes between treatment and non-treatment schools were found in elementary and high schools. Of the high schools included in the study that were tested with both student disengagement and FRL rates, only Mathematics evidenced a significant slope for total disengagement.

The student teacher ratio was only found to be statistically significant in non-treatment high schools, but the magnitude was found to be the highest in any previously tested model. Indeed, a ten student decrease in this ratio would yield 5 percentage point standardized achievement gains. The percentage of minority students within a school's population was found

to be significant in middle schools and high schools, with a considerable difference between the two school types. The district-level FRL rate was only found to be statistically insignificant in non-treatment high schools, with coefficients that were considerably less than at the building level. Finally, the regional level FRL rate was found to be strongly positively correlated to middle school standardized achievement levels when the models also accounted for higher-order student engagement levels.

The per pupil expenditure predictor was the only variable found to be statistically insignificant across all the models that were tested. The percentage of married couples was only found to be significant in IPI treated elementary schools, but this coefficient was rather high and very much intuitive, as family stability among younger children enrolled in these elementary schools would be more impactful than for students in either middle or high school.

Insert Table 10 approx. here

Discussion

In today's public educational environments, instructional leaders have very little latitude to experiment with their time or money. As importantly, rapidly changing demographics and enhanced pockets of poverty in urban and rural districts inject added pressures into the educational process. In sum, the task of enhancing the educational quality of instruction and resulting standardized achievement levels becomes all the more challenging on the basis of factors that rest outside the control of even the most capable educators. The findings contained in this study are highly encouraging to public school leaders on a number of fronts. Complex empirical considerations of the differences in standardized achievement levels between schools

that incorporated the IPI instructional treatment with those that did not might inform important practical administrative and policymaking practices. The findings associated with the study offer the following insights into the import of the IPI treatment, and possibly, similar instructional initiatives.

IPI schools appear to have less of their achievement variance explained by the controllable and uncontrollable school and district educational inputs. School leaders and policymakers might be left to conclude, therefore, that schools immersed in instructional improvement initiatives will be impacted by educational inputs at differential rates than schools not incorporating these improvement initiatives. Schools that incorporated the IPI initiative also contained free and reduced lunch (FRL) rate population levels that were found to be unrelated to standardized achievement levels. Conversely, those schools that did not undertake the IPI process *did* yield statistical relationships between FRL rates and achievement. More importantly, the building types mattered greatly in terms of how much influence FRL rates impact standardized achievement. As such, school leaders and policymakers should take note of the fact that FRL rates do not impact elementary, middle, and high school performance equally. Instead, certain school leaders may face more pronounced challenges than others.

District-level FRL rates impact standardized achievement levels similarly across school types and between IPI and non-treatment schools. This intuitive finding informs a key policy suggestion: what happens on the ground at the building level can be a deciding factor in distinguishing achievement levels between elementary, middle, and high schools.

The disparity of the impact of FRL rates on standardized achievement levels, when studied by distinctive school type, is striking. This is especially true for middle schools where the FRL rates of middle schools most detrimentally impact standardized achievement levels. More specifically, the FRL rates of middle schools decreased achievement levels to an extent that was twice as great as was the case for high schools and fully three times as great as in elementary schools.

Analyses of school types that included a more exhaustive accounting of school-level variables also yielded distinctive differences between IPI and non-treatment schools. The large differences between fully specified school types warranted consideration by school leaders and policymakers. Differential FRL rates between elementary and middle schools can affect standardized achievement levels by 16 percentage points when FRL populations differ by 40%. Finally, considerations of the mitigating effect that the IPI might exhibit on socioeconomic factors that affect standardized achievement levels must also be more brightly underscored. Across-the-board diminishment of FRL rates on standardized achievement in IPI schools suggest that, on average, 20 point disparities in FRL rates between school building types can translate into 4 percentage point differences in standardized achievement levels.

The findings presented in this study serve as a powerful reminder that the magnitude of the difference in standardized achievement on the basis of disparities in student populations is unexpectedly large. The allure of the IPI is, therefore, great. Low-cost, high-yield instructional programs such as the IPI are demonstrated to benefit schools with socioeconomic and racial populations that are shown to underperform at disproportionately elevated levels. Clearly, there

is a benefit to creating a reform design that concerns the indispensible means of enacting improvement plans that alter instruction in ways that are readily measurable over time. By providing the added benefit of making achievement possible for populations who otherwise find growth to be an unmanageable challenge, the IPI (and like programs) illustrates itself as a fitting reform plan for schools of all types, impoverished ones especially.

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