# Instructional Improvement in Rural Settings: Charting the Impact of Pedagogical Reform on Student Engagement and Achievement Levels

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**Abstract:** *Research underlying the Instructional Practices Inventory (IPI) demonstrates that lower-order student engagement levels profoundly impact standardized achievement levels across public schools. This study exclusively considered the relationship between lower-order student engagement levels and the resulting standardized performance levels of rural school districts across Missouri. Using schools' IPI student engagement data and the corresponding school culture data from the IPI Survey Questionnaire, relationships between lower-order student engagement and student achievement levels were quantitatively interrogated. Additionally, the relationship between the educational input levels with student achievement, student engagement, and school culture were all empirical propositions that were explored in the study.*

*Tested in both Hierarchical Linear Models and measurement modeling, performed using LISREL software, the data from rural school classrooms yielded several significant findings. Lower-order thinking levels within rural schools appear to be less impactful on standardized achievement levels than the wider state population sample. Moreover, the effectiveness of the IPI in reshaping school culture appears to be less potent in rural schools. Finally, very strong relationships were evidenced between educational inputs and student achievement and student engagement levels, suggesting the considerable impact of proportion of students receiving free and reduced lunch ("FRL") within a school population on engagement and achievement levels.*

It is not easy being an administrator or teacher in today's public school systems. Unfortunately, rural school leaders face additional challenges and impediments not encountered by other districts. Most rural schools have very low enrollment numbers and very high poverty levels. This presents a two-front battle for the rural principal: she must contend with operational scale issues, in which per student costs can be remarkably greater, while also addressing the many challenges associated with educating students from impoverished backgrounds.

Rural principals and teacher leaders are, however, presented with an ironic upside to their school reform and effectiveness efforts: size. The very factor that contributes to great financial pressure can also be the rural school leaders' greatest asset. The small size of most rural school's provides a physical setting within which instructional leaders can more quickly and materially enact meaningfully building level changes. The psychological challenges associated with the task are also less daunting in those schools that enroll far less than 1,000 students. Rural principals are able to gauge and sway teacher efficacy levels over more compressed time horizons. Additionally, monitoring and altering student engagement behaviors across rural school classrooms becomes a more controllable undertaking in rural settings.

The literature base on student engagement is quite deep. It is also refreshed with some frequency. Nevertheless, gaps remain in the research on student engagement behaviors within the classroom. Though much is discussed about the importance of student engagement, considerably less effort is dedicated to numerically capturing and assessing such classroom behaviors. As a result, instructional leaders resort to softer "feel tests" to determine whether adequate instructional improvements are being pursued.

Far fewer efforts have been made by the educational research community to fit these pedagogical considerations more tightly into the rural classroom context. Mindful of such deficiencies, this paper is designed to address important matters of rural educational quality in the theoretical context of instructional improvement in these settings. Moreover, a closer look at the broad base of compiled empirical findings are analyzed and presented in this paper in a manner designed to better inform today's rural educators about the relationship between classroom engagement behaviors with resulting standardized performance levels.

It is first important, therefore, to characterize desirable student engagement in a fashion that provides for a meaningful distinction with learning behaviors that are non-higher order in nature. To date, the distinction between desirable and undesirable student engagement behaviors has been too blunt to allow rural school leaders to undertake the sorts of surgical repairs to classroom instruction that most greatly bolster higher order and critical thinking.

In sum, this paper encourages rural educators to focus on a more finely wrought approach to the distinctions between higher and non-higher order classroom behaviors. Not only can the building-level behavioral composites of student engagement across rural schools be quantified to reflect both the nature and prevalence of such classroom activity, but they can also be considered in direct relationship with student outcomes such as standardized achievement levels. Finally, situating this investigation in the rural context allows for statewide comparisons of the effects of student engagement on achievement. As a result, rural educators are made more keenly aware of the exact instructional conditions contained within their unique educational settings. Moreover, the challenges and adaptations needed to most effectively promote excellent instructional behaviors are better understood. These rural instructional leaders can then more intelligently act upon such information.

## Review of the Literature

### The Face of Higher-Order Engagement

The engagement of students in critical thinking stimulates student learning and prepares them for subsequent educational endeavors (Pogonowski, 1987). The simple acquisition of knowledge that informs students' information base is a necessary but insufficient component of appropriate instruction, as students should also be engaged in higher-order thinking (Underbakke, Borg & Peterson, 1993). Teachers can broach generative topics that relate to a wider variety of issues (Kowalchuk, 1999). However, teaching that incorporates topics that examine what students already do in their everyday lives, while also encouraging student learning outside the classroom, is a most effective way of stimulating higher-order thinking and learning (Kowalchuk, 1999).

Training teachers to question students in a fashion that provokes higher-order thinking is related to student achievement (Cotton et al., 1989). Ultimately, it is within the teacher's control to dictate the nature of their pedagogical practices and other classroom activities that actively facilitate such higher-order thinking. Such higher-order thinking challenges the student to interpret, analyze, manipulate, or otherwise synthesize information (Lewis & Smith, 1993). Brophy (1990) suggests that higher-order thinking requires that students posses: 1) an in-depth knowledge of content, 2) skills in processing information, and 3) the attitudes or dispositions of reflectiveness (Brophy, 1990).

Higher-order thinking is an intellectual practice that actively promotes student learning (Brophy, 1990; Kauffman, Davis, Jakubecy, & Lundgren, 2001; Underbakke, Borg, & Peterson, 1993; Freeman, 1989; Kowalchuk, 1999). The educational history and knowledge base of the learner matters; consequently, teachers must be cognizant of a student's previous exposure to

certain content material if they are to effectively engage students in appropriate learning (Lewis, 1978). It should be cautioned that the assumption that students must master basic skills before moving on to higher-order skills can lead to inequitable educational experiences for students (Freeman, 1989). The importance of actively incorporating higher-order thinking into the educational curriculum should, therefore, not be underestimated in the rural setting.

Ultimately, it is the teacher who is the mediator of a community of inquiry (Daniel et al., 1999). The teacher's role in establishing higher-order thinking and learning within classrooms is irreplaceable in all educational settings, irrespective of geography. Actively engaging students in higher-order thinking enables students to more effectively and actively process information (Underbakke, Borg, & Peterson, 1993). A study conducted by Cotton et al. (1989) that involved the collection of classroom observation data to glean the nature of teacher pedagogy found that during an average recitation, 60% of questions were found to be lower cognitive, 20% were higher cognitive and 20% were procedural (Cotton et al., 1989). This is not to suggest that higher cognitive questions are categorically better than lower ones, however (Cotton et al., 1989). It is the case that a certain level of teacher directed pedagogy that provides students with an appropriate knowledge base is both necessary and desirable (Valentine, 2005; 2007; 2008).

Rural school faculty members should also note that there is no singular or superior way to provide higher-order instruction and thinking to students. It is common, however, for pedagogy that is intended to engage students in higher-order thinking to incorporate instructional methods that encourage students to engage in the following behaviors: 1) hypothesizing and testing, 2) assessing arguments, 3) solving interpersonal problems, and 4) thinking in probabilistic terms (Kowalchuk, 1999). This focus, of course, ensures that rural schools are ridded of the lower order engagement behaviors that can stunt student learning and achievement.

**Linking the Engagement Literature to the Present Study**

The import of determining if, and to what extent, the nature of student engagement within rural schools impacts standardized achievement levels is clear. Resolving these important questions requires a structured study that captures classroom learning behaviors in these exclusively rural settings. Under these empirical conditions, the relationship between student engagement levels and standardized performance can be tested, the results of which can be compared to the broader national composite of public schools. Of course, offering an informed explanation of differences based upon theoretically-grounded propositions rather than the sole reliance on statistics places the empirical discussion of the rural engagement-achievement relationship into a more coherent, on-the-ground narrative.

Best illustrated for rural educators, then, is a key linkage to those more desirable levels of learning and achievement that these instructional leaders are tasked with augmenting. Additionally, as rural school leaders are better informed of the importance of the variables within their schools, such as the impact of free-and-reduced lunch rates and years of teacher experience, the engagement-achievement nexus, relative to other schools across the nation, is explained in fuller depth

Arriving at answers to questions involving the unique attributes of rural education first requires a sound empirical method to test these more global queries. Linking student engagement and test scores is, at least from a statistical standpoint, rather straightforward. Framing a theoretical discussion of the broader processes and environmental factors impacting engagement and achievement is, however, a much more complicated undertaking.

A big picture approach is a desirable means of exploring the engagement and achievement link in rural education. Presently, the research is bereft of studies that allow rural

leaders to access findings on the overall nature of these interrelated educational parts. As a result, this study frames the relationship between engagement and achievement under a wider instructional lens. Assessed therein are the differences in learning, reform practices, and faculty quality that may also spell resulting differences in engagement and achievement across public school settings. In particular, any differences found in these rural settings are also likely to spell differences in student engagement levels, and the resulting effect on standardized achievement.

**Effective Schooling**

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).

School improvement initiatives that seek to enhance school effectiveness and student achievement are found to be more likely to succeed when teacher control (Moe & Chubb, 1990; Witte & Walsh, 1990) and parental involvement (Henderson et al., 2005; Witte & Walsh, 1990) are evidenced. Furthermore, effective schools have been found to enjoy wider discretion and control over staff decision-making (Moe & Chubb, 1990). This is not to suggest that school leaders or teachers should necessarily be given unfettered autonomy, as a certain degree of structure and disciplined leadership provides appropriate guidance for schools (Moe & Chubb, 1990). Indeed, effective schools commonly contain strong leadership, clear classroom

objectives that are frequently monitored, and a climate that is characterized by the expectation that all children can learn (Druian & Butler, 1987).

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). A school wide vision that is congruent with the instructional goals and resources of schools is also vitally important (Cuban, 1998). Promising research conducted by Koch (1999) suggests that only a minimal funding threshold must be surpassed to allow for the enactment of programs and curricular initiatives associated with effective schooling. This is not to suggest, however, that nonfinancial factors do not greatly impact the quality of schools (Clemmitt, 2007).

Attempts to determine whether certain commonalities exist across effective schools might enable the researcher to find generalizable prescriptions that rural school leaders can incorporate within their buildings in the quest to introduce more effective school practices within their educational setting. Miles and Darling-Hammond (1998) note that from a selected population of effective high schools it was determined that flexible student grouping, efforts to create personal relationships, larger and more varied blocks of instructional time, more common planning time, and the creative definition of staff roles and school workdays were common among the effective schools. This sample of effective schools also contained leaders who directly challenged policies, regulations, and collective bargaining agreements. Hargreaves (2007) further suggests several strategic solutions that school leaders might find helpful in their

quest to become more effective, which include: 1) establishing correct valuation 2) developing sustainable growth rates 3) remaining ethically consistent 4) balancing investments 5) prioritizing their planning 6) broadening the language and vision of their goals 7) creating intermediate indicators to track goal progress 8) reducing **"**initiativitis," and 9) building change efforts and goals from the bottom with an appropriate level of guidance from the top.

Rural schools typically enroll fewer students than schools in other regions of the state. Rural schools might, therefore, offer more intimate environments in which to forge the wider community relationships that provide sustained support for instructional initiatives. Salient research concerns surround underlying empirical considerations of organizational learning. The structure of these rural schools might, for instance, influence the nature and extent of instructional improvement and the effectiveness of educational provision in these distinctive setting.

**School Leadership**

As rural school leaders exercise authority at the building level, they dictate the level of autonomy and discretion that teachers are able to exercise. School leaders are often the primary actors designated to modify a school's climate and culture as they attempt school reform or improvement initiatives that target the attainment of heightened levels of building-level effectiveness (Henderson et al., 2005). To accomplish such an ambitious task, these leaders must establish and clarify the school's shared beliefs and values, while also demonstrating how such values exhibit congruency with the proposed changes (Beach & Lindahl, 2007).

The necessity of a strong leadership presence, as required by the organizational need for constant review, re-evaluation, and short-term stability, has been well established in the educational research literature (Darling-Hammond, Bullmaster, & Cobb, 1995). School leaders

who exercise appropriate leadership can prove to be an invaluable component in guiding a school through the arduous process of reform and improvement (Hargreaves, 2007; Leithwood, Menzies, & Jantzi, 1994). Such leadership requires both rationality and sufficient transparency associated with the corresponding decision making process to diminish the likelihood that it will be viewed as arbitrary or capricious by the faculty within a school **(**Leithwood, Menzies, & Jantzi, 1994 ; Yukl, 2006). It is important that such leadership authority, whether technical, managerial, or rational be viewed as legitimate and necessary (Henderson et al., 2005; Leithwood et al., 1976; Yukl, 2006). Leithwood et al. (1976) further elucidate the characteristics of legitimate leadership authority, which he suggests are evidenced by individuals who 1) foreshadow the impending change, 2) distribute authority among peer representatives, 3) train clients to cope with change, 4) invoke the need to enact successive changes, and 5) highlight merits of change and answer questions. Little reason exists to suggest that these findings are any less applicable to rural schools than for any other educational setting.

The role of the principal within the school's administrative team is, of course, also as vital and irreplaceable in rural settings as elsewhere. Indeed, it is the principal who staves off the external demands placed upon the school (Henderson et al., 2005; Hoy, Tarter & Hoy, 2006; Valentine, 2005; 2007; 2008). Furthermore, principals can directly influence the organizational health of a school, which might be as determinative as to whether the school is effective as is the demographic composition of the school's population (Henderson et al., 2005).

**A Literature-Informed Accounting of Disparate Reform Progress**

As the nature of student engagement is captured and analyzed, school leaders will then seek to augment these levels to more ideal proportions. The goals in rural schools are no different, but carrying out such visions may present a different set of instructional obstacles.

Consequently, this paper next investigates school improvement efforts geared toward moving the student engagement needle in rural schools. Data clearly demonstrate that not all schools are created equal when it comes to student classroom behavior. There is no reason to believe efforts to transform such learning are any more uniform across buildings.

Considered, then, are the sorts of factors that govern the effectiveness of educational improvement efforts. These include, but are not limited to, institutional and leadership qualities that are found in rural schools. Here, the size and student compositions of these buildings vary considerably from their counterparts in suburbia. From this, the baseline student engagement data are placed in fuller context. More importantly, efforts to alter these classroom behaviors become more relatable to rural leaders when considered in theoretical terms that quantitatively spell out the differences in educational effectiveness efforts that are based on distinctive building-level factors.

**Differential Instructional Approaches and Outcomes**

The contributing factors of differential educational outcomes across schools are several and complicated. The same goes for differences in the extent to which segments of the student population perform under the same schoolhouse roof. While the tracking practices of rural schools might not differ radically from other regions of the state, the socioeconomic composition and prior educational experiences of these students may be considerably distinguishable from suburban students. Consider, for example, student tracking, a practice not unfamiliar to rural schools. Not surprisingly, the nature and quality of instruction in high and low-track classrooms starkly differ. In low-track classrooms, for instance, open classroom discussion averaged 3.7 minutes, while open discussion in high-track classrooms averaged 14.5 minutes (Applebee et al., 2003). Such differences are far from superficial, and can dictate the extent to which students are

able to effectively pursue future academic endeavors. Indeed, effective preparation and a quality educational experience can empower students to then actively explore their own academic interests. Applebee et al. (2003) argue that "when student's classroom experiences emphasize high academic demands and discussion-based approaches to the development of understanding, students internalize the knowledge and skills necessary to engage in challenging literacy tasks on their own" (p. 723).

Most school leaders who seek to create and maintain high-performing schools develop specific and ambitious organizational goals (Hargreaves, 2007; Leithwood, Menzies, & Jantzi, 1994; Moe & Chubb, 1990). Establishing clearly defined goals enables rural school leaders to incorporate benchmarks that allow these educators to distinguish the current operational integrity of the school from their desired performance objectives. Leithwood, Menzies, and Jantzi (1994) argue that "goals energize action only when a teacher's evaluation of present circumstances indicates that it is different from the desired state" (p. 43). Leithwood, Menzies, and Jantzi (1994) further suggest that goals will be most effective if they are believed to be achievable, clear, and concise. This goal setting process should also be highly participatory, ongoing, and continuous (Leithwood, Menzies, & Jantzi, 1994). When teachers' goals were congruent with their perceptions of the school's culture and direction, schools were found to be more likely to enjoy success (Leithwood, Menzies, & Jantzi, 1994).

**Differential Outcomes in the Context of a Rural Study**

While instructional leaders care about educating students, they also feel the unrelenting pull of accountability pressures. It is inescapably the case that today's rural educators are required that they translate student learning into test score growth. In the current educational policy environment, test scores are tracked and prescribed with meticulous scrutiny. Suffice it

to say, no matter the size of school or geographic setting, test scores remain squarely on the minds of educators.

Tracing the nature of student engagement, reform efforts, and the alterations to educational quality must be tied to test score performance to capture the dynamic of instructional improvement in the accountability era. Unquestionably, the interest of under-fire school leaders requires as much. As this paper will document in detail, just as the school improvement efforts are not created equal, it is likely the case that the influence of student engagement on test scores is unequal across educational settings.

As a result, it becomes important to first test the relationship between student engagement and standardized achievement levels. As important are the findings associated with comparing the impact that the various types of student engagement exhibit on achievement in rural schools, both in isolation and relative to other public school settings. These empirical results more clearly flesh out the impact that instruction in rural settings has on engagement levels in rural classrooms. Additionally, how these behaviors impact standardized achievement levels relative to their counterparts elsewhere across the nation can also be more fully explained by linking observed student engagement data with resulting test score progress. The challenges to rural school leaders are well known. Whether these factors make test score growth more difficult is not so well established. This paper, therefore, resolves lingering questions on the relationship of rural engagement and achievement that have gone unexplored for too long.

# Methodology

## The IPI Instrumentation

The Instructional Practices Inventory (IPI) is a process employed by classroom observers to ascertain the nature of student engagement across classrooms within a school. The IPI is comprised of "a set of observational categories complex enough to provide substantive data grounded in the knowledge of best practice (valid) yet easily understood and interpreted" (Valentine, 2007). The IPI instrumentation allows a trained classroom observer to collect scores of observational codes that capture student engagement behaviors for each school. The observation categories included in the IPI observation protocol are: (1) student disengagement, (2) student engagement in non-higher order activity without teacher participation, (3) student engagement in non-higher order activity with teacher support, (4) teacher-directed instruction, (5) student engagement in higher-order classroom discussion, and (6) all other higher-order student learning.

Table One offers an explanation of each of the six coding categories. It is important to note that higher-order categories ("5" and "6") represent desirable forms of student learning whereas the lower-order categories ("1" and "2") represent less effective and generally undesirable, indefensible forms of student activity within classrooms. It is not, however, always possible, nor desirable, for students to be engaged solely in higher-order activities. As such, categories "3" and "4" account for those moments during classroom instructional time when the teacher is primarily involved in informing and directing the students' activities in the classroom, as student engagement becomes mostly passive and inactive. This might come in the form of teachers informing students of certain tasks or logistical considerations or teacher-directed

learning, both of which are inevitable components of effective teacher pedagogy and student learning.

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**Capturing Instructional Improvement Data**

The Instructional Practices Inventory (IPI) survey questionnaire was the primary instrument used to capture data about the nature of the implementation of the IPI process. The IPI survey was constructed in collaboration with the developer of the IPI process to measure several environmental factors demonstrated to directly affect student performance. More specifically, the IPI survey enabled the researchers to ascertain the perceived levels of school trust, collective teacher efficacy, teacher commitment, and the self-reported levels of importance that are placed on academic achievement (Valentine, 2005; 2007; 2008).

School trust can be a critical and necessary component for academic excellence. Hoy, Tarter, and Hoy (2006) note that "A culture of trust should provide a setting in which people are not afraid of breaking new ground, taking risks, and making errors" (p. 237). Survey responses suggestive of school environments in which school leaders are mindful and prospective in their mission, and desirous of improving the operational effectiveness and academic excellence of the school, served as a proxy of faculty trust. Question 14 of the IPI survey, for instance, while not restricted solely to such a consideration, captured elements of the processes and practices in the public school environment. Furthermore, IPI adoption serves as a meaningful proxy of schools that are proactive in their efforts to anticipate future challenges by focusing on current operational deficiencies (Hoy, Tarter, & Hoy, 2006). The school trust construct was captured by

several IPI survey questions that asked the respondents to indicate his or her perception of the extent of teacher autonomy and school democracy/egalitarianism levels, as well as the extent to which teacher input is valued in the school (Question 6 – whether the faculty was informed about the process; Question 9 – who led the first data collection; Question 10 – the organization and structure associated with first IPI faculty meeting). Respondents were also asked to indicate their perceptions of the extent to which teachers lead the IPI faculty sessions. Such behaviors represent an accurate proxy for the level of trust that pervades the wider school environment (Valentine, 2005; 2007; 2008).

The IPI survey questionnaire also contained questions that empirically captured the level of teacher collective efficacy within the school (Valentine, 2005; 2007; 2008). Goddard, Hoy, and Hoy (2004) adopt Bandura's (1977) definition of collective teacher efficacy as "the perceptions of teachers in a school that the efforts of the faculty as a whole will have a positive effect on students. While teacher efficacy is a type of self-efficacy, collective efficacy involves the personal agency of teachers at a context-specific group level" (Goddard, Hoy, & Hoy, 2004). As a consideration of collective teacher efficacy might allow for an enhanced understanding of how schools differ in the attainment of the education of students, such a factor was incorporated in the IPI questionnaire (Goddard, Hoy, & Hoy, 2004**)**. By questioning respondents as to whether teachers were able to work in teams (IPI Survey Question 10), and whether these teachers were empowered to determine the tone and direction of the meetings (Question 12), an empirical determination of efficacy levels was made (Valentine, 2005; 2007; 2008). The level of faculty receptivity could also be gleaned from several of the survey questions (Valentine, 2005; 2007; 2008). Finally, the extent to which the survey respondents were convinced that the IPI was effectively being employed within the schools and ultimately yielded material gains to both

the quality of teacher pedagogy and subsequent student learning served as a sound proxy for teacher collective efficacy (Question 14) (Valentine, 2007; 2008).

The survey questionnaire further captured the number of times and the duration that the IPI practices were executed within a given school (Questions 4 and 5) (Valentine, 2007; 2008). The frequency and duration of IPI practices undertaken within schools served as a proxy for the extent to which the schools value academic achievement (Hoy, Tarter, & Hoy, 2006). For the purposes of the present study, the extent to which the IPI was implemented with integrity is assumed to be a robustly telling proxy that manifests other features of the school's culture and climate (Valentine, 2007; 2008). More specifically, a good faith IPI implementation effort was equated with a school's desire to ensure that a challenging climate of academic excellence exists at the building level (Hoy, Tarter, & Hoy, 2006). Furthermore, a consideration of the priorities of the respondents, as they enumerate their objectives on the IPI questionnaire (Questions 3, 12, and 14), serves as a telling indicator of the extent to which classroom instruction and student achievement is valued by the school, and can be considered to be an apt proxy for the fidelity of IPI treatment implementation (Hoy, Tarter, & Hoy, 2006). The importance of the academic optimism factor (captured by Questions 6b and 11) must not be understated, as such academic emphasis can explain math and reading achievement scores despite markedly differing SES levels of a school population (Hoy, Tarter, & Hoy, 2006).

A problematic feature of these curricular initiatives is the extent to which "teachers view the acquisition of pedagogical knowledge as unrelated to formal programs that seek to demonstrate or develop that knowledge" (Firestone & Pennell, 1993, p. 507). The extent to which the faculty is committed to the instructional treatment was gleaned from the survey

questionnaire, as questions about the mechanics of incorporating initiatives (survey question 3), expectations (survey questions 12, 13a, and 13b), and programs of prospective benefits to the school were employed (question 14). Firestone and Pennell (1993) note that "the committed [teacher] believes strongly in the object's goals and values, complies with orders and expectations voluntarily, exerts considerable effort beyond minimal expectations for the good of the object, and strongly desires to remain affiliated with the object." The changing nature of teacher commitment can prove to be impactful on the broadly defined but fluid conception of what constitutes good teaching (Firestone & Pennell, 1993). With this in mind, the IPI questionnaire temporally captured the level of teacher commitment within rural schools.

## Measures

Hierarchical Linear Modeling (HLM) represents an especially attractive methodology upon which to address the theoretical concerns underlying the incorporation of the Instructional Practices Inventory (IPI) in school settings of all kinds. The structurally and spatially nested nature in which student learning and school processes are configured can be duly accounted for by HLM Modeling. That is, the extent to which the IPI gains traction at the building level (as evidenced by IPI survey response scores) can be tested as independent variables that are embedded ("nested") within the district level, where resources and demographics are likely to impact their success.

After investigating the more isolated and narrow components of school practices and processes associated with the IPI treatment on engagement levels, it becomes necessary to consider the site-level variables and their contemporaneous interactions with one another in a more holistic manner. The researcher began testing for the IPI treatment's influence on the practices and processes within schools on student engagement levels by employing a two level

structure. Such a model most realistically captures the wider contextual environment in which the student engagement levels are evidenced in, and influenced by, the respective school districts in which students are situated.

Level-One School-wide engagement : Level-One of the HLM models employed in the study contained the variable that captured the student engagement levels within the classrooms. Raw percentage breakdowns are computed for each school type that provided three or more IPI classroom data profiles, in the form of singular disengagement codes for core and total classrooms (C1, T1 and C2, T2). As multiple classrooms observations are coded for each classroom within the building over the course of a school day a statistically representative depiction of student engagement levels within each school setting can be introduced into the multilevel statistical study at Level One of the HLM models. The assignment of student engagement levels as dependent variables in the model to test against the corresponding IPI practices and processes, as captured by coded IPI survey responses, has been emphasized at this level.

Level-Two School Districts: For the purposes of this study, traditional socioeconomic, and controllable and uncontrollable educational resources and input factors were collected and recorded for the corresponding school districts containing schools that provided data for the current research undertaking. More specifically, the per pupil expenditure levels (PPE), the percentage of minority students (Pct_min), the free and reduced lunch rate at the district level (FRL), the percentage of families that have remained in the district the last five years (PCT_not) and the proportion of married families (Now_married) 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 Centers: Not unlike many states across the nation, Missouri is comprised of several disparate regions. The several districts within the study were nicely dispersed across the region, creating averages that are statistically representative of regional demographic, controllable and uncontrollable inputs, and student achievement. The geographic and economic makeup of these areas are disparate, providing meaningful across-region differences to be methodologically captured. Here, the FRL rates of regions were included in Level Three of each model.

**Measurable Outcomes Variable**

A student engagement outcome of great interest for this study is the percentage of higher-order student engagement in core content area classrooms coded as a "5" or a "6" (AV_C56), was assigned as the dependent variable in both the two and three level models. As importantly, though, the non-higher order student engagement levels were also tested as dependent variables, to ascertain not only fluctuations that result from independent variable manipulations, but to compare any fluctuations to their higher-order counterparts. To test this theoretical proposition, the dependent variables included the percentage of classrooms coded as either a "1", "2", (either student disengagement (AV_C1 or teacher inattentiveness, AV_C2, within core classrooms). Ultimately, the student engagement and achievement relationship can be more thoroughly and holistically explored by testing data under a HLM statistical framework. Simply put, the HLM models enable the researcher to determine the extent to which the IPI more directly influenced student engagement levels, which might, in turn, also exhibit influence on standardized test score levels of schools.

**Explanation of Population Sample and Descriptive Data**

In 2005, numerous schools across Missouri and the nation began to conduct IPI classroom walkthroughs. These walkthroughs enable the level of student engagement in each classroom within a school to be captured and documented by a trained observer. At the time of this study, approximately 300 Missouri public school utilize the Instructional Practices Inventory with some degree of fidelity.

**Data Collection Procedure**

To collect IPI data, a certified data collector moves continuously from learning setting to learning setting (classroom to classroom) throughout the school day, observing student engagement in learning and coding that engagement on a data coding form as many as 150 times during the school day. Two points are to be stressed at this point as it relates to the trained IPI classroom observers who conduct classroom walkthroughs: First, teacher and school leaders other than principals are designated as data collectors to diminish the possibility of bias in data collection or concern about the instrument as a mechanism for supervision or evaluation. Second, all IPI data collectors are to have an IPI reliability measure of .90 on a post-workshop assessment.

## Results

Provided in Tables Two through Five is the descriptive output associated with the Hierarchical Linear models that were constructed to test the relationship between lower-order student engagement and standardized achievement in rural schools. Of note is the proportion of free-and-reduced lunch students (FRL) that is comparable to the FRL rates of the IPI studies included schools from across the state. Additionally, both the higher and lower-order student engagement levels, as well as the standardized achievement levels within rural schools, do not

deviate appreciably from the wider population samples that have been tested in the past. Differences between rural schools and the schools tested in the wider state study do emerge, however. In particular, the proportion of teacher's with master's degrees, administrator salaries, enrollment, the percentage of minority students, and the student-teacher ratio are all considerably lower in these areas than in other schools across Missouri.

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Insert Table 2 approx. here

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Not surprisingly, the district-level data, contained in Table Three below, is very similar to the building-level data.

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Insert Table 3 approx. here

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Finally, descriptive output for the regional levels is provided in Table Four below.

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Six disparately-constructed measurement models were employed to test the relationship between student achievement levels, student engagement levels, educational inputs, and school practices and processes. Figure One provides a pictorial representation of the structure assumed by these various models.

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Insert Figure 1 approx. here

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The findings associated with the three-level HLM models that incorporate lower-order student engagement as the dependent variable and the IPI practices and processes, as captured by the IPI SCS, reveal insignificant findings associated with IPI process in the rural schools. As is displayed in Table Five below, the most substantial extent to which lower-thinking is affected by the IPI process relates to non-higher order student engagement with teacher disengagement in core and all classrooms ("C2" and "T2," respectively). Question 6b of the survey, a metric faculty receptivity to instructional improvement, reveals that the enthusiastic adoption of the IPI instructional initiative would, at most, lead to a 9.30 point reduction in student engagement coded as a "2" in core classrooms, and 8.34 points across all classrooms. Question 10 of the survey appears to introduce an offsetting effect in such gains, as faculty discussions of data (Q10) were found to be positively related to lower order student thinking. The magnitude associated with such a relationship is quite small, however. More specifically, the slope associated with this ordinally-scaled question suggests that student disengagement and lower order student engagement with teacher disengagement would be enhanced by no greater than 6 points. Nevertheless, this presents, at the very least, a qualifier to the otherwise highly encouraging findings associated with faculty enthusiasm.

The findings associated with the proportion of student populations that receive free-and-reduced lunch ("FRL") are far more consequential. In isolation, the level-one FRL coefficient ranging from -.14 - .17 are more depressed than in other studies. Aggregating the level-one FRL coefficient with the FRL coefficient reveals the more muted impact of FRL on student

disengagement levels in rural schools (.06- .09). Stated differently, were the FRL rate of a given school 100%, while another school had a 50% FRL rate, this would translate into 3-4.50 percentage point discrepancy in lower-order student engagement levels between the two schools. Similarly, the percentage of minority students coefficient was also a depressed .22, suggesting that the minority populations in rural regions, already scant, would not substantially augment lower-order student engagement levels. Finally, certain structural factors associated with wider educational environments of these rural schools appear to be impactful on student disengagement levels, but not predictably so. That is, the proportion of students whose parents are married appears to be positively associated with student disengagement ("1"), but more greatly negatively associated with non-higher order thinking and teacher disengagement ("2"). As an example, schools with a 10 percentage point discrepancy in students who reside in married households would yield student disengagement ("1") reductions of 2.2 points. On the other hand, non-higher order thinking with teacher disengagement ("2") would be diminished by as many as 5.7 percentage points.

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Insert Table 5 approx. here

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A consideration of those HLM models that incorporated standardized achievement levels as the dependant variable tested with lower-order student engagement and education input levels reveals findings that were, for the most part, intuitive. As provided in Table Six, the coefficients associated with student disengagement in core classrooms ("C1," "T1") ranged from -.39-.42. Similarly, the coefficient for student disengagement in all classrooms ("T1") was found to be .46. Likewise, the coefficients associated with the non-higher order thinking ranged from -.20 – .28 in core classrooms ("C2") and -.26-.31 in all classrooms ("T2"). The magnitudes of these independent variable coefficients are more depressed in rural regions than for the entire statewide study. To illustrate the point, consider what happens to student engagement in the classroom. Among rural schools, it happens to be the case that for every 10 percentage point increase in student disengagement, a 4 point decline in standardized achievement is to be expected. For student non-higher order engagement with teacher disengagement ("C2," "T2"), 3 percentage point declines would result.

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Insert Table 6 approx. here

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Findings from the Measurement Models are provided in Table Seven below. Significant findings in the expected direction are evidenced among several factors within each of these models. It should be noted that the magnitudes of the factor correlations vary considerably. The correlational magnitudes between achievement and school inputs, for example, ranged from -.33 - -.99. The integrity-engagement latent factor relationships evidenced a similar dispersion of magnitude values (-.26 - .97). More uniform magnitudes were evidenced for the engagement and input latent factors (-.72-.90) and integrity and input -.56- -.74. Finally, weak to weakly

moderate correlational relationships existed with achievement-school process latent factors (.20) and the achievement-engagement factors (-.17 - - .33).

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Insert Table 7 approx. here

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**A Note on Model Variance**

The proportion of student achievement variance explained in rural schools was of interest to the researchers. The great majority of standardized achievement variance is attributable to across-school differences (90%), while the remaining 10% can be linked to across-district disparities. No standardized achievement variance is accounted for by inter-regional differences according to the findings of the many models employed in this study.

A separate but related issue involved the variance associated with lower-order engagement and disengagement when tested in relation to building level practices and processes associated with the IPI. The uniformity found with standardized achievement variance discussed above was entirely absent once student engagement variance was considered. More specifically, the across-school differences accounted for between 18 -100% of total variance. The explanation for such marked disparities in variance apportionment is not as elusive as it might facially appear. Indeed, while only lower-order ("2") and disengagement ("1") were the outcome variables upon which the variance distribution was considered, a wide panoply of building level practices and processes associated with the IPI appeared to largely dictate the levels of across school and across district variance. While the IPI is oftentimes initiated by school districts but undertaken by schools, certain coded practices and processes would be more attributable to school level attributes, while others would be more greatly linked to district level

considerations. Though they are not readily self-explanatory, the findings nevertheless are meaningful and telling when considered on an individual basis.

## Discussion

The essence of the overall IPI process parallels the methodology of this study quite coherently. That is, after an initial IPI data collection, rural school leaders immediately become aware of their school's current student engagement profile in raw percentage terms. Quantifying student engagement behaviors is not only diagnostically meaningful, but presents the opportunity for more healthy and constructive goal setting in rural schools. Indeed, rural school leaders are then empowered to chart a more data-driven course for their faculties. The designated benchmarks, in turn, will augment standardized test passage rates according to the findings fleshed out below.

Rural teacher leaders and administrators need not approach the IPI process with a blindfold on. Groping in the dark to attain arbitrary declines in lower-order thinking could lead to faculty dissent, confusion, and/or a lack of full-buy in. While the optimal level of total disengagement is, of course, zero percent, rural faculty members are also wise to appreciate the devastating effect that ballooning student disengagement levels can exact on both teacher morale and standardized achievement levels. As such, designating 25% to be a realistic level of student disengagement levels after school faculties have been asleep at the wheel for a few academic quarters is meant to represent a preventative construct, and not a false instructional doomsday premonition.

Also important is the temporal design of the IPI process. The IPI process is not a quick fix or shock treatment meant to remedy all that ails a school's instructional health

instantaneously. Instead, the IPI process demands from faculties a sustained commitment to altering their pedagogical techniques and practices over a sustained time horizon. It is in this vein that rural school administrators can employ the student engagement benchmarks not as a punitive or heavy-handed oversight metric, but as attainable building-level guideposts that signify faculty growth, commitment, and instructional excellence.

**Eradicating Disengagement**

The conceptual ideas presented above were empirically derived. Now, the task turns to facilitating school practitioners, policymakers, and researchers as they seek to better translate these findings into meaningfully interpretable data. At present, the end goal of public education appears to be very clearly defined: standardized test performance. While the appropriateness and desirability of this metric in assessing and valuing school effectiveness and reform efforts can be philosophically debated, policymakers and school leaders are expected to enhance student performance quickly and precipitously. The practical import of this study closely aligns with these realities. School policymakers and leaders who target and eradicate student disengagement levels can expect to find resulting test performance levels that are marginally enhanced. In this study, the findings for Mathematics and Communication Arts achievement models are virtually identical. Were student disengagement ("C1") to be entirely eliminated within the rural schools, mathematics achievement would increase by 1.34 percentage points. Mathematics achievement levels would be increased by an additional 2.28 percentage points if non-higher student engagement with teacher disengagement in core classrooms ("C2") were entirely eliminated. Communication Arts achievement levels would be enhanced by 1.24 percentage points were student disengagement within core classrooms to be entirely eliminated. Similarly, the

eradication of lower-order student engagement with teacher disengagement in core classrooms ("C2") would lead to Communication Arts gains of 1.62 percentage points.

**The High Stakes of Disengagement**

The implications for rural school leadership on standardized test performance are made strikingly evident as a result of this study. The quality and activeness of school administrators and teacher leaders can largely dictate the extent to which student disengagement levels rise over time. School leaders in rural settings who become complacent, disaffected, or distracted can find themselves in an educational setting where student disengagement levels have risen from a relatively muted 3-5% to a more preponderant 15-25% of all student engagement behavior. The importance of mitigating student disengagement and lower-order thinking within classrooms becomes brightly evident when the reader considers achievement disparities for rural schools with average lower-order student engagement levels with those rural settings where 25% of all coded student engagement observations reflect disengagement. Under such a circumstance, mathematics achievement levels are 9.16 percentage points lower in the school with 25% disengagement, while communication arts pass rates trail by 8.51 percentage points. Finally, where the non-higher student engagement with teacher disengagement in core classrooms ("C2") represent 25% of all coded classroom behavior, Mathematics proficiency rates are 4.72 percentage points lower, while Communication Arts passage rates trail schools with average levels of this classroom conduct by 3.37 percentage points.

For good reason, rural school leaders often decry the fiscal difficulties associated with educating students on such a small and unusually expensive scale. Lost in the discussion is a consideration of the potential benefits that rural leaders can enjoy by attempting school reform efforts on this more truncated scale. Within rural schools, lower-order student engagement

levels and educational inputs are strongly correlated to one another. The relationship is substantially greater in rural schools, however, suggesting the disproportionately elevated extent to which rural funding and demographics impact student achievement levels.

Building level relationships, efficacy levels, goal setting regimes, and student-teacher relationships are also far more easily manipulated at the rural level. Quite literally, the more physically condensed educational setting may make the complex and highly fluid variables associated with school change initiatives more easily detectable and navigable by school administrators. Not surprisingly, therefore, lower-order student engagement levels were found to be more considerably correlated with educational inputs than is the case for those schools included in the wider state study. This suggests that uncontrollable school inputs pose greater challenges to rural school leaders as they attempt to reduce lower order student engagement across classrooms.

Next, a consideration of the IPI process within the rural school setting can better place the study's findings in an appropriate context. The very design of the IPI process is complimentary of the expectations and demands placed upon rural school leaders. The structured IPI process encourages whole-faculty input that is acknowledged and transformed by teacher-leaders into actionable building level programs and initiatives that can stimulate student engagement and student learning. All the while, rural buildings' faculty efficacy levels and collective moral will also enjoy growth, as teacher input is valued and dignified. Accordingly, the extent of teacher involvement in the IPI process makes it akin to a grassroots movement for lasting change in the rural setting. The many uniquely distinctive demands that confront rural school settings across the country appear, from the findings, to be aptly addressed by employing the IPI process.

The structural form of the IPI process, and its relationship to school improvement and achievement metrics in rural settings, can now be considered alongside the empirical findings of this study. The integrity levels with which school initiatives are undertaken and the student engagement levels were also found to be more highly correlated with one another in rural regions. Rural school leaders can reasonably conclude, therefore, that the fidelity with which school improvement initiatives and best practices are approached at the building level can greatly impact the nature of student engagement within the classroom.

The findings of this study should broadcast loud signals to policymakers that rural settings are influenced and impacted by both resource input variables and school improvement initiatives to an extent that varies from their suburban and urban counterparts. Educational inputs were clearly shown to be highly correlated with the integrity to which school practices and process are undertaken. Given the relationship found between the integrity of the IPI process and student engagement levels within schools, this finding suggests that certain uncontrollable factors may constrain the extent to which rural school leaders are able to manipulate student engagement within classroom.

Policymakers are keenly aware of the increased costs needed to educate each child in isolated and rural regions of states. The findings from this study are not a direct product of geographic or financial considerations, but instead focus internally on the school reform challenges that building leaders face as a result of various expenditure, teacher competency, and student demographic considerations. At the very least, it appears that educational leaders in rural settings may face greater school improvement challenges as a result of the influence that educational inputs exhibit on the IPI school improvement initiative. Both student achievement levels and nature of the practices and process associated with the IPI, as well as student

achievement and student engagement levels were found to evidence lower correlation to one another within these rural schools tested as opposed to the school included in the statewide study. As its core, this suggests that for student achievement levels of these rural schools to be considerably impacted, the school processes and student engagement levels need to be altered more appreciably than is the case in schools in non-rural areas. In short, policymakers and school leaders are implored to craft school improvement and reform processes that acknowledge such differences.

**Wrapping Up a Wide Angle Study**

Using a fuller approach than is found in the preexisting literature, this paper broached pressing questions on the methods of rural instructional practices that impact student engagement and achievement. That is, questions surrounding the baseline composite of student engagement levels within rural classrooms served as a starting point of the inquiry. Next, considering whether various building-level input factors impact not only the nature of student engagement levels, but the resulting test scores, is fully explored.

All the while, the structure of the paper accounted for the high-stakes testing environment in which instructional improvement initiatives unfold. As test scores are now tracked with more scrutiny than ever, spelling out the nature of the impact that student engagement exhibits on standardized test scores also sheds valuable light on instructional reform efforts yet to be resolved but sure to remain a timely consideration that rests on the minds of all rural educators. Unquestionably, rural classrooms that fostered student disengagement suffered noteworthy depressions in standardized test passage rates over time.

Ultimately, the findings of this study, like the factors involved in rural education, provide a mixed prognosis. It is clear that rural educators face unique fiscal and student demographic

challenges that can yield classroom engagement-standardized achievement relationships that hinge more delicately upon school funding, teacher characteristics, and socioeconomic status. Countervailing instructional conditions include the more intimate faculty and administrative relationships which present the opportunity to undertake school improvement and reform efforts with greater faculty buy-in and traction. It is this level of complexity that demands the sorts of statistical and theoretically methods applied in this paper. All told, rural school leaders, along with state and federal policymakers should heed findings from the study that again reaffirm that all schools are not created equal.

## Table 1. Instructional Practices Inventory Category Descriptions

| | | |
|---|---|---|
| **Student Active Engaged Learning (6)** | Students are engaged in higher-order thinking and developing deeper understanding through analysis, problem solving, critical thinking, creativity, and/or synthesis. Engagement in learning is not driven by verbal interaction with peers, even in a group setting. Examples of classroom practices commonly associated with higher-order/deeper Active Engaged Learning include: inquiry-based approaches such as project-based and problem-based learning; research and discovery/exploratory learning; authentic demonstrations; independent metacognition, reflective journaling, and self-assessment; and, higher-order responses to higher-order questions. | **Student Engagement in Higher-Order Deeper Learning** |
| **Student Verbal Learning Conversations (5)** | Students are engaged in higher-order thinking and developing deeper understanding through analysis, problem solving, critical thinking, creativity, and/or synthesis. The higher-order/deeper thinking is driven by peer verbal interaction. Examples of classroom practices commonly associated with higher-order/deeper Verbal Learning Conversations include: collaborative or cooperative learning; peer tutoring, debate, and questioning; partner research and discovery/exploratory learning; Socratic learning; and, small group or whole class analysis and problem solving, metacognition, reflective journaling, and self-assessment. Conversations may be teacher stimulated but are not teacher dominated. | |
| **Teacher-Led Instruction (4)** | Students are attentive to teacher-led instruction as the teacher leads the learning experience by disseminating the appropriate content knowledge and/or directions for learning. The teacher provides basic content explanations, tells or explains new information or skills, and verbally directs the learning. Examples of classroom practices commonly associated with Teacher-Led Instruction include: teacher dominated question/answer; teacher lecture or verbal explanations; teacher direction giving; and, teacher demonstrations. Discussions may occur, but instruction and ideas come primarily from the teacher. Student higher order/deeper learning is not evident. | **Student Engagement in Knowledge and Skill Development** |
| **Student Work with Teacher Engaged (3)** | Students are engaged in independent or group work designed to build basic understanding, new knowledge, and/or pertinent skills. Examples of classroom practices commonly associated with Student Work with Teacher Engaged include: basic fact finding; building skill or understanding through practice, "seatwork," worksheets, chapter review questions; and multi-media with teacher viewing media with students. The teacher is attentive to, engaged with, or supportive of the students. Student higher-order/deeper learning is not evident. | |
| **Student Work with Teacher not Engaged (2)** | This category is the same as Category 3 except the teacher is not attentive to, engaged with, or supportive of the students. The teacher may be out of the room, working at the computer, grading papers, or in some form engaged in work not directly associated with the students' learning. Student higher-order/deeper learning is not evident. | |
| **Student Disengagement (1)** | Students are not engaged in learning directly related to the curriculum. | **Students Not Engaged** |

*IPI coding is not based on the type of activity in which the student is engaged, but rather how the student is engaging cognitively in the activity. Examples provided above are only examples often associated with that category.* The Instructional Practices Inventory categories were developed by Bryan Painter and Jerry Valentine in 1996. Valentine refined the descriptions of the categories (2002, 2005, 2007, and 2010) in an effort to more effectively communicate their meaning.
The IPI was developed to profile school-wide student engaged learning and was not designed for, nor should it be used for, personnel evaluation.

**Table 2. Level-One Rural Descriptive Statistics**

| VARIABLE NAME | N | MEAN | SD | MINIMUM | MAXIMUM |
|---|---|---|---|---|---|
| DISCIPLI | 133 | 1.18 | 1.70 | 0.00 | 9.10 |
| TCHR_CER | 133 | 96.82 | 3.76 | 84.20 | 100.00 |
| TCHR_MAS | 133 | 41.40 | 14.08 | 7.50 | 76.10 |
| TCHR_SAL | 133 | 38.17 | 3.94 | 27.09 | 49.72 |
| ADMIN_SA | 133 | 62.89 | 9.09 | 43.46 | 92.91 |
| FRL | 133 | 45.08 | 13.24 | 13.90 | 79.20 |
| TCHR_EXP | 133 | 12.47 | 2.24 | 8.20 | 18.00 |
| ENROLLME | 133 | 406.73 | 270.70 | 43.00 | 1858.00 |
| PCT_MIN | 133 | 5.15 | 5.58 | 0.00 | 36.20 |
| STU_TCHR | 133 | 17.56 | 3.55 | 5.00 | 27.00 |
| COMM_07 | 133 | 42.81 | 7.70 | 20.50 | 63.00 |
| MATH_07 | 133 | 43.98 | 9.67 | 18.40 | 73.50 |
| AV_T1 | 133 | 3.54 | 3.42 | 0.00 | 16.00 |
| AV_T2 | 133 | 8.27 | 5.84 | 0.00 | 34.50 |
| AV_C1 | 133 | 3.18 | 3.26 | 0.00 | 14.50 |
| AV_C2 | 133 | 8.14 | 6.05 | 0.00 | 34.50 |

**Table 3. Level-Two Rural Descriptive Statistics**

| VARIABLE NAME | N | MEAN | SD | MINIMUM | MAXIMUM |
|---|---|---|---|---|---|
| AVG_TCHR | 69 | 37.39 | 4.11 | 27.09 | 50.22 |
| AVG_ADM | 69 | 67.67 | 7.69 | 43.46 | 92.80 |
| PER_PUP | 69 | 78.99 | 15.63 | 60.58 | 143.95 |
| AVG_FAM | 69 | 44.72 | 6.59 | 30.01 | 60.27 |
| HOUSE_VA | 69 | 79.66 | 25.59 | 36.37 | 149.23 |
| PCT_MIN | 69 | 5.61 | 5.86 | 0.00 | 29.10 |
| AVG_ACT | 69 | 20.84 | 1.04 | 18.00 | 23.50 |
| TO_COLLE | 69 | 61.53 | 11.67 | 23.00 | 88.90 |
| TCHR_CER | 69 | 97.19 | 2.69 | 83.30 | 100.00 |
| TEACHER | 69 | 40.54 | 12.73 | 13.10 | 66.50 |
| FRL | 69 | 46.59 | 13.31 | 18.10 | 100.00 |
| PCT_POV | 69 | 10.15 | 4.75 | 3.30 | 28.70 |
| TCHR_STU | 69 | 16.67 | 2.90 | 7.00 | 24.00 |
| COMM07 | 69 | 42.99 | 6.34 | 14.70 | 56.90 |
| MATH07 | 69 | 44.11 | 7.39 | 24.10 | 59.60 |
| YRS_TCHR | 69 | 12.50 | 1.97 | 7.70 | 17.30 |
| DISCIPLI | 69 | 0.98 | 0.77 | 0.00 | 2.90 |
| DROPOUT | 69 | 2.78 | 1.81 | 0.00 | 9.50 |
| PCT_NOT | 69 | 78.50 | 7.19 | 49.50 | 92.70 |

| | | | | | |
|---|---|---|---|---|---|
| NOW_MARR | 69 | 61.50 | 4.23 | 50.80 | 71.60 |

**Table 4. Level-Three Rural Descriptive Statistics**

| VARIABLE NAME | N | MEAN | SD | MINIMUM | MAXIMUM |
|---|---|---|---|---|---|
| AVG_TCHR | 8 | 38472.68 | 3595.99 | 35219.50 | 47097.00 |
| AVG_ADM | 8 | 70086.19 | 7054.18 | 63151.50 | 86729.69 |
| PER_PUP | 8 | 8062.64 | 897.48 | 7270.11 | 9415.83 |
| AVG_FAM | 8 | 47852.20 | 5892.64 | 43793.87 | 61813.88 |
| HOUSE_VA | 8 | 82016.63 | 15798.53 | 61972.77 | 114278.63 |
| PCT_MIN | 8 | 10.15 | 9.25 | 3.61 | 32.43 |
| AVG_ACT | 8 | 20.89 | 0.23 | 20.40 | 21.14 |
| TO_COLLE | 8 | 64.15 | 3.70 | 60.26 | 71.43 |
| TCHR_CER | 8 | 97.05 | 1.31 | 94.88 | 98.57 |
| TEACHER | 8 | 44.03 | 8.33 | 36.20 | 62.86 |
| FRL | 8 | 45.11 | 4.66 | 38.24 | 53.01 |
| PCT_POV | 8 | 10.28 | 2.80 | 5.58 | 14.34 |
| TCHR_STU | 8 | 17.27 | 1.27 | 14.23 | 18.06 |
| COMM07 | 8 | 43.98 | 1.41 | 41.56 | 45.79 |
| MATH07 | 8 | 45.14 | 2.04 | 41.60 | 47.68 |
| YRS_TCHR | 8 | 12.55 | 0.62 | 11.83 | 13.68 |

| | | | | | |
|---|---|---|---|---|---|
| ADA | 8 | 94.64 | 0.33 | 94.02 | 95.05 |
| DISCIPLI | 8 | 1.17 | 0.50 | 0.47 | 2.09 |
| DROPOUT | 8 | 3.18 | 0.66 | 1.85 | 4.03 |
| PCT_NOT | 8 | 77.77 | 2.66 | 73.98 | 82.80 |
| NOW_MARR | 8 | 59.78 | 2.49 | 55.90 | 63.39 |

**Figure 1. Representative Measurement Model**

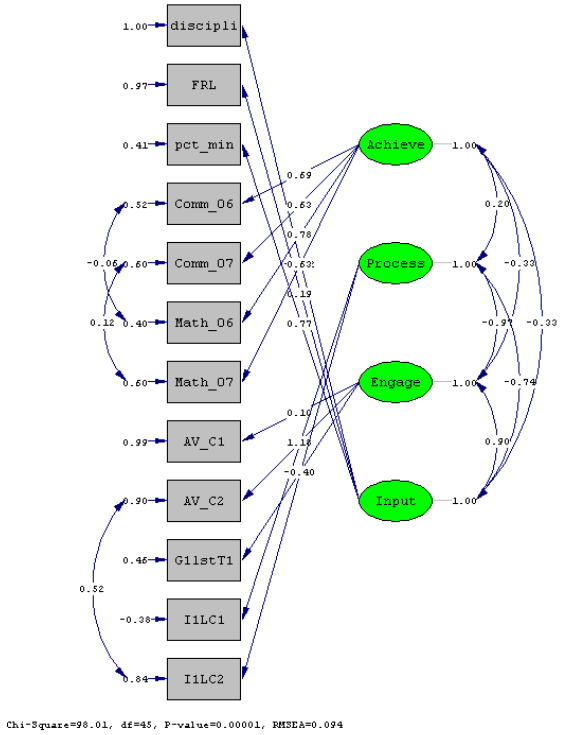


**Table 5. Relationships Between Rural Engagement and School Improvement Processes**

| DV | Survey | Fixed | FRL- | Survey | PPE | Pct_min | FRL | Pct- | Married | FRL |
|---|---|---|---|---|---|---|---|---|---|---|

| | Ques. | Effect | L1 | Quest | | | L2 | not | | L3 |
|---|---|---|---|---|---|---|---|---|---|---|
| C1 | Q4 | 4.48** | -.01 | -.20 | -.04 | .15 | .03 | -.01 | .15 | -.19 |
| C1 | Q5 | 4.38** | .00 | -.56 | -.05 | .15 | .03 | .00 | .13 | -.13 |
| C1 | Q10 | 4.27** | .05 | 1.01** | -.08* | .22** | .03 | .03 | .22* | -.25 |
| C1 | Q11 | 4.57** | -.01 | -.22 | -.04 | .13 | -.01 | -.02 | .15 | -.22 |
| C1 | Q12 | 4.52** | -.01 | .15 | -.04 | .14 | .03 | -.01 | .17 | -.23 |
| C2 | Q10 | 10.20** | -.16** | .99** | -.06 | .28 | .23* | .02 | -.44 | -.39 |
| C2 | Q3 | 10.38** | -.17** | .16 | -.04 | .23 | .19 | .00 | -.45 | -.38 |
| C2 | Q4 | 10.23** | -.16** | -.38 | -.04 | .26 | .19 | .02 | -.50 | -.32 |
| C2 | Q5 | 10.14** | -.14* | -.69 | -.05 | .25 | .17 | .03 | -.51* | -.29 |
| C2 | Q6B | 10.31** | -.17*** | -1.55** | -.07 | .24 | .19 | .04 | -.57* | -.21 |
| C2 | Q11 | 10.44** | -.16** | -.82 | -.05 | .22 | .18 | .01 | -.52 | -.36 |
| C2 | Q12 | 10.45** | -.16** | -.40 | -.05 | .22 | .18 | .00 | -.52 | -.38 |
| C1 | Q3 | 4.53** | .01 | .73* | -.05 | .13 | .02 | -.02 | .18 | -.25 |
| C1 | Q6B | 4.55** | -.01 | .08 | -.04 | .13 | .03 | -.02 | .17 | -.23 |
| T1 | Q10 | 4.21** | .02 | 1.02** | -.08* | .24** | .05 | -.06 | .21* | -.19 |
| C1 | Q14 | 4.54** | -.02 | .49 | -.03 | .15 | .03 | -.02 | .21 | -.25 |
| C2 | Q14 | 10.38** | -.16** | -.24 | -.04 | .22 | .19 | .01 | -.52 | -.37 |
| T2 | Q14 | 10.60** | -.15** | -.22 | -.05 | .18 | .20 | -.01 | -.49 | -.48 |
| T1 | Q3 | 4.41** | -.01 | .70* | -.05 | .16 | .03 | .01 | .17 | -.21 |
| T1 | Q4 | 4.40** | -.03 | -.16 | -.04 | .17 | .05 | .01 | .15 | -.16 |
| T1 | Q5 | 4.25** | -.09 | -.52 | -.06 | .19 | .05 | .03 | .12 | -.08 |
| T1 | Q6B | 4.45** | -.03 | .24 | -.04 | .15 | .05 | .01 | .16 | -.19 |
| T1 | Q11 | 4.47** | -.03 | -.15 | -.04 | .15 | .05 | .01 | .15 | -.18 |
| T1 | Q12 | 4.38** | -.03 | .26 | -.04 | .16 | .05 | .02 | ,17 | -.19 |
| T1 | Q14 | 4.44** | -.04 | .56** | -.03 | .18 | .05 | .00 | .21 | -.21 |
| T2 | Q4 | 10.49** | -.15** | -.30 | -.04 | .21 | .20 | .00 | -.47 | -.44 |
| T2 | Q3 | 10.60** | -.16** | .11 | -.04 | .19 | .20 | -,01 | -.47 | -.49 |
| T2 | Q5 | 10.40** | -.13** | -.58 | -.05 | .21 | .19 | .01 | -.48 | -.41 |
| T2 | Q6B | 10.52** | -.16*** | -1.39*** | -.07 | .20 | .20 | .02 | -.54* | -.34 |
| T2 | Q10 | 10.46** | -.15** | .75 | -.06 | .23 | .23* | .00 | -.43 | -.49 |
| T2 | Q11 | 10.65** | -.15** | -.71 | -.05 | .19 | .20 | -.01 | -.49 | -.47 |
| T2 | Q12 | 10.65** | -.15** | -.32 | -.05 | .19 | .20 | -.01 | -.49 | -.49 |

**Table 6. Relationships Between Rural Engagement and School Improvement Processes**

| DV | Fix | Engage | Tchrmast | TFRLL1 | Stutchr | Engage | PPE | Pct_min | FRl 2 | Pct_Not | Married | FRLL3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Comm | 42.3 | C1 | -.04 | .04 | .33 | -.39** | .04 | -.13 | -.24*** | -.19** | -.19 | .04 |
| Comm | 42.33 | C2 | -.04 | .04 | .26 | -.20* | .06 | -.15 | -.23*** | -.03 | -.26 | .06 |
| Math | 43.46 | C2 | -.11* | -.10 | .39 | -.28** | .15** | -.41** | -.10 | -.19* | -.49** | .15** |
| Math | 42.37 | T2 | -.04 | .03 | .25 | -.26** | .06 | -.13 | -.22*** | -.18* | -.27 | .05 |
| Math | 43.42 | C1 | -.11* | -.09 | .49* | -.42* | .13** | -.41** | -.25*** | -.20* | -.39 | .10 |
| Math | 43.46 | C2 | -.11* | -.10 | .39 | -.28** | .15** | -.41** | -.10 | -.19* | -.49** | .11 |
| Math | 43.45 | T1 | -.11* | -.10 | .48* | -.46** | .12** | -.36** | -.24*** | -.19* | -.37* | .13 |
| Math | 43.47 | T2 | -.10* | -.10 | .39 | -.31** | .14** | -.40** | -.22*** | -.19* | -.49 | .10 |

**Table 7. Latent Factor Relationship Strengths**

| Factor Relationship | Strength | Model |
|---|---|---|
| Achievement-Input | -.99** | Model 1 |
| Achievement-Input | -.80** | Model 2 |
| Achievement-Input | -.33* | Model 3 |
| Achievement-Input | -.99** | Model 4 |
| Achievement-Input | -.45** | Model 5 |
| Achievement-Input | -.69** | Model 6 |
| Engagement-Input | .15 | Model 1 |
| Engagement-Input | .23 | Model 2 |
| Engagement-Input | .90** | Model 3 |
| Engagement-Input | -.72* | Model 4 |
| Engagement-Input | .09 | Model 5 |
| Engagement-Input | .18 | Model 6 |
| Achievement-Process | .04 | Model 1 |
| Achievement-Process | .16 | Model 2 |
| Achievement-Process | .20* | Model 3 |
| Achievement-Process | .20* | Model 4 |
| Achievement-Process | .23 | Model 5 |
| Achievement-Process | -.11 | Model 6 |

| | | |
|---|---|---|
| Achievement-Engagement | -.10 | Model 1 |
| Achievement-Engagement | -.30** | Model 2 |
| Achievement-Engagement | -.33* | Model 3 |
| Achievement-Engagement | .11 | Model 4 |
| Achievement-Engagement | -.17* | Model 5 |
| Achievement-Engagement | -.23** | Model 6 |
| Integrity-Input | .33 | Model 1 |
| Integrity-Input | -.56* | Model 2 |
| Integrity-Input | -.74** | Model 3 |
| Integrity-Input | -.65* | Model 4 |
| Integrity-Input | -.15 | Model 5 |
| Integrity-Input | .11 | Model 6 |
| Integrity-Engagement | .93** | Model 1 |
| Integrity-Engagement | -.85** | Model 2 |
| Integrity-Engagement | -.97** | Model 3 |
| Integrity-Engagement | .68** | Model 4 |
| Integrity-Engagement | -.26* | Model 5 |
| Integrity-Engagement | .69** | Model 6 |

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