Article

The Relationship Between Grade Configuration and Standardized Science Test Scores of Fifth-Grade Students: What School Administrators Should Know

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Abstract: *This study utilized a causal comparative (ex post facto) design to determine if a consistent relationship existed between fifth-grade students' success on the Science Texas Assessment of Knowledge and Skills (TAKS) at the elementary (K-5) level in comparison to fifth-grade students' success on the science TAKS at the intermediate (5-6) level. The data were collected by obtaining reports from the Texas Education Agency's Academic Excellence Indicator System (AEIS) and TAKS Summary Reports. The z test for two independent proportions yielded a significant result ($z = 9.01$, $p < .0001$), which indicated an 18% difference in science achievement among the fifth-grade students who attended the elementary school configuration during the 2007-2009 testing years when compared to the students who attended intermediate school configuration. To estimate the effect size, Cohen's d was calculated ($d = 0.38$).*

Introduction

Schools in the United States must emphasize excellence in elementary science education in order to become economic leaders in the global market of the 21st century (United States Department of Education [USDOE], 2004). In response to the launching of Sputnik in 1957, the United States began to heavily fund programs, which focused on improving teaching and learning practices in science education. One part of this effort was the Curriculum Developmental Projects supported by the National Science Foundation (NSF) and the subsequent preparation of teachers to use the new materials (Harms & Yager, 1980). The 1980s triggered national reports which included *A Nation at Risk* (National Commission on Excellence in Education, 1983) that highlighted the need for educational reforms to improve student achievement. Other national reform efforts have stemmed from the publication of the *Benchmarks for Science Literacy* (American Association for the Advancement of Science [AAAS], 1993) and the *National Science Education Standards* (National Research Council [NRC], 1996). Current policies in education in the United States are influenced by the No Child Left Behind Act of 2001, and the focus on improving student achievement through stronger accountability measures (Owens, 2009). While the initial purpose of reconstructing science education stemmed from the competitive nature of the United States to retain military superiority, the current reforms are aimed at improving student achievement, building science literacy, and ensuring that educators are preparing students as they contend with others for acceptance at institutions of higher learning and as they enter into the workforce.

Student Achievement in Science

Concerns regarding science achievement internationally, nationwide, and at state and local levels continue due to increased demands which have been influenced by the No Child Left Behind Act of 2001 (Owens, 2009). Since the National Commission on Excellence in Education (1983) published *A Nation at Risk*, national agencies have had the goal of improving student achievement in science (Von Secker & Lissitz, 1999). Student achievement in science is defined nationally by the National Assessment of Educational Progress (NAEP) in three levels of achievement: basic, proficient, and advanced (Loomis & Bourque, 2001). At the basic level of achievement students demonstrate partial mastery of the concepts. Students who reach proficiency have exhibited competence in challenging subject matter. Students at the advanced level have demonstrated superior performance on the science assessment (Grigg, Lauko, & Brockway, 2006). The goal for increased student performance in science is to ensure that students are meeting the proficient level of achievement.

During the 2007-2008 academic school year the implementation of science assessments was mandated by the NCLB Act of 2001 (USDOE, 2004). This mandate resulted in stronger accountability at the state level, as states were required to implement and administer science assessments once in each of grades 3-5, 6-9, and 10-12 (USDOE, 2004). At the state level, student achievement in science is defined as a threshold of performance on the state science assessment (Owens, 2009). In Texas, the assessment that is used to measure student achievement in science, as well as reading, mathematics, and social studies, is the Texas

Assessment of Knowledge and Skills (TAKS). While states have flexibility in developing assessments and proficiency standards, the data is used to determine if schools and school districts are meeting the established achievement goals.

Grade-Level Configuration

Grade span or grade-level configuration is a controversial topic in education and has been the subject of debate for more than 80 years (Jenkins & McEwin, 1992). Grade-level configuration is defined as "the range of grades that a school comprises" (Coladarci & Hancock, 2002, p. 2). Grade span also refers to the number and range of grade levels offered within an individual school (Cullen & Robles-Piña, 2009). There are a number of grade configurations across the United States, which includes elementary models of K-5, K-4, K-3; middle school models of 5-8, 6-8, 7-8, and 7-9; and high school models, which include 9-12 and 10-12. There are also a number of unique configurations which may include early childhood centers, stand-alone ninth-grade centers, intermediate campuses which span fifth to sixth grade, or "elemiddle" schools K-8, which are inclusive of elementary and middle grades structured in one campus setting (Hough, 1995). The dominant configuration in the 21st century includes the traditional setting which consists of PreK-5, 6-8, and 9-12 (DeJong & Craig, 2002). Because of the limitless possibilities available for structuring the learning environment, it is critical that policymakers note the importance of the potential benefits and potential challenges of each configuration, and make conscious decisions in an effort to meet the needs of all students.

Potential Benefits of Grade-Level Configurations

White (2008) explored the impact of grade-level configuration on student achievement, determining that the K-8 configuration resulted in significant increases in achievement when compared to other configurations including 6-8, 7-8, and 7-12. It is important to note that she also found other variables impacted student achievement including gender, the students' perceptions of their feeder school climate, and the grade configuration of their feeder school. Connolly, Yakimowski-Srebnick, and Russo (2002) followed two subgroups of a student cohort in the Baltimore City Public School System. Students attending the K-8 school had significantly higher pass rates on the Maryland Functional Testing Program including mathematics, writing, and reading, than students attending the K-5 and then the 6-8 schools. Wren (2004) concluded, "As grade span configuration increases so does achievement. The more grade levels that a school services, the better the student performs. The more transitions a student makes, the worse the student performs" (p. 9).

Potential Challenges of Grade-Level Configurations

When school districts make decisions about grade-level configurations for housing middle school students, they must also consider the number of transitions from one school to another. Cullen and Robles-Piña (2009) define school transitions as a process in which a student changes from one school to another because they have completed all of the grades available in the school. Cullen and Robles-Piña (2009) examined research studies that reported on the impact of transitions as students move from elementary to secondary schools and concluded that the research is inconclusive. According to Howley (2002) some of the consequences of transitioning from one campus to another include a disruption in the social structure and lower academic achievement. Alspaugh (1999) found statistically significant achievement loss associated with the transition from elementary to middle school in sixth grade, in comparison to K-8 schools. Alspaugh (1999) concluded that high school dropout rates were higher for districts utilizing the 6-8 configurations than for districts implementing the K-8 model. In addition, Paglin and Fager (1997) also found negative results each time students made transitions from one school to another. Recognizing the negative impact that transitioning from one to school another can have on adolescents, Dillon (2008) recommends organized transition programs that use peers to provide support.

Erb (2006) cautions that just reducing the number of transitions in order to impact improvements in students' learning may be somewhat effective but that this change will have a greater impact when combined with a successful middle school reform model. Research on effective, impactful educational reforms for middle school students goes beyond a checklist approach to the implementation of structural changes, such as the implementation of learning communities (Felner & Jackson, 1997). They contend that to be successful, the reforms must be implemented with a high degree of fidelity, which takes time and money. Reforms cannot be implemented quickly or cheaply.

Purpose of the Study

Research on the impact of grade-level configuration on students' achievement is inconclusive and students' declining scores in science need to be further examined. Additionally, research on the appropriate grade-level configuration for fifth-grade students is lacking. Hence, the purpose of this study was to examine grade-level configuration and student achievement in science, specifically the potential relationship between the placement of fifth-grade students and their achievement of the "met standard," a score of 2100, on the fifth-grade Science Texas Assessment of Knowledge and Skills (TAKS).

Research Question and Hypothesis

The following research question guided the study: Are grade-level configuration and student achievement in science related? The hypothesis was that school grade-level configuration and the "met standard" on the fifth-grade Science TAKS are related.

Method

This study examined the performance on the Science TAKS by fifth-grade students in two different school configurations in one school district over a three-year period. A causal comparative (ex post facto) design was utilized. Data were collected by obtaining reports for the Texas Education Agency's Academic Excellence Indicator System (AEIS) and TAKS Summary Reports.

Setting and Access

The school district in this study encompasses 35 square miles and serves 45,130 students. There are currently 44 campuses which include 21 elementary (PK-4), three elementary (PK-5), six intermediate campuses (5-6), one middle school (6-8), five middle schools (7-8),

two ninth-grade centers, two high schools (10-12), two high schools (9-12), and two alternative learning centers.

Participants

The three elementary schools and six intermediate schools comprised the convenience sample for the study. The three elementary schools were assigned letters A through C as identifiers. These schools consisted of PreK to fifth-grade students. The six intermediate schools were assigned letters AA through FF. These schools consisted of students in fifth and sixth grade. The 2009 population of the schools consisted of 3,388 fifth-grade students, all of who took the fifth-grade Science TAKS in April 2009. During the 2008-2009 school year, the student population was primarily Hispanic (49%) and African American (34.8%). The remaining student population was comprised of Asian (12.5%), White (3.6%), and Native American (10%). Two independent groups from two different campus configurations formed the population for the study. The first group (A, B, C) was comprised of fifth-grade students on three elementary (PK-5) campuses, who could potentially remain on the same campus from PK to fifth grade. The second group (AA, BB, CC, DD, EE, FF) was comprised of fifth-grade students on six intermediate (5-6) campuses, who after successfully completing fourth grade, made a school-to-school transition when they entered fifth grade.

Instrumentation

The Texas Education Agency (TEA, 2010) describes TAKS as an assessment which is designed to measure what students have learned and are able to apply according to the knowledge and skills in each grade level tested. The Science TAKS is categorized into four objectives which include The Nature of Science, Life Sciences, Physical Sciences, and Earth Sciences. Within the context of the current study, student achievement in science is described as students who achieve the "met standard" on the Science TAKS. Because of the grade spans identified in the NCLB Act of 2001 (3-5, 6-8, and 10-12), TEA determined that science would be assessed in grades five, eight, ten, and exit level. The TAKS assesses student achievement of the Texas Essential Knowledge and Skills (TEKS), which are the student expectations for each grade level and content area tested. The TEKS were aligned with *The National Science Education Standards* and the *Benchmarks for Science Literacy* (TEA, 2004).

The TEA formed advisory committees consisting of educators from districts across the state as content experts from each content area, who determined the content validity of test items. Current reliability estimates used the Kuder-Richardson formula (KR20) and the KR20 reliability of the Science TAKS ranges from .81 to .93 (TEA, 2008). The TEA established concurrent validity by determining that the TAKS scale score met the standard performance level predicted by ACT and SAT 1 (TEA, 2008).

Data Collection

Archival TAKS data that spanned the 2007-2009 academic school years were obtained from the Texas Education Agency's Academic Excellence Indicator System (AEIS) containing the fifth-grade Science TAKS scores from the elementary and intermediate campuses selected for this study. TAKS Summary Reports were also collected from the district data management system. Once all of the TAKS data were collected, the campus names were converted to letter identifiers, and sorted by elementary and intermediate groups.

Analysis

In order to make a determination regarding the data, the z test for two independent proportions to evaluate the hypotheses for the two possible configurations for fifth-grade students was utilized. The z test for two independent proportions uses sample data to assess the hypotheses about the values of p and q for a 2 x 2 contingency table (Sheskin, 2007). The two categories utilized in the current study were the pass-fail proportions for the elementary fifth-grade students and the pass-fail proportions for the intermediate fifth-grade students. Because the sample size is large, the z-test for proportions was appropriate in this study. Because student achievement on the fifth-grade Science TAKS was determined by those students who achieve a minimum scale score of 2100, further analysis of the data was conducted. Summary data were collected and disaggregated which included pass-fail numerical and percentage data, mean score data, disaggregated percentage score data, scale scores by campus, and pass-fail distribution data.

Results

This study investigated the relationship between grade-level configuration and standardized science scores of fifth-grade students in elementary and intermediate settings. A causal comparative design, which employed the use of the z test for two independent proportions was used to evaluate the hypotheses for the two configurations. A 2 x 2 contingency table was created which included pass/fail percentages for fifth-grade composite Science TAKS scores for students in three elementary schools and six intermediate schools (see Table 1). The z test for two independent proportions was used to test the null hypothesis. A significant difference was found ($z = 9.01$, $p < .0001$). To estimate the effect size, Cohen's d was calculated ($d = 0.38$). These indicate that there was a strong reason to reject the null hypothesis and that there was a sufficient effect size to consider the estimated difference in proportions to be meaningful.

Table 1

Pass-Fail Rate for Elementary and Intermediate Schools (2007 – 2009)

Campus Configuration	Course Results		
	Pass	Fail	Total
Elementary	508 (85%)	87 (15%)	595
Intermediate	5,502 (67%)	2,710 (33%)	8,212
Totals	6,010 (68%)	2,797 (32%)	8,807

Additional Analyses

While the aggregated data revealed a significant difference in achievement in the elementary schools in comparison to the intermediate schools, further analysis of the data was provided to put the results into context. The additional data analysis was critical to understanding and interpreting the results. The aggregated results indicated higher pass rates in the elementary schools in each of the corresponding tables and figures. The summary data were useful in examining the differences in student achievement in science in the elementary and the intermediate configurations (see Table 2).

Table 2

Fifth-Grade TAKS Pass-Fail Percentage Data (2007-2009)

School	2007		2008		2009	
	Met	Not Met	Met	Not Met	Met	Not Met
A	69%	31%	81%	19%	89%	11%
B	72%	28%	89%	11%	83%	17%
C	82%	18%	94%	6%	93%	7%
AA	59%	41%	68%	32%	75%	25%
BB	57%	43%	65%	35%	69%	31%
CC	62%	38%	73%	27%	81%	19%
DD	60%	40%	70%	30%	73%	27%
EE	52%	48%	61%	39%	68%	32%
FF	68%	32%	71%	29%	76%	24%

These data display an increase in passing percentage of elementary students in all three schools during the 2007 and 2008 school years. However, for 2009 only elementary school A showed an increase, while Schools B and C showed decreases. School B showed a 6% decrease and School C showed a 1% decrease. Table 2 also presents data showing that from 2007 to 2009 all of the intermediate schools (AA through FF) showed increases. Additionally, the data show that between 2007 and 2008, each of the elementary schools increased the passing percentage by more than 10%. Even though two of the three elementary campuses showed decreases for 2009, the elementary schools maintained higher pass rates than the intermediate schools for each of the three testing years. However, there was only a 2% difference in pass rates between school B (83%) and school CC (81%) in 2009.

Table 3 presents an average of the pass-fail percentages for the elementary and intermediate schools for the three years of the study. The overall percentage of elementary and intermediate students who achieved the met standard score of 2100, during this time period ranged from 59% to 90%. The greatest increase in passing percentage (23%) occurred between 2007 and 2008 in the elementary configuration. Elementary students remained at the 90% pass rate between 2008 and 2009; whereas, intermediate students passing percentages increased from 68% to 74% between 2008 and 2009. The percentage of elementary students who met the passing standard increased by 13% from 2007 to 2009, in comparison to the percentage of intermediate students who met the passing standard with an increase of 15% during the same period.

Table 3

Fifth-Grade TAKS Pass-Fail Percentages for Elementary and Intermediate Schools (2007-2009)

Configuration	2007		2008		2009	
	Met	Not Met	Met	Not Met	Met	Not Met
Elementary	77%	23%	90%	10%	90%	10%
Intermediate	59%	41%	68%	32%	74%	26%

Figure 1 demonstrates and compares the changes in pass rates for the elementary and intermediate campuses for three years 2007-2009. The graphical representation of the pass rates shows an increase at the elementary level from 77% to 90% from 2007 to 2008. The pass rates at the elementary level remained steady from 2008 to 2009. The graph also demonstrates that while the percentage of intermediate fifth-grade students who met the passing standard increased from 59 to 74%, there was a 16-point difference in the elementary and intermediate pass rates in 2009.

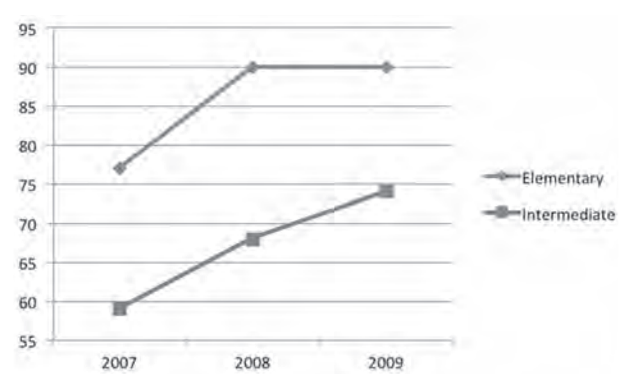

Figure 1. Fifth-grade TAKS pass-fail percentage mean score data for elementary and intermediate schools 2007-2009.

Figure 2 is a graphical representation of the pass-fail percentage data and it clearly demonstrates the differences in achievement between the elementary and the intermediate campuses. The data show that the elementary schools have maintained higher passing rates for the three-year testing period than the intermediate schools. Figure 2 also demonstrates an anomaly existed within the elementary campuses as the scores in School B and School C show a decrease in students who met the passing standard during the 2009 test administration. School C maintained the highest passing percentage for each of the three years, from 82% in 2007 to 93% in 2009. School A demonstrated continuous improvement as the scores increased from 69% in 2007 to 89% in 2009. The intermediate schools also demonstrated a continuous increase in pass rates; however, there were not any intermediate schools, which reached the passing percentage of the elementary schools.

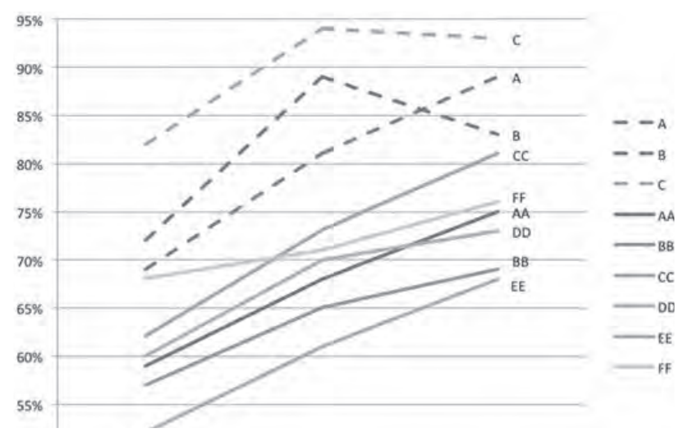

Figure 2. Fifth-grade TAKS pass-fail disaggregated percentage score data for elementary and intermediate schools 2007-2009.

Analysis of the Means Aggregated by School Type and by Year

Because the z test for two independent proportions is based on pass-fail proportions, which is based on a minimum scale score of 2100, it was important to further analyze the mean scores in each configuration. In 2007, the TEA defined the scale score as a statistic that is used to determine if a student achieved the standard or commended performance. The average scale scores are the means of the individual student scale scores and are useful in comparing the achievement of all the schools within this study.

The data in Table 4 presents data on the average TAKS scale scores for each school during the three-year period. This table shows that Schools B and C scored higher than the other schools for each of the years reported. From 2007 to 2009 Schools B and C remained in the same range and scored higher than all other schools, while the scores reported by school A were intermingled with the intermediate schools.

Table 4

Average TAKS Scale Scores by Campus (2007-2009)

School	2007	2008	2009
A	2135	2189	2245
B	2207	2312	2321
C	2262	2357	2339
AA	2127	2197	2235
BB	2113	2160	2182
CC	2147	2210	2275
DD	2158	2182	2201
EE	2109	2145	2177
FF	2197	2197	2255

Figure 3 demonstrates increases in passing rates for elementary and intermediate campuses for the three testing years. The graph shows that although School CC demonstrated the greatest amount of growth from 2007 to 2009 by an increase in the average scale score from 2147 to 2275, Schools B and C maintained a greater percentage of students who scored higher than all of the other schools.

The graph also demonstrates a significant increase in the average scale score from School A from 2135 to 2245, which indicated an increase of 110 points. The school that demonstrated the least amount of growth over the three-year period was School DD. The average TAKS scale scores from School DD increased from 2158 to 2201. The average scale scores of School FF remained stagnant from 2007 to 2008, and then increased in 2009 by 58 points.

A statistically significant difference was found ($z = 9.01$, $p < .0001$) between school grade-level configuration and the "met standard" rate on the fifth-grade Science TAKS. To estimate the effect size Cohen's d was calculated ($d = 0.38$) which indicated that there was sufficient effect size to consider the estimated difference in proportions to be meaningful. The archival TAKS data provided an opportunity to analyze the number of fifth-grade students who were successful in meeting the standards set forth by the state of Texas, to compare the passing percentage of fifth-grade students in elementary settings to those in intermediate settings, and to analyze other relevant scores in an effort to identify the similarities that existed between the success rate in both configurations. The data also revealed that more students demonstrated success on the fifth-grade Science TAKS in the elementary configurations.

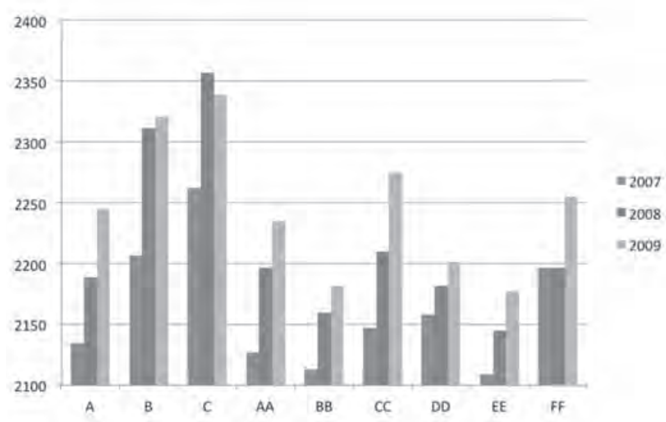

Figure 3. Fifth-grade mean TAKS scale scores by campus 2007-2009.

Discussion

This study included an analysis of the fifth-grade Science TAKS data from two different school level configurations, to determine if grade-level configuration and student achievement in science is related. In order to review students' achievement over a period of time, archival TAKS data, which spanned a period of three years, was utilized. The following research question guided the study: Are grade-level configuration and student achievement in science related?

Fifth-Grade TAKS Pass-Fail Percentage Data

The data presented in Table 4 show the pass-fail rates as percentages to facilitate understanding and comparing the individual elementary schools and the intermediate schools. The percentage data showed that elementary campuses continued to maintain higher passing rates than the intermediate campuses from 2007 to 2009. The number of fifth-grade students in the elementary campus configurations ranged from a minimum of 51 students to a maximum of 126 students. The elementary schools contain a wider range of grades than the intermediate schools and the student population is smaller in the elementary schools. Howley (2002) suggests that educational quality and student achievement is negatively impacted when schools have limited grade ranges, as reflected in the intermediate schools configurations.

These results support research indicating that students who transition from fourth grade at one campus to fifth grade at another may be at a disadvantage when compared to the students who make the transition within the same school. For example, Wihry, Coladarci, and Meadow (1992) found that the best placement for eighth graders was in a K-8 school and they suggest that one reason may be that the students made fewer transitions from one school to another. Also, Connolly et al. (2002) found that students who remain in a K-8 school scored higher on a standardized test in both mathematics and language arts than students who made the transition from an elementary school to a middle school.

Fifth-Grade Average Percentage Data for Elementary and Intermediate Schools

Table 2 presents the average of the pass-fail percentages of the students who met the scale score during 2007 to 2009. The data indicates that the average percentage of passing students was higher for the elementary students than for the intermediate students. The range of students meeting the minimum threshold at the elementary level was 77% to 90% and the range of students meeting the minimum threshold at the intermediate level was 59% to 74%. Although there was 15% increase in the pass rate at the intermediate level, those scores did not reach the minimum standard of achievement of 77%, which was demonstrated at the elementary level.

Table 2 also demonstrates that the elementary schools may have reached their peak in student performance. The average pass rate from 2008 to 2009 remained the same while the intermediate campus continued to increase in the percentage of passing students. Although the pass rates at the intermediate level continued to increase, there was an apparent gap in student achievement from the intermediate to the elementary level. Table 2 provided further support for the research hypothesis. School grade-level configuration and the "met standard" rate on the fifth-grade Science TAKS are related.

Fifth-Grade TAKS Pass-Fail Percentage Data

Figure 1 provides a graphical representation of the pass-fail percentage data and was a clear indication that the students at the elementary level continuously scored well above the students at the intermediate level. Figure 1 demonstrates a gap in student achievement, which existed between the elementary and intermediate configurations. The largest gap in student achievement was demonstrated in 2008. While 90% of the elementary students met the passing standard, 68% of the intermediate students met the passing standard. This represents a 22% difference in student achievement on the fifth-grade Science TAKS. Although the scores at the elementary level seemed to have reached a peak, the scores at the intermediate level were 16% lower than those at the elementary level.

The literature revealed the benefits of the K-8 configuration in meeting the needs of early adolescent learners while also attending to the academic needs of middle level students. The findings of this study supported research (Anfara & Buehler, 2005; Connolly et al., 2002; George, 2005; Hough, 1995; Mizell, 2005) which included fifth-grade students in the elementary setting. Similar to the K-8 configuration, the elementary K-5 configuration demonstrated increased test scores and required fewer transitions from one building to another. This study confirms research by Wren (2004) and Connolly et al. (2002), which indicated that fewer school-to-school transitions resulted in greater student achievement. The students who attended the elementary schools were not required to make any school-to-school transitions, in comparison to the fifth-grade intermediate students who transitioned from the elementary (K-4) level and were required to make a transition from one school to another. However, as Erb (2006) cautioned, just reducing the number of transitions students make is only somewhat effective and a greater impact could be made by also making sure the schools are following a successful middle school reform model.

Fifth-Grade TAKS Pass-Fail Disaggregated Percentage Data

Figure 2 provided an extensive look at each of the schools within the study and highlighted that the pass rates at the elementary schools remained at the top of the chart, while scores at the intermediate schools were consistently lower. The data further indicate that a difference in student achievement exists amongst the intermediate schools. The results showed that School CC reached an average of 81% in 2009, in comparison to School EE, which had a passing rate of 68%. The disaggregated data also presented a discrepancy in the wide range in student achievement from the elementary level to the intermediate level. The maximum passing percentage at the elementary level in 2009 was 93%, while the lowest pass rate at the intermediate level was 68%. This demonstrated a difference of 25% in student achievement from the elementary level to the intermediate level. These findings show that when examining the impact of grade-level configuration on students' achievement it is also important to look at other variables including the structure of the school, instructional expenditures, pupil-staff ratio, and teacher attributes.

Average TAKS Scale Scores by Campus

The analysis of the scale score data provided further insight into the analyses of the campuses. Table 4 shows that if the schools were placed in rank order, Schools B and C would have maintained the highest rank for each of the three years reported. Schools B and C also remained within the same range. The average scale scores of schools B and C were above 2200 in 2007 and surpassed 2300 in the two subsequent testing years. In ranking the schools, School CC would have followed closely behind School B in 2008 and 2009.

When the data are averaged, School A was placed within the top three highest achieving schools on pass rate. Through careful examination of the data, it must be noted that the scores of School A rank in the middle of the broader scale score data. The data in Table 4 revealed School A reported lower scores than at least two of the intermediate schools during the 2007 – 2009 testing years. The scores of School A were behind three of the intermediate schools in 2007 and 2008. The scores of School A were lower than two intermediate schools in 2009. This was an important finding which demonstrated an anomaly within the elementary configurations and again supports the importance of looking at other variables characteristic of the schools.

Fifth-Grade Average TAKS Scale Scores by Campus

Figure 3 demonstrated growth in student achievement over the three-year period. The graph in Figure 3 supplemented the findings in Table 4, while providing a clear picture of the growth over time. The graph indicates growth in student achievement at the elementary and intermediate level. However, as a result of the number of students exceeding the minimum standards at the elementary level, the average TAKS scale scores are significantly higher at the elementary level in Schools B and C. The graph in Figure 3 demonstrates that the scores in School CC were the closest to the scores of School B.

The data presented in Figure 3 further demonstrates the anomaly that existed within the elementary campuses. The scores of School A are intermingled with the scores of Schools AA and FF. During the 2009 testing period, the scores of Schools A, AA, and FF were within ten points of each other. Although the average scale scores of School A were not as high as Schools B and C, and seemed to be intermingled with AA and FF, the average scale scores increased more than any of the other intermediate schools from 2007 – 2009 with the exception of School CC.

Conclusion and Implications for Practice

The findings of the numerical and percentage data revealed that the elementary configuration yielded higher results for each of the three test administrations. Data from this study provide a broader implication that can focus educators on a more thorough review of elementary and intermediate structures and the potential benefits for students' achievement in science. Although the results of this study show an overall statistically significant higher achievement rate amongst fifth-grade students in the elementary setting than in the intermediate setting, the disaggregated data presented enough variations to suggest caution when considering acting upon these findings. Regardless of the manner in which the grades are structured, primary emphasis should be placed on the academic and developmental needs of the students. District leaders need careful data analysis and current information regarding sound instructional practices for meeting the needs of adolescents in order to make knowledge-based decisions regarding grade-level configuration.

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