Journal of Advanced Academics
jaa
Volume 21 ✤ Number 2 ✤ Winter 2010 ✤ pp. 272–298

# Relationship Between Grade Span Configuration and Academic Achievement

**Mary Jane Dove**
**L. Carolyn Pearson**
*University of Arkansas at Little Rock*

**Herbert Hooper**
*Texas A&M–Texarkana*

Since 1965, when the Elementary and Secondary Education Act (ESEA) was passed, the federal government has assumed a larger and larger role in public education, even though education is commonly regarded as a function of the individual states. The primary focus of ESEA was to provide funding for the education of students who were economically disadvantaged. The federal role continued to expand over time. During the Nixon administration, the National Institute of Education was created to study the link between federal aid and student performance. The National Assessment of Educational Progress (NAEP) was established, although it was to be administered by the Education Commission of the States. Desegregation, equal educational opportunity, and compensatory education became central issues in the educational landscape. The 1977 news of the decline in Scholastic Aptitude Test scores spawned a new wave of standardized testing throughout the nation. In 1980, during the Carter administration, the U.S. Department of Education was formed

# summary

In an effort to address the NCLB-mandated testing process, one of the issues to be considered is how best to configure student populations to maximize all aspects of the educational setting while simultaneously maximizing student achievement; one aspect is grade span configuration. We examined the relationship between the grade span configuration of all schools in Arkansas attended by sixth-grade students and the academic achievement of the combined population of students as measured by the Arkansas Benchmark Examination. We found no relationship between grade span configuration and academic achievement as measured by the Arkansas Benchmark Examination for sixth-grade students. However, the nonsignificant findings do not negate the importance of the study. The results imply that there are other factors that are affecting scores in the middles grades. The results of the study also revealed that over the time span examined, mathematics Benchmark achievement rose but the results for literacy were stagnant. These results suggest that newly implemented practices or other factors may have improved mathematics achievement, but not achievement in literacy. Grade span configuration alone does not account for sixth-grade students' academic achievement as measured by the Arkansas Benchmark Examination. Decisions about campus configurations include other factors such as projected enrollments, transportation costs, size of schools, school goals, fiscal constraints, political tensions, geographic realities, and financial accountability. As student populations shift, educational leaders can look for grade span configurations that best fit their community culture and current facilities, focusing financial resources on other means of improving academic achievement.

Dove, M. J., Pearson, L. C., & Hooper, H. (2010). Relationship between grade span configuration and academic achievement. *Journal of Advanced Academics, 21,* 272–298.

(States Impact on Federal Education Policy Project [SIFEPPE], 2006; U.S. Department of Education, 2006).

President Ronald Reagan believed in smaller federal government, which translated into dramatic cuts in federal funding for schools. At the same time federal funds were diminishing, federal reports were issued criticizing the low academic achievement of students in the public schools, most notably as reported in *A Nation At Risk* (National Commission on Excellence in Education, 1983). Federal plans for improving education, such as President George H. W. Bush's America 2000 and President Bill Clinton's Goals 2000 soon followed. These plans called for improving education by encouraging states to develop their own educational standards and corresponding assessments. Federal funds became tied to academic achievement, and systemic reform was required (SIFEPPE, 2006).

On the third day after his inauguration, President George W. Bush introduced his legislative plan for improving schools to Congress, and in January 2002, No Child Left Behind Act of 2001 (NCLB) became law. This reauthorization of ESEA contains "four principles of educational reform: stronger accountability for results, expanded flexibility and local control, expanded options for parents, and an emphasis on teaching methods that have been proven to work" (U.S. Department of Education, 2003, p. 1). As NCLB charges schools throughout the nation with improving academic achievement, patterns of school organizations are being examined, and schools are experimenting with scheduling, grouping, calendars, length of school day, and grade configurations (Lashway, 2000). "As researchers and policymakers have begun to explore any and all possible ways to maximize learning in this day of educational accountability, grade level span patterns have begun to garner attention" (Stevenson, 2006, p. 12).

NCLB demands academic gains in return for federal funding and sanctions schools that do not meet Adequate Yearly Progress (AYP; U.S. Department of Education, 2004, p. 1). Many Arkansas schools are having difficulty meeting these academic achievement goals, and slowly but surely, more are falling into the category of School Improvement due to inadequate AYP. The number of schools designated for School Improvement due to inadequate AYP rose from 267 in 2005 to 299 in 2006 (Arkansas Department of Education, 2006b, 2007). Although the largest number of schools in academic distress in 2005–2006 were in Year 1 of School Improvement (114 schools), the most troubling statistics lie in the subsequent years. Arkansas schools in Year 3 School Improvement increased during this period, from 41 in 2004–2005 to 86 in 2005–2006; there was also an increase for schools in Year 4 School Improvement, from 4 to 14. During the 2005–2006 period, there were 2 schools labeled as Year 5 School Improvement and one school with Year 6 designation (Arkansas Department of Education, 2006c).

Arkansas elementary students were performing acceptably on the National Assessment of Educational Progress (NAEP); in 2005, Arkansas fourth-grade students scored at the national average in reading, with 30% of students scoring proficient or above (Southern Region Education Board [SREB], 2006). Unfortunately, achievement gains ceased sometime after the fourth grade, as evidenced by the poor eighth-grade scores on the same exam. The report from the SREB stated that Arkansas students also "trailed the nation" in mathematics (SREB, 2006, Slide 12). The middle-level achievement problem was further evidenced on Arkansas Benchmark scores: On the 2003 Arkansas Benchmark, 61% of the fourth-grade students scored proficient or above in mathematics, but in 2005, when the same students were in the sixth grade, their math scores dropped to only 44% proficient or above (SREB, 2006). Sixty-five percent of fourth-grade students scored proficient or above in mathematics on the Arkansas Benchmark in 2004, but when they arrived in sixth grade their scores dropped to 45% for the same category of achievement. Arkansas' 2004 sixth-grade students scored 41% proficient or above on their Benchmark mathematics exam; when they were in the eighth grade, only 45% scored proficient or above (Arkansas Department of Education, 2006c). Although a slight increase was demonstrated, this was not "adequate" progress.

Lack of achievement in these middle grades is not unique to Arkansas (Mulhall, Flowers, & Mertens, 2002). The results of the math portion of the 1995 Third International Mathematics and

Science Study (TIMSS) revealed that American fourth-grade students were scoring at the international average. "Four years later, the same students were 22 points below the national average" (Yecke, 2005, p. i). Since 1990, eighth-grade students' NAEP math scores have risen only slightly, and their reading scores in 2004 remained flat. Disturbingly, the "relatively high achievement of America's nine-year-old children begins to level off and then plummet in the middle years" (Yecke, 2005, p. 1).

In an effort to address the NCLB-mandated testing process, one of the issues to be considered is how best to configure student populations to maximize all aspects of the educational setting while simultaneously maximizing student achievement, and one aspect of the educational setting is grade span configuration. Current research offered minimal empirical information about the relationship between grade span configuration and academic achievement (Anderman, 2002; Bickel, Howley, Williams, & Glascock, 2000; Coladarci & Hancock, 2002a; Cox, 1996; DeJong & Craig, 2002; Hough, 2005; Howley, 2002; Paglin & Fager, 1997; Reeves, 2005; Renchler, 2000, 2002; Stevenson, 2006; Vaccaro, 2000; Wihry, Coladarci, & Meadow, 1992). The available research consisted primarily of case studies of specific schools or school districts and documentation of the changes in that particular location (Coladarci & Hancock, 2002a). Although case studies add to the body of knowledge and one can draw inferences from these studies, the problem calls for the examination of empirical data taken from large samples (Anderman, 2002; Coladarci & Hancock, 2002a; Franklin & Glascock, 1998; Hough, 2005; Howley, 2002; Paglin & Fager, 1997; Reeves, 2005; Renchler, 2002; Wihry et al., 1992). The intent of this study, therefore, was to examine grade span configuration on a larger scale in order to address prior methodological weaknesses, particularly small sample sizes.

## Conceptual Framework

In an effort to address academic achievement, geographic conditions, cultural expectations, and developmental issues, public school grade configurations have changed over the years. The one-room, ungraded schoolhouse was a popular facility for many years (Franklin & Glascock, 1998). One room ungraded schools merged to larger schools, thus the introduction of the graded school system in the mid-1800s. As schools gained students, grades 1 through 8 were usually the norm. In 1900, the predominant configuration was still 8 years of primary school and 4 years of high school, and 80% of the 1920 high school graduates had attended an elementary school that contained grades 1–8, followed by a 4-year high school (Juvonen, Le, Kaganoff, Augustine, & Constant, 2004; Paglin & Fager, 1997). In rural areas, the grade span for the school remained first grade through the eighth grade for many years. "Prior to 1948, the majority of schools in the United States were one-teacher schools typically serving a small rural community and enrolling about 30 children in the elementary grades" (Howley, 2002, p. 1). Throughout the early 1900s, schools that contained the first eight grades dominated the nation (Look, 2002). High schools became centralized in larger communities, due to the larger number of students and faculty necessary for those schools (Franklin & Glascock, 1998; Howley, 2002).

As our country changed from primarily agricultural to industrial, children needed more education in order to secure better employment. The rise and fall of the junior high was perhaps the largest change regarding grade span configuration in the 20th century (Paglin & Fager, 1997). As junior high schools continued to resemble senior high schools, secondary enrollments were declining and elementary enrollments were rising due to both the baby boom and implementation of early childhood programs (Juvonen et al., 2004). The growing elementary enrollment pushed the seventh- and eighth-grade students into junior high school, which was initially designed to serve as a transition to the more rigorous high school, and this configuration remained popular throughout the 1950s and 1960s (Craig, 2006). However, as junior highs began to incorporate sixth grade due to another period of increasing elementary school enrollment, they were also being criticized for their similarity to high schools (Juvonen et al., 2004). In 1963, the "life-adjustment movement," which originated in the 1940s and 1950s (Yecke, 2005), found a proponent in education, and the National Middle School Association was formed (Lounsbury & Vars, 2003; Yecke, 2005); therefore, junior highs were replaced by middle schools at a rapid rate.

The first middle school was created in Bay City, MI, in 1950 (Banks, 2004). In the 1950s and 1960s the prominent grade span configurations were K–6 (or 1–6), 7–9, and 10–12, as schools built more facilities to house children of the baby boom. Later in the 1970s and 1980s, grade span configurations shifted to K–5, 6–8, and 9–12 (Craig, 2006). Middle schools grew rapidly and embraced sixth-grade students. "In the early 1970s, less than one-quarter of middle schools incorporated 6th grade: by 2000, three-quarters of all middle schools enrolled 6th grade students" (Cook, MacCoun, Muschkin, & Vigdor, 2007, p. 2). Although middle schools were designed to address the needs of adolescent learners (Russell, 1997), the middle school has not been without its critics. In 1983, the Carnegie Council of Adolescent Development released *Turning Points: Preparing American Youth for the 21st Century,* which "declared that nearly all early adolescents are dysfunctional" (Yecke, 2005, p. 11). In the Executive Summary to *Mayhem in the Middle: How Middle Schools Have Failed America—and How to Make Them Work*, Yecke (2005) defined "middle schoolism" as "an approach to educating children in the middle grades (usually grades 5–8), popularized in the latter half of the 20th century, that contributed to a precipitous decline in academic achievement among American early adolescents" (p. i).

In an effort to improve academic achievement by changing the school climate as well as reducing campus transitions, many school districts started changing their grade span configurations back to the K–8 model. Sometimes called "elemiddles," some research has demonstrated an improved rate of student performance on standardized tests (Hough, 2005; Vaccarro, 2000; Yecke, 2005), and these schools were also perceived as safer (Waugh, 2004). Several cities, including Minneapolis, Philadelphia, Cincinnati, Cleveland, Memphis, and Baltimore, expanded their K–8 schools in lieu of their former middle school grade span configurations (Wallis, Miranda, & Rubiner, 2005; Waugh, 2004; Yecke, 2005).

## Academic Effects of Transition

Transitions between campuses may have an effect on academic achievement. The number of times students may change school campuses in their K–12 education depends upon the grade span configuration within schools in the school district. Brown (2004) stated that with each new school, students encounter a new building, new teachers and administrators, new rules for conduct, and new sets of classmates. Although there is limited empirical research that has examined these effects (Anderman, 2002; Coladarci & Hancock, 2002b; Howley, 2002; Renchler, 2002), that which is available suggests some negative achievement occurs during transition (Akos, 2004; Alspaugh, 1998; Anderman, 2002; Brown, 2004; Cook et al., 2007; Grolnick, Kurowski, Dunlap, & Hevey, 2000; Howley, 2002; Johnson, 2002; Mizelle, 1999; National Middle School Association & National Association of Elementary School Principals, 2002; Pardini, 2002; Renchler, 2002).

Dropout rates also seem to be affected by transition. Howley (2002) reported a study of 45 schools in Missouri that compared the grade level in which students made the transition to high school with the student dropout rate and found a lower dropout rate in 7–12 schools than in 10–12 schools. Renchler (2002) confirmed that the later the transition occurred, the higher the dropout rate. Brown (2004) examined the number of student transitions in Ohio to determine if transitions predicted graduation rates and aggregate achievement on the Ohio Proficiency Test, which was given to ninth-grade students. Significant differences in test scores were found for all students, whether in a rural, urban, or suburban school settings; however, significant differences for graduation rates were found only in rural schools.

At age 10 or 11, many students move from the elementary school they have always attended to a middle school; these new schools may be larger and farther away from home. Cook et al. (2007) examined the effect of transition on sixth-grade students in North Carolina. The focus of the research was to study the effects of grade span configuration on student behavior in sixth-grade students who were in the elementary setting as opposed to those in the middle school setting. Behavior problems rose and academic achievement dropped during the first year of transition into a middle school, even when adjusting for socioeconomic and demographic characteristics of the students and their schools. There were no similar behavior problems and academic achievement losses in sixth-grade students who remained in the elementary setting.

Johnson (2002) conducted a study involving 303 South Dakota rural sixth-grade students in a grade 5–8 configuration school and rural seventh-grade students in a grade 6–8 configuration school in which academic achievement was compared during the last year in elementary school and the first year in the new school to assess if there was any transition effect. Academic achievement was measured with the students' Scholastic Achievement Test 9th Edition (SAT 9) scores as well as report card grades. Findings from the study indicated that SAT 9 scores declined in both reading and mathematics when students transitioned after the fifth grade, as opposed to when the transition occurred after the fourth grade, which was when reading scores were most affected. There was no significant difference in the achievement of students who transitioned at the end of the fifth or sixth grade; therefore, it was recommended that the study be replicated with an older population to assess the effects of transition from middle school to high school.

In a qualitative case study from Virginia, eighth-grade students were asked to write a letter to incoming sixth-grade students telling them what they needed to know to be successful in their new middle school (Akos, 2004). The themes that emerged from the letters revolved around choosing and changing classes, improving study habits, and making and managing friends. As a result of this study, Akos (2004) called for additional research in the area of transition to middle school, specifically combining "student perspectives with examination on how individual and ecological factors relate to differential transitional experiences" (p. 8) to give school personnel the information needed to support the students during the transition period; thus, such a call solidified the need to examine transition. Most students experienced a transition during the middle-level years, yet some students experienced several before high school graduation.

## Academic Effects of Grade Span Configuration

Although meager, the research is consistent in suggesting that achievement of students in middle grades is higher when they attended schools with a wide grade span configuration, such as K–8 (Coladarci & Hancock, 2002a; Franklin & Glascock, 1998; Wihry et al., 1992). In a nested case study of an elementary school in a large urban district in Pennsylvania, Look (2002) revealed the potential of the K–8 grade span configuration to improve academic achievement. Coladarci and Hancock (2002a) described studies in New York City in which eighth-grade achievement test scores were found to be higher in schools with K–8 configurations than in schools with other grade configurations. In a Pennsylvania study, these researchers also reported sixth-grade achievement test scores were higher for students with low socioeconomic status when they were in an elementary configuration than when they were in a middle school configuration. Howley (2002) reported on studies in Connecticut in which student achievement was found to be higher when sixth- and seventh-grade students were included in the elementary setting. An additional study by Wihry et al. (1992) agreed: “The elementary setting appeared to be the most favorable location for 8th graders in Maine, resulting in achievement advantages ranging from one third to a full standard deviation” (p. 68). Older students also seemed to perform better academically when they were in a school with a wide grade span configuration. In two studies that measured student achievement of 10th-grade students in Indiana and Texas, both indicated that achievement was higher for students attending a school with a 7–12 or K–12 grade span configuration (Howley, 2002; Wise, 2000). Other factors also impact academic achievement, as Barth (2001) observed significant achievement differences in middle school students when linked to their socioeconomic status, and not the grade span configuration of the school.

The literature suggests that the next logical step in reorganization is to return to the smaller neighborhood school with a larger grade span configuration. Arkansas, a predominantly rural state, still has many small schools with larger grade spans. At the time of this study there were only 3 schools with a K–8 grade span configuration, but 74 schools with a grade span of K–6 (Arkansas Department of Education, 2006a). As the population increased in the predominantly rural areas that contain K–6 schools, the issue became whether school district officials should build additions to the elementary school, plan for additional elementary campuses, or develop new middle schools. As stated earlier, the intent of this study was to examine grade span configuration on a larger scale in order to address the methodological weakness of small sample sizes. Specifically, the intent was to examine the relationship between the grade span configuration of all schools in Arkansas attended by sixth-grade students and the academic achievement of the combined population of students as measured by the Arkansas Benchmark Examination.

# Method

## Participants

The population identified for inclusion in the study was all schools in Arkansas containing grade 6. In the school year 2006–2007, there were 20 different grade span configurations within the 355 schools in Arkansas that include the sixth grade (Arkansas Department of Education, 2006a). A purposive sample of 281 schools was drawn from this population. To be included in the sample, the schools had to retain their grade span configuration for the 3 years examined (2004–2005, 2005–2006, and 2006–2007) and had complete Arkansas Benchmark 6 scores for mathematics and literacy for the combined population for the 3 years posted to the Arkansas Department of Education School Report Card website.

## Design

The design was *ex post facto* with two repeated measure dependent variables: the mathematics and literacy percent scores for 3 years (2005, 2006, 2007), which were formed by adding Proficient and Advanced because this total is what determines AYP. There was one independent variable: grade span configuration (no transition, first year of transition, and second year of transition). The three levels for grade span configuration were formed from the different grade span configurations according to the year of transition (or lack thereof) in relation to the placement of sixth grade within the school. The first level contained all schools in Arkansas where sixth-grade students had no transition for the past 5 years and who were the oldest students and grade arrangements included PK–6 (11 schools), K–6 (158 schools), and 1–6 (4 schools), for a total of 173 schools. The second level contained schools where sixth-grade students were in their first year of transition and the grade span configuration was narrowed to a maximum of 3 years, and grade arrangements contained sixth grade only (3 schools), 6–7 (13 schools), and 6–8 (37 schools), totaling 53 schools. The third level contained schools in which sixth-grade students were in their second year of transition, and grade arrangements included 5–6 (21 schools), 5–7 (8 schools), and 5–8 (26 schools), for a total of 55 schools.

## Procedure

Data collection involved identification of schools in the sample from the Arkansas Department of Education (ADE) website and downloading benchmark scores as posted on the School Report Card website (Arkansas Department of Education, 2006b). The data needed were totals per year per school; no individual student's test scores were used. Benchmark examination results are available to the public only as the percentage of students in the school that scored in each of four performance levels (Advanced, Proficient, Basic, and Below Basic) for mathematics and literacy. Combined populations scores were used, with no differentiation made between students with disabilities or other subpopulation characteristics. Results of the Benchmark Exam were sent directly to the ADE, not to individual schools; therefore, there was no control over the accuracy of the posting of the scores, and it is assumed by school personnel that the ADE accurately reports to the public. There is a period of time for school officials to have their posted scores amended or corrected.

## Instrumentation

The Arkansas Benchmark 6 Examination was the approved NCLB-mandated exam for Arkansas' sixth-grade students and was a criterion-referenced test that is administered annually. The exam was aligned to the state mathematics and English language arts frameworks, was developed by Arkansas teachers and the Arkansas Department of Education (Arkansas Department of Education, 2006d), and contained both multiple-choice and open-response questions in mathematics and literacy; the literacy portion was further divided into reading (three constructed-response scored by two readers and 24 multiple choice) and writing (two prompts within five domains and eight multiple choice) skills. As noted by the Arkansas Department of Education (2006e), the Benchmark assessment was considered to provide psychometrically sound scores for determining AYP (however, no psychometric properties of the six alternative forms were provided, particularly the reliability and validity of the scores):

> The assessment system is constructed based on the Content Standards. Independent contractors utilize proven test construction practices in the design, scoring, scaling and reporting. An independent technical advisory committee of experts with documented assessment and psychometric training observe and advise. (Arkansas Department of Education, 2006e, item 7.3)

The Arkansas Department of Education's Rules and Regulations and the Administration Manual for the exam ascertain that all students take the exam under the same conditions and on the same dates. Test administrators must be certified teachers who attend required training within the district each year. Test administrators, building administrators, and superintendents must sign affidavits of compliance in testing procedures (Arkansas Department of Education, 2006d), and each year various schools are monitored by the Arkansas Department of Education during the testing period for compliance issues.

## Data Analysis

Individual students, their parents, and the schools receive raw and/or scaled scores from the Benchmark exam, and this data is then made available to the public after the scores have been categorized into 1 of 4 performance levels: *Advanced, Proficient, Basic,* or *Below Basic*. The results are reported only as the percent of students in the school placed in each level. For schools to meet AYP, the percent of students scoring Proficient or above had to increase by a predetermined percent each year, and the amount of the increase was determined by, and varied across, the schools. The schools reported the data to the state as raw scores, which are interval data, but the state then categorized the students into percents per performance level. The analysis was a one-between two-within analysis of variance with grade span configuration as the independent variable and the mathematics and literacy percentages for 3 years as the repeated measures dependent variables. Statistical assumptions pertinent to ANOVA (e.g., univariate outliers, normality, homogeneity of variance) were examined.

## Results

### Statistical Assumptions

We examined all statistical assumptions prior to the data analysis. A parametric procedure was used to examine percentages, which are nonparametric data; therefore, it was expected that the assumptions may be violated. When examining the data for univariate outliers (using $z$-scores of $\pm$ 3.00), 6 of the schools were univariate outliers with extreme yet legitimate percentages;

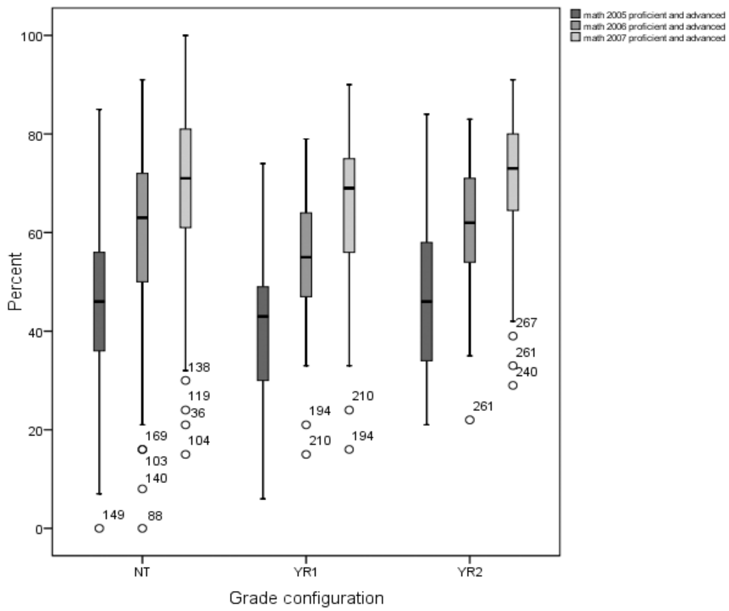


*Figure 1*. **Box and whisker plots of mathematics performance by grade configuration.**

therefore, they were retained for the analysis. Examination of the mathematics and literacy percentages via box and whisker plots for the 3 years by grade configuration revealed very little skewness in the distributions. However, the 6 schools with extreme yet legitimate scores were present (see Figures 1 and 2). The box and whisker plots also revealed a very wide range of mathematics (6 to 100) and literacy (18 to 93) performance. Moreover, normality was examined within the various levels via the Shapiro-Wilk test.

## Descriptive Statistics

Examination of the descriptive statistics revealed the differences in the percentages across the performance levels for the mathematics and literacy percentages (see Table 1); this result was expected and was not of interest. Examination of the math-

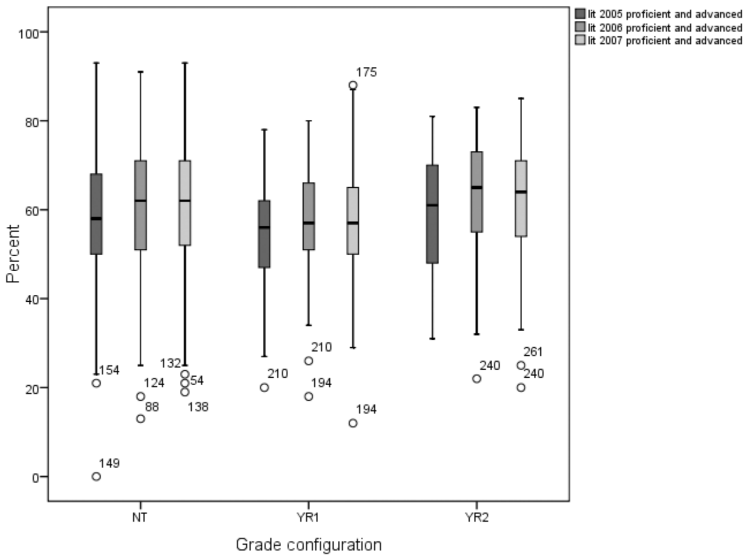


*Figure 2*. **Box and whisker plots of literacy performance by grade configuration.**

ematics and literacy percentages by grade configuration, however, revealed that there were few differences.

Adequate Yearly Progress is measured by the percent gain in the combined categories of Proficient and Advanced, which was determined for and varied across each school. Examination of the percentages over time revealed that when the upper levels of performance for mathematics and literacy were combined (Proficient and Advanced), grade configuration differences were marginal (see Table 1 and Figure 3 and 4).

Correlations between the percentages were examined within the grade configurations for the 3 years examined and revealed statistically significant relationships for most of the combinations ($p < .01$). All of the grade configurations demonstrated a moderate relationship between mathematics percentages, particularly for 2006 and 2007, and all of the relationships were large for literacy.

**Table 1**

*Means and Standard Deviations of Mathematics and Literacy Benchmark Scores for 2005, 2006, and 2007 by Grade Span Configuration*

| | | Mathematics | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2005 | | 2006 | | 2007 | |
| | *n* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* |
| No transition | | | | | | | |
| Below basic | 173 | 23.40 | 13.68 | 14.90 | 11.58 | 12.09 | 9.69 |
| Basic | 173 | 31.03 | 9.76 | 24.97 | 11.02 | 18.68 | 9.30 |
| Proficient | 173 | 30.26 | 10.86 | 33.80 | 9.82 | 30.97 | 9.71 |
| Advanced | 173 | 15.31 | 9.58 | 26.31 | 14.02 | 38.54 | 16.14 |
| % proficient or advanced | | 45.57 | | 60.11 | | 69.51 | |
| First year of transition | | | | | | | |
| Below basic | 53 | 27.47 | 13.21 | 18.28 | 10.04 | 14.87 | 9.88 |
| Basic | 53 | 32.02 | 5.81 | 26.98 | 6.66 | 21.11 | 7.42 |
| Proficient | 53 | 26.00 | 7.58 | 31.25 | 7.00 | 29.53 | 5.51 |
| Advanced | 53 | 14.30 | 7.98 | 23.47 | 10.91 | 34.58 | 13.76 |
| % proficient or advanced | | 40.30 | | 54.72 | | 64.11 | |
| Second year of transition | | | | | | | |
| Below basic | 55 | 21.00 | 10.38 | 13.58 | 7.34 | 11.24 | 8.25 |
| Basic | 55 | 33.15 | 7.32 | 25.95 | 6.75 | 18.42 | 7.64 |
| Proficient | 55 | 29.38 | 6.99 | 33.22 | 5.42 | 31.44 | 6.00 |
| Advanced | 55 | 17.00 | 10.20 | 27.31 | 10.06 | 38.91 | 14.61 |
| % proficient or advanced | | 46.38 | | 60.53 | | 70.35 | |
| | | Literacy | | | | | |
| | | 2005 | | 2006 | | 2007 | |
| | *n* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* |
| No transition | | | | | | | |
| Below basic | 173 | 8.64 | 6.27 | 8.17 | 6.55 | 8.83 | 6.81 |
| Basic | 173 | 33.98 | 12.00 | 31.35 | 11.22 | 31.03 | 11.93 |
| Proficient | 173 | 40.14 | 9.67 | 39.65 | 10.24 | 40.69 | 10.04 |
| Advanced | 173 | 17.28 | 10.63 | 20.58 | 11.34 | 19.38 | 11.16 |
| % proficient or advanced | | 57.42 | | 60.23 | | 60.07 | |
| First year of transition | | | | | | | |
| Below basic | 53 | 9.66 | 4.76 | 9.89 | 5.47 | 10.66 | 6.18 |
| Basic | 53 | 36.08 | 8.30 | 33.94 | 8.71 | 32.79 | 8.82 |
| Proficient | 53 | 38.79 | 6.67 | 35.08 | 7.10 | 38.77 | 7.42 |
| Advanced | 53 | 15.45 | 6.70 | 21.04 | 9.19 | 17.75 | 8.44 |
| % proficient or advanced | | 54.24 | | 56.12 | | 56.52 | |
| Second year of transition | | | | | | | |
| Below basic | 55 | 6.91 | 4.43 | 7.00 | 5.21 | 8.42 | 5.29 |
| Basic | 55 | 33.44 | 10.35 | 30.27 | 9.80 | 30.36 | 10.76 |
| Proficient | 55 | 42.07 | 7.77 | 38.07 | 6.05 | 39.76 | 6.80 |
| Advanced | 55 | 17.62 | 7.72 | 24.65 | 10.85 | 21.36 | 10.13 |
| % proficient or advanced | | 59.69 | | 62.72 | | 61.12 | |

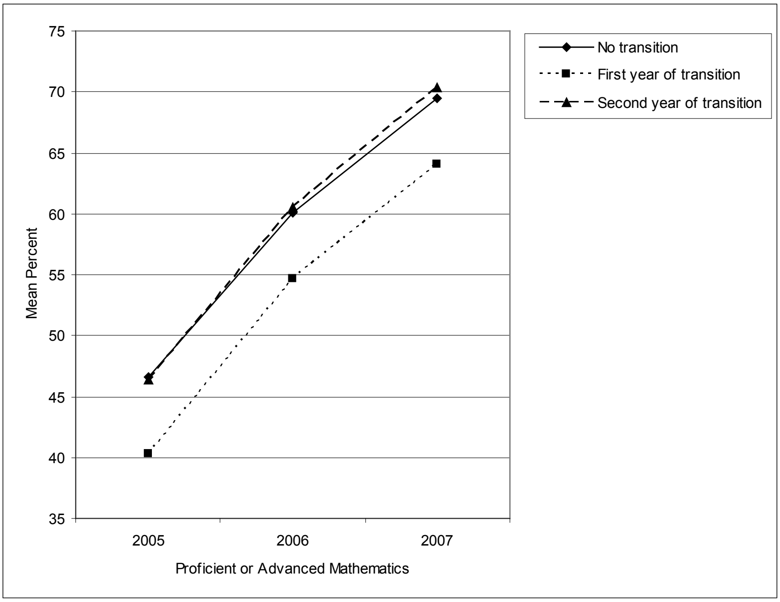


*Figure 3*. **Mathematics grade span configuration performance level mean percent by year for proficient and advanced combined**

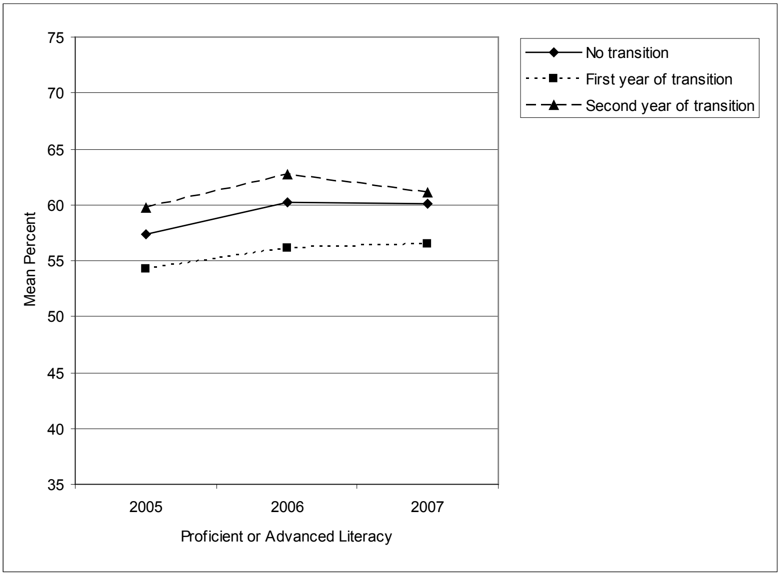


*Figure 4*. **Literacy grade span configuration performance level mean percent by year for proficient and advanced combined**

**Table 2**

*Correlations of Mathematics and Literacy Scores by Grade Configuration for 2005–2007*

| | Mathematics | | | Literacy | | |
|---|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2005 | 2006 | 2007 |
| No transition | | | | | | |
| 2005 | — | .36** | .07 | — | .74** | .72** |
| 2006 | | - | .53** | | - | .73** |
| 2007 | | | - | | | - |
| First year of transition | | | | | | |
| 2005 | — | .50** | .13 | — | .87** | .90** |
| 2006 | | - | .68** | | - | .87** |
| 2007 | | | - | | | - |
| Second year of transition | | | | | | |
| 2005 | — | .45** | .14** | — | .86** | .86** |
| 2006 | | - | .66** | | - | .84** |
| 2007 | | | - | | | - |

*Note*. ** $p < .01$.

## ANOVA

The results of the one-between two-within analysis of variance with grade span configuration as the independent variable and the mathematics and literacy percentages for 3 years as the repeated measures dependent variables revealed no statistically significant differences for the percents by grade configuration, $F(4, 554) = 2.32$, $p > .05$, partial $\eta^2 = .02$, or the grade configuration by year interaction, $F(8, 550) = .20$, $p > .05$, partial $\eta^2 = .01$, for the omnibus test but did reveal statistically significant differences in the percents over the years, $F(4, 275) = 205.18$, $p < .001$, partial $\eta^2 = .75$ (see Table 3). The follow-up univariate tests for the years revealed that both mathematics, $F(2, 556) = 333.27$, $p < .001$, partial $\eta^2 = .55$, and literacy, $F(2, 556) = 5.04$, $p < .001$, partial $\eta^2 = .02$, contributed to this effect.

**Table 3**

*Analyses of Variance for Mathematics and Literacy Percentages*

| Source | Multivariate | | | Univariate: Mathematics | | | Univariate: Literacy | | |
|---|---|---|---|---|---|---|---|---|---|
| | *F* | η | *p* | *F* | η | *p* | *F* | η | *p* |
| Between subjects | | | | | | | | | |
| Grade configuration | 2.32 | .02 | .06 | | | | | | |
| Within subjects | | | | | | | | | |
| Year | 205.18 | .75 | .001 | 333.27 | .55 | .001 | 5.04 | .02 | .007 |
| Grade configuration by year interaction | .20 | .01 | .99 | .02 | .01 | 1.00 | .24 | .01 | .92 |

***Note*. Multivariate *F* ratios were generated from Wilks' λ.**

## Conclusions

The results of this study did not reveal a relationship between grade span configuration and academic achievement as measured by the Arkansas Benchmark Examination for sixth-grade students. However, the nonsignificant findings do not negate its importance. The results imply that there are other factors that are affecting achievement scores in the middle grades. The results of the study also revealed that over the time span examined, mathematics Benchmark achievement rose but the results for literacy were stagnant. These results suggest that newly implemented practices or other factors may have improved mathematics achievement, but not achievement in literacy. Local school officials can use the information obtained from this study as one facet of the decision-making process when reviewing grade span configurations and academic achievement in the district. Local decisions about campus configurations should also include other factors such as projected enrollments, transportation costs, size of schools, school goals, fiscal constraints, political tensions, geographic realities, and financial accountability (Coladarci & Hancock, 2002b; Howley, 2002). As student populations shift, educational leaders can look for grade span configurations that best fit their community culture and current facilities, focusing financial resources on other means of improving academic achievement.

## Discussion

NCLB requires "stronger accountability for results" (U.S. Department of Education, 2003, p. 1), and schools that do not achieve the mandated percent gain each year (Adequate Yearly Progress) in their NCLB-approved assessment scores face sanctions and are in danger of losing federal funding. The number of schools falling short of this goal in Arkansas rose from 267 in 2005 to 299 in 2006 (Arkansas Department of Education, 2006b, 2007). As school officials strive for new ways to increase academic achievement, they are examining patterns of school organization such as grade span configurations (Lashway, 2000; Stevenson, 2006). Unfortunately, this study found that grade span configuration alone was not of statistical/practical significance.

The results of the study suggest that grade span configuration alone does not account for sixth-grade students' academic achievement as measured by the Arkansas Benchmark Examination. The results are consistent with findings by Johnson (2002), in a study of rural students in South Dakota, which found no impact on achievement of students who transitioned to a new school after the fifth or sixth grade. That study only included rural students, however, and utilized scores from the Scholastic Aptitude Test, 9th Edition (SAT 9). The results of this study contradict others (e.g., Barth, 2001, Cook et al., 2007, Franklin & Glascock, 1998, Vaccaro, 2000, Wihry et al., 1992), which suggested that grade span configuration had some effect on academic achievement. Although all of the aforementioned studies were conducted with different populations, none were conducted using sixth-grade students, statewide data, and the NCLB-approved assessment for the state.

NCLB has placed pressure on schools across the nation to raise student achievement (Gable, Hester, Hester, Hendrickson, & Sze, 2005), and these results indicate that Arkansas has made gains in sixth-grade achievement overall; particularly in the mean percent for mathematics, with a large effect size ($\eta^2 = .55$). Prior research has offered little in terms of explaining the relationship between grade span configuration and achievement (Anderman, 2002; Bickel et al., 2000; Coladarci & Hancock, 2002a; Cox, 1996; DeJong & Craig, 2002; Hough, 2005; Howley, 2002; Paglin & Fager, 1997; Reeves, 2005; Renchler, 2000, 2002; Stevenson, 2006; Vaccaro, 2000; Wihry et al., 1992), but this study did contribute to the body of knowledge by demonstrating that there was no relationship between grade span configuration and achievement with the strength of utilizing a large sample size representative of an entire state.

There are several opportunities to further examine the relationship between grade span configuration and academic achievement. For example, the study could be augmented as each year's Benchmark results are known, expanding the number of years of data collected and examined. Also, the study could be duplicated with any grade in any state, as well as with other grades in Arkansas. Achievement is falling in the middle grades (SREB, 2006); therefore, examining grades 5, 7, and 8 would be a logical extension of what is presented here. Additional research could examine the effect of transition on specific subpopulations of students, following these students from grade 3 through grade 8, using the approved NCLB academic assessment for that state. Although case studies of individual districts would provide vital information to these districts, statewide studies are needed so that some generalization is possible. Although this study utilized data from the combined population of students, future research could examine subpopulations of students (considering factors such as race/ethnicity, student SES, and rural/urban/suburban) in any of the aforementioned areas if states make individual student data obtainable. Additional studies should also investigate the identification of policies and practices that contributed to the gain in students' Benchmark mathematics achievement scores. Once identified, these practices could possibly be adapted and implemented to improve literacy achievement and aid schools in better meeting their goal of Adequate Yearly Progress.

This research encompassed statewide data from the NCLB-approved state assessment using a purposive sample comprised of 281 Arkansas schools housing sixth-grade students during 2005, 2006, and 2007. Because the results of the assessment were reported to the public only as the percent of students assigned to a performance level (category) by their raw score, both interval and ordinal statistical tests were conducted to determine if there was a relationship between the grade span configuration and the results of the Benchmark for sixth-grade students over time. The results of the study indicated overall differences in performance level, which was to be expected and was not the effect of interest. However, there was no statistically significant difference in the relationship between grade span configuration and mathematics and literacy scores over the 3 years examined.

## References

Akos, P. (2004). Advice and student agency in the transition to middle school. *Research in Middle Level Education Online, 27*(2), 1–11.

Alspaugh, J. W. (1998). The relationship of school and community characteristics to high school drop-out rates. *Clearing House, 71,* 184–188.

Anderman, E. M. (2002). School effects on psychological outcomes during adolescence. *Journal of Educational Psychology, 94,* 795–809.

Arkansas Department of Education. (2006a). *Arkansas education directory 2006–2007*. Little Rock, AR: Author.

Arkansas Department of Education. (2006b). *Arkansas public schools adequate yearly progress, school improvement list 2004–2005.* Little Rock, AR: Author.

Arkansas Department of Education. (2006c). *State report card*. Little Rock, AR: Author.

Arkansas Department of Education. (2006d). *Student assessment.* Retrieved from http://www.arkansased.org/testing/assessment.html

Arkansas Department of Education. (2006e). *Workbook for determining adequate yearly progress in No Child Left Behind*. Retrieved from http://www.arkansased.org/nclb/ayp.html

Arkansas Department of Education. (2007). *2005–2006 SI list post appeals revised April 27, 2007.* Retrieved from http://www.arkansased.org/nclb/pdf/ayp_si_2006_rev042707.pdf

Banks, R. (2004, July). *Middle school*. Urbana: University of Illinois at Urbana-Champaign, Clearinghouse on Early Education and Parenting.

Barth, J. J. (2001). The investigation of the relationship between middle school organizational health, school size, and school achievement in the areas of reading, mathematics, and language. *Dissertation Abstracts International, 62*(5), 1642.

Bickel, R., Howley, C., Williams, T., & Glascock, C. (2000). *Will the real "Texas miracle in education" please stand up?* Randolph, VT: Rural School and Community Trust. Retrieved from ERIC database. (ED447995)

Brown, E. L. (2004). The effect of number of school-to-school transitions on district performance. *Dissertation Abstracts International, 65*(9), 3224.

Coladarci, T., & Hancock, J. (2002a). *The (limited) evidence regarding effects of grade span configurations on academic achievement: What rural educators should know*. Retrieved from ERIC database. (ED467714)

Coladarci, T., & Hancock, J. (2002b). Grade span configuration. *Journal of Research in Rural Education, 17,* 189–192.

Cook, P. J., MacCoun, R., Muschkin, D., & Vigdor, J. (2007). *Should sixth grade be in elementary or middle school? An analysis of grade configuration and student behavior*. Retrieved from http://www.pubpol.duke.edu/research/papers/SAN07-01.pdf

Cox, B. E. (1996). School grade span configurations which include the eighth grade. *Dissertation Abstracts International, UMI 58*(1), 38.

Craig, J. A. (2006). Grade configuration. *School Planning and Management, 45*(3), 42.

DeJong, W. S., & Craig, J. (2002). Age appropriate schools: How should schools be organized? *School Planning and Management, 41*(6), 26–32.

Franklin, B. J., & Glascock, C. H. (1998). The relationship between grade configuration and student performance in rural schools. *Journal of Research in Rural Education, 14,* 149–153.

Gable, R. A., Hester, P. P., Hester, L. R., Hendrickson, J. M., & Sze, S. (2005). Cognitive, affective, and relational dimensions of middle school students: Implications for improving discipline and instruction. *Clearing House, 79,* 40–44.

Grolnick, W. S., Kurowski, C. O., Dunlap, K. G., & Hevey, C. (2000). Parental resources and the transition to junior high. *Journal of Research on Adolescence, 10,* 465–488.

Hough, D. L. (2005). The rise of the "elemiddle" school. *School Administrator, 62*(3), 10–11, 13–14.

Howley, C. B. (2002). Grade span configurations: Where 6th and 7th grades are assigned may influence student achievement, research suggests. *School Administrator*, *59*(3), 24–29.

Johnson, D. J. (2002). Academic achievement of rural students as they transition from elementary school to middle school. *Dissertation Abstracts International, 63*(4), 1207.

Juvonen, J., Le, N., Kaganoff, T., Augustine, C., & Constant, L. (2004). *Focus on the wonder years: Challenges facing the American middle school*. Santa Monica, CA: RAND Corporation.

Lashway, L. (2000). *Educators reorganize schools to foster a sense of community*. Retrieved from http://eric.uoregon.edu/trends_issues/organization/index.html

Look, K. F. (2002). K–8 schooling: A retreat? A mandate? An intervention? *Dissertation Abstracts International, 63*(5), 1649.

Lounsbury, J. H., & Vars, G. F. (2003). The future of middle level education: Optimistic and pessimistic views. *Middle School Journal, 35*(2), 20–38.

Mizelle, N. B. (1999, August). *Helping middle school students make the transition into high school.* Retrieved from ERIC Digest database. (EDO-PS-99-11)

Mulhall, P. F., Flowers, N., & Mertens, S. B. (2002). Research on middle school renewal. *Middle School Journal, 34,* 56–61.

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform*. Washington, DC: U.S. Government Printing Office.

National Middle School Association, & National Association of Elementary School Principals. (2002). *A position paper jointly adopted: Supporting students in their transition to middle school.* Westerville, OH: Author.

No Child Left Behind Act, 20 U.S.C. §6301 (2001).

Paglin, C., & Fager, J. (1997). *Grade configuration: Who goes where?* Retrieved from http://educationnorthwest.org/webfm_send/464

Pardini, P. (2002). Revival of the K–8 school. *School Administrator, 59*(3), 6–11.

Reeves, K. (2005). Figuring and reconfiguring grade spans. *School Administrator, 62*(3), 16–21.

Renchler, R. (2000). Grade span. *Research Roundup, 16*(3), 1–4.
Renchler, R. (2002). *School organization: Grade span, trends and issues.* Eugene, OR: ERIC Clearinghouse on Educational Management. Retrieved from ERIC database. (ED472994)
Russell, J. F. (1997). Relationships between the implementation of middle-level program concepts and students achievement. *Journal of Curriculum and Supervision, 12,* 169–185.
States Impact on Federal Education Policy Project. (2006). *Federal education policy and the states, 1945–2004; A brief synopsis*. Retrieved from http://www.sifepp.nysed.gov/edpolicy/altformats/ed_background_overview_essay.pdf
Stevenson, K. R. (2006). *Educational facilities within the context of a changing 21st century America.* Retrieved from National Clearinghouse for Educational Facilities: http://www.edfacilities.org/pubs/Ed_Facilities_in_21st_Century.pdf
Southern Region Education Board. (2006). *Goals for education: Challenge to lead: Arkansas*. Retrieved from http://www.sreb.org/main/Goals/Publications/06BW_PDF/AR-2006BW.pdf
U.S. Department of Education. (2003). *Fact sheet on the major provision of the conference report to H.R. 1, the No Child Left Behind Act*. Retrieved from http://www.ed.gov/nclb/overview/intro/factsheet.html
U.S. Department of Education. (2004). *Four pillars of NCLB*. Retrieved from http://www.ed.gov/nclb/overview/intro/4pillars.html
U.S. Department of Education. (2006). *The federal role in education*. Retrieved from http://www.ed.gov/about/overview/fed/role.html?src=ln
Vaccaro, D. A. (2000). A comparative study of middle school and K–8 school value-added gains in the areas of reading, language, math, science, and social studies. *Dissertation Abstracts International, 61*(6), 2175.
Wallis, C., Miranda, C. A., & Rubiner, B. (2005, August 8). Is middle school bad for kids? *Time, 166,* 48–51.
Waugh, R. (2004). Stuck in the middle. *Scholastic Scope, 53*(2), 21.
Wihry, D. F., Coladarci, T., & Meadow, C. (1992). Grade span and eighth-grade academic achievement: Evidence from a predominantly rural state. *Journal of Research in Rural Education, 8,* 58–70.
Wise, S. R. (2000). The effect of middle school organization upon student achievement. *Dissertation Abstracts International, 61*(3), 958.

Yecke, C. P. (2005). *Mayhem in the middle: How middle schools have failed America—and how to make them work*. Retrieved from http://edexcellence.net/institute01.pdf