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School Size and Socioeconomic Status on Mathematics and Literacy Achievement for Students in Arkansas

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SCHOOL SIZE AND SOCIOECONOMIC STATUS ON MATHEMATICS AND LITERACY ACHIEVEMENT FOR STUDENTS IN ARKANSAS

by

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DEDICATION

This dissertation is dedicated to my wife, Aerren Childers, who has supported me through, not only this dissertation, but also my life as an adult learner. Her devotion and love inspires me daily.

ABSTRACT

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Title: School Size and Socioeconomic Status on Mathematics and Literacy Achievement for Students in Arkansas (Under the direction of Dr. Michael Brooks)

The purpose of this dissertation was to add to the limited available research concerning the effects of size of school and socioeconomic status (SES) on literacy and mathematics achievement for students in Grades 9 through 12 in Western and Northwestern Arkansas. Of the four high schools, two were larger 6A/7A schools, and two were smaller 3A/4A schools. In all four hypotheses, the independent variables were size of school and SES measured by lunch status. In the first hypothesis, the dependent variable was literacy achievement as measured by student performance on the 2012 End of Course (EOC) literacy examination. In the second hypothesis, the dependent variable was mathematics achievement as measured by student performance on the 2012 EOC geometry examination. In the third hypothesis, the dependent variable was literacy achievement as measured by student performance on the reading portion of the 2012 American College Test (ACT). In the fourth hypothesis, the dependent variable was mathematics achievement as measured by student performance on the mathematics portion of the 2012 ACT. A review of the literature identified the various aspects of the effects of size of school and SES on student achievement in reading and mathematics.

This causal comparative study was conducted in Western and Northwestern Arkansas with Grades 9 through 12 in four high schools in four districts. The sample for this study included students from two larger 6A/7A high schools and two smaller 3A/4A high schools. School A was a higher-SES high school with a free and reduced lunch percentage of 39%, and School B was a lower-SES high school with a free and reduced lunch percentage of 59%. The two other high schools used in this study were small 3A/4A schools. School C was a higher-SES high school with a free and reduced lunch percentage of 40%, and School D was a lower-SES high school with a free and reduced lunch percentage of 65%. All of these schools were located in the northwestern part of Arkansas and had largely White student populations with roughly equal numbers of males and females. Students from the four high schools in a Northwest Arkansas school district were identified to participate in this study. The 2011–2012 demographics of the districts as a whole were 50.75% free and reduced lunch status. There were approximately 92% White, 7% Black, and 8.5% Hispanic. Students with disabilities made up approximately 10% of the total population of approximately 19,000.

A 2 x 2 factorial ANOVA was used to analyze the data collected for each of the four hypotheses. The results of this study showed no significant interaction effects between the effects by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on literacy and mathematics achievement measured by EOC literacy and mathematics testing and ACT reading and mathematics testing for students in Grades 9 to 12. In all four hypotheses, no significant interaction effect existed. The main effect for size of school was not found to be significant for any of the four hypotheses involving students in 9th through 12th grade, regardless of the dependent variable. However, the

results for Hypothesis 2, which dealt with the results for EOC geometry, were somewhat less conclusive though still not significant. In analyzing the means, the scores of the 9th and 10th grade students participating in the free/reduced lunch program from 6A/7A schools were virtually identical to 9th and 10th grade students from 3A/4A schools, but the non-participants in 6A/7A schools scored roughly 11 points ahead of non-participants in 3A/4A. Among non-participants, size of school did appear to make some impact but not enough to make a significant difference.

Many of the studies reviewed revealed findings similar to this study. Some studies revealed a greater difference in size of school and SES. No sweeping generalizations regarding size of school can be made. The effects of size of school differ depending on individual communities and schools. SES, however, was found to be a rather consistent predictor in measuring student achievement.

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CHAPTER 1

INTRODUCTION

From a global perspective, the United States has much at stake when it comes to how the country educates its students. Students are no longer merely competing with each other on a state or national level; competition has now moved to a global level (Douglass, Edelstein, & Hoareau, 2011; Singh, 2011). Therefore, educators are constantly looking for ways to improve the learning environment of their students. One way of improving learning environments may lie in how schools are organized, and one facet of school organization is school size.

The topic of school size and its effect on student achievement has become a hot-button issue, with some taking a definite stance on the subject (Johnson, 2006; Stewart, 2009). Throughout the nation's history, the school has been a large part of a community's identity. The notion of a community not having its own school or having to share with another community is a foreign concept to many (Knupfer, 2013; Surface, 2011). An increase in the accountability demands placed on schools, along with the pressure to prepare students for an ever-changing world, has prompted some state departments of education to re-examine the school size issue. Johnson (2006) noted that, in some circles, larger schools are perceived to be superior because they offer more opportunities for students and can, therefore, better prepare them for college and the world than can smaller schools, which might lack important resources. On the other hand, Johnson

argued that proponents of small schools fear not only losing their community's identity but also the intimacy that a larger school may simply be unable to provide.

To further complicate the matter is the issue of student socioeconomic status (SES). Students who do not come from print-rich homes and who do not have the same experiences in the world as their wealthier peers may have a difficult time succeeding in school no matter the size of the school (Gassama, 2012). Students coming to school without their other needs met are not prepared to learn and grow. They also have a difficult time remaining motivated and engaged (White, 2012). In addition, low-SES students can suffer unwittingly due to the perceptions of others around them. For instance, teachers can have lower expectations of low-SES students (Speybroeck et al., 2012). Thus, with the combination of perceived impersonalization of large schools and some students' lack of preparation due to their low-SES backgrounds and the lack of resources to support their learning, can the size of a school really make a difference in students' achievement?

Statement of the Problem

The purposes of this study were four-fold. First, the purpose of this study was to determine the effects by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on literacy achievement measured by the End of Course literacy test for 11th grade students in two large and two small Arkansas high schools. Second, the purpose of this study was to determine the effects by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on mathematics achievement measured by the End of Course geometry test for 9th and 10th grade students in two large and two small Arkansas high schools. Third, the purpose of this study was to determine the effects

by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on literacy achievement measured by the ACT for 12th grade students in two large and two small Arkansas high schools. Fourth, the purpose of this study was to determine the effects by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on mathematics achievement measured by the ACT for 12th grade students in two large and two small Arkansas high schools.

Background

Research was rather inconsistent when addressing the effects of school size and SES on mathematics and literacy achievement for students. Most of the studies noted at least some connection between SES and student achievement. The researcher has provided the reader with studies that encompassed examples spanning a variety of facets on the issue.

Effects of School Size

Researchers who have examined the effect of school size on student achievement have sometimes taken other factors such as community expenditures and level of teacher education into account, as well. Lindahl and Cain (2012) studied not only the relationship between the size of Alabama's high schools and performance on standardized exams, but they also studied financial indicators and school quality. What they found was, when SES among students was held constant, the size of the schools had very little effect on levels of achievement on the reading and mathematics sections of the Alabama High School Graduation Exam. Lindahl and Cain also found little difference in the numbers of teachers with masters degrees based on school size, but a greater number of highly qualified teachers were found in Alabama's largest high schools. The U.S. Department of

Education (2005) noted that, by definition, highly qualified teachers must possess at least a bachelor's degree, full state certification or licensure, and prove that they know each subject they teach. Teachers can prove their competency by having a major in the subject they teach, credits equivalent to a major in the subject, passage of a state-developed test, advanced certification from the state, or a graduate degree. Per pupil expenditures were also quite similar across schools of varying size. Only in amounts of millages did the researchers find any discernible difference. Districts of large high schools expended 3.2 mills, as opposed to the 1.5 mill average of districts of small high schools. This particular study used 85 Alabama high schools whose 11th grade classes ranged from 40 to 618 students.

Weiss, Carolan, and Baker-Smith (2011) attempted to investigate the link between school size and achievement by taking the aspect of student engagement into account. The researchers used the Educational Longitudinal Study of 2002 as a starting point. The study encompassed 10,946 students from the 10th grade, 54% of whom were male, and the remaining 46% were female. Weiss et al. were specifically looking to see if school size affected mathematics achievement. The over-arching focus of this study centered on the recent trend in the United States of building smaller high schools, as opposed to buiding larger schools. The findings demonstrated a strong relationship between the factors of school size, mathematics achievement, and engagement. Further analysis concluded that school size and cohort size provided the greatest engagement advantage for all students. In addition, results indicated that there were potentially harmful consequences for allowing a cohort to exceed 400 students. Even in light of these

findings, however, the researchers would not go so far as to prescribe the ideal size of school or cohort because different size groups affect individual students differently.

However, there are those who believe there is a definite answer in the school size debate. Johnson (2006) defended smaller, rural schools and opposed the consolidation movement in Iowa based on the perception that consolidation would enhance the achievement of students based on a greater variety of course offerings. All 344 Iowa school districts that had a high school were included in this study. Unlike previous studies, Johnson chose not to use the American College Test (ACT) as an instrument in his study. Although many viewed the ACT as a reliable measure of school performance, Johnson rejected it for several reasons in the study. First, he made the point that a greater proportion of students from districts with fewer than 400 students took the test than those in districts of more than 400 students. This, he argued, led to a lower overall average score for the smaller districts. Second, the author asserted that Iowa's smaller districts suffer from higher rates of poverty, which negatively influenced ACT scores. Third, he maintained the state-mandated Iowa Tests of Educational Development were a better judge of student achievement based on its 98% participation rate. The participation rate for the ACT was 64%. When performing the analysis, Johnson defined large schools as having 200 or more students enrolled. Results of the *t*-test revealed no significant difference in student performance on the Iowa Tests of Educational Development between students from large and small districts. He asserted that small schools achieve as well as large schools despite offering few credits and their battle with poverty.

In another part of the country, Stewart (2009) combined school size and SES in some Texas schools. The researcher wanted to know if there was a relationship between

student performance in all four areas (reading, writing, mathematics, and science) of the Texas Assessment of Knowledge and Skills and the size of the high school, including SES factors of the students. Stewart used five levels of high school size in this study. The findings revealed that the smaller rural high schools had the highest percentage of students passing all four areas of the 11th grade Texas Assessment of Knowledge and Skills. In addition, results noted that 25% or more of those students in the larger urban high schools were living in low-SES conditions.

North Carolina's schools were the focus of another study using longitudinal achievement data examining the link between school size and achievement (McMillen, 2004). This study was different in that it examined three cohorts of students—one each from elementary, middle, and high school. The study's results revealed several interactions between student size and characteristics. All of these interactions pointed to the fact that the achievement gaps that typically exist between subgroups get larger as the schools get larger. These types of results were more common in mathematics than in reading and more obvious in high school than in lower grade levels. The elementary and middle school levels revealed no significant relationship between school size and achievement. Students who entered sixth grade on grade level tended to do slightly better in larger middle schools, whereas students entering sixth grade below grade level did slightly better in smaller schools. However, effects were more pronounced at the high school level. In reading and mathematics achievement, results implied that students performed better in larger high schools. Regarding reading, this was especially the case for Caucasian students and students whose parents had at least some post-secondary education. Non-Caucasian students and students whose parents had only a high school

education did approximately the same in small and large schools. As for mathematics, exposure to algebra and geometry could have made high school students higher achievers. This was something not available to elementary and middle school measurements. The North Carolina data are not as clear-cut as national views are concerning school size and achievement. Such national views have held that smaller schools are better in terms of behavioral outcomes, participation in extracurricular activities, and academic achievement.

In the same vein, a study in Maine produced less than clear results concerning small schools and achievement (Coladarci, 2006). In examining the relationship between school size, SES, and student achievement, the researcher studied eighth graders in 215 schools. When exploring the effects on mathematics achievement, the hypothesis that small schools could thwart the negative effects of SES held true. However, when reading achievement became the dependent variable, the same hypothesis was not supported.

Chargois, Irons, and Carlson (2011) studied the academic performance of fifth grade African-American students in the context of school size and achievement. In looking at 1,257 fifth grade students, 782 of which were African-American, they found that the small school students performed significantly better compared to their large school counterparts on the mathematics portion of the Texas Assessment of Knowledge and Skills. However, students in medium sized schools (400-699 students) outperformed the other two groups. Likewise, using a Tukey HSD analysis, the researchers also found that African-American students in middle-sized classes of 16 to 19 students significantly outperformed their peers in larger classes of 20-21 and smaller classes of 12-15.

Werblow and Duesbery (2009) studied school size, mathematics achievement, and dropout rates. Data for this study were gathered from the Educational Longitudinal Study of 2002. Results of this study showed that students of smaller schools were less likely to drop out than were students in larger schools. In terms of mathematics achievement, students attending very small (less than 674) or very large (greater than 2,592) high schools had the largest mathematics gains. In addition, students attending medium sized high schools realized smaller mathematics gains. In discussing the study's limitations, the authors attempted to explain their results. They pointed out that the effects of schools in the largest quintile represented very few schools and could have led, therefore, to sampling error. They also acknowledged using mathematics, as opposed to reading achievement as a learning outcome variable, presented another limitation in that it could be confounded if students in some of the schools did not take four years of mathematics.

Effects of Socioeconomic Status

Researchers who have examined the effect of SES on student achievement have sometimes considered teacher expectations. Speybroeck et al. (2012) studied 3,948 kindergarten students looking at the association between SES and achievement. This study showed teachers' expectations mediated the relation between students' SES and their later language and mathematics achievement. This is particularly telling because the authors noted that teachers often have lower expectations for lower SES students. The researchers found this association between SES and expectations to be stronger for majority students than for minority students. They also determined that teachers paid less attention to the differences between high- and low-SES levels of minority students.

The 1985 to 1989 study was the basis for Konstantopoulos' (2009) look at the effects SES had on students. His data originated from a large scale, randomized experiment in Tennessee called Project Student Teacher Achievement Ratio (Project STAR), which involved 11,000 elementary students. Researchers randomly assigned students to classrooms within schools and examined how teacher effects interacted with students' gender, race, and SES. In addition, researcher examined teacher effects to see if such effects were more pronounced in high-poverty schools. Results indicated that all students benefit from high quality teaching, such as the highly qualified designation defined by NCLB (U.S. Department of Education, 2005). Differential effects on gender, race, and SES were overall small and insignificant.

Meckes and Bascope (2012) studied the placement of novice teachers in the context of SES and its effect on achievement. The findings revealed that more qualified novice teachers tended to be placed in high-SES schools or in schools that perform better academically. Novice teachers who did not perform as well on their exit exams tended to be placed in economically disadvantaged schools. These novice teachers also often come from the same disadvantaged backgrounds as the students they are serving. According to the researchers, the challenge of closing the achievement gap between high- and low-performing schools includes taking a closer look at where and how novice teachers are placed in schools.

Other studies have attempted to tie SES together with gender and race. Once again, Project STAR was used along with data from grade 4 Stanford Achievement Test scores in mathematics, reading, and science (Konstantopoulos & Chung, 2011). Along with studying the interactions between gender, race, and SES, the researchers also

explored whether teacher effects were more pronounced in schools with higher proportions of minority or female students. The results indicated that the teacher effects on female, minority, and low-SES students' achievement were not significant.

Nearly 272,000 students in 41 countries were involved in the Programme for International Student Assessment, which laid the foundation for a 2008 study on disadvantaged students in Canada (Edgerton, Peter, & Roberts, 2008). Nearly 28,000 of the assessed students resided in Canada. Edgerton et al. (2008) painted a picture of Canadian students that could be applicable to the status of students in the American public school system. The authors noted that low-SES students tended to be educationally disadvantaged. Unlike other studies that examined SES, this one also considered a cultural component. Specifically, the authors discussed cultural advantages that students of middle-class parents had over students with working-class parents. The former were more likely to pass on skills that helped lead to success in schooling. The wealthier the parent, the more likely they understood the daily school routine. Edgerton et al. noted this could have obvious advantages for students in that such parents interact better with teachers and the school as a whole. The entire school experience, then, is more positive for the child.

Researchers have studied individual factors affecting fifth and sixth grade students' mathematics achievement (Shores, Shannon, & Smith, 2010). In this study, researchers focused on the factors of SES, gender, and ethnicity. They studied 761 such students in this manner. What they found was definite connections were present between gender, motivation, self-regulated learning, SES, and academic performance. Shores et al. argued that, along with females and African American students, low-SES students need

to be assisted in seeing such connections to their own situations. Students in these categories tend to come from homes lacking in positive role models who encourage the student to overcome obstacles and not conform to stereotypes such as girls are not good at mathematics, or poor students cannot do as well in school.

Other factors, such as gender, have often been linked to studies regarding SES. Teacher efficacy and the belief that low-SES students can learn and have a bright future are major factors in terms of achievement (Auwarter & Aruguete, 2008). Low expectations among teachers further hinder poor students who already possess low expectations of their own abilities. This enables the cycle of poverty and its effects. The researchers of this study arrived at some interesting conclusions regarding the interaction of SES and gender. When studying girls, they found that low-SES girls were rated more favorably compared to high-SES girls. At the same time, ratings of boys were reversed; high-SES boys were more highly rated compared to low-SES boys. Childs and McKay (2001) noted that when it came to low-SES boys and low-SES girls, teachers viewed the low-SES girls more favorably, and they possessed negative perceptions regarding the low-SES boys. In the study, low-SES girls seemed to be the beneficiaries of high expectations, but when the focus shifted to high-SES students, boys benefited from increased expectations.

The National Assessment of Educational Progress also offered up telling data that link SES and gender. The National Assessment of Educational Progress data running from 1990 to 2003 inspired a study by McGraw, Lubienski, and Strutchens (2006) that examined the effect of SES in the context of gender gaps in achievement. The researchers found that the gender gaps favoring males were small but consistent over the period and

were largest in the areas of measurement, number and operations, and geometry, mostly near the upper echelon of scores. These consistencies were most prevalent among White, high-SES students. Gender gaps were not reported for Black students. Regarding females, McGraw et al. found attitudes and self-perceptions that were more negative about mathematics than when studying the males.

Karaarslan and Sungur (2011) conducted a study that linked self-efficacy and SES. They looked at SES in terms of parents' education level, parents' employment status, number of siblings, number of reading materials, presence of a separate study room and a computer with an internet connection, frequency of buying a daily newspaper, and income. Not surprisingly, the researchers concluded that students who had more reading materials at home, a higher frequency of buying a daily newspaper, and a higher income level were likely to be more self-efficacious in science and technology courses. On the other hand, Karaarslan and Sungur noted students with a separate study room and a computer with an internet connection were found to possess a negative association with self-efficacy. The researchers made the point that such findings of the effects of SES have practical implications. "Cognitively stimulating environments" give students more access to more resources (p. 22). They observed that more books in the home, greater frequency of newspaper purchases, and higher incomes were found to be positively linked to elementary students' science self-efficacy.

Other researchers have examined SES as a predictor pursuant to graduating and dropping out of school. Students with higher SES and higher levels of confidence in mathematics abilities have been predicted to have lower levels of dropping out of school (Bergeron, Chouinard, & Janosz, 2011). However, the warning signs for dropping out are

similar for low- and high-SES students. At the end of the day, more low-SES students drop out despite the commonalities. Bergeron et al. (2011) contended that when low-SES students are taken into account, self-perceptions of mathematics competence do not play a deciding role in whether or not a student drops out of school. However, these same self-perceptions of mathematical ability can predict the intentions of dropping out for high-SES students. This study also hypothesized that low-SES boys with low beliefs in their mathematical abilities would have higher intentions of dropping out, but this area did not reach significance when tested.

Students can have attendance problems without dropping out, though the connection to SES has proven to be problematic (Baxter, Royer, Hardin, Guinn, & Devlin, 2011). Absenteeism and SES were shown not to be significantly related. The authors were quick to caution, however, that there were possible explanations for this lack of relationship that they had expected to find. First, they indicated low variability was present in the two SES categories that may have helped to hide the relationship. Second, the researchers also pointed out that qualification for free or reduced lunch prices was a general and not a specific measure of SES.

Expectations from parents cannot be discounted when discussing the potential effect of SES. Stull (2013) examined how parents' expectations could influence students' performance in a powerful way. Once again, however, the effects of SES emerge. The percentage of parents expecting their child to earn at least a Bachelor's degree someday rises with family SES. However, this is not absolute. Stull described that the percentage of high-SES parents of low-achieving students expecting their students to earn at least a Bachelor's degree is actually higher than that for low- and middle-SES parents of high-

achieving students. Stull's study puts forth some important distinctions regarding direct and indirect effects of SES on student achievement.

Hypotheses

The present study attempted to differentiate between the direct effects of school size and SES on academic achievement. The researcher generated the following hypotheses.

1. No significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on literacy achievement measured by the End of Course literacy test for 11th grade students in two large and two small Arkansas high schools.
2. No significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on mathematics achievement measured by the End of Course geometry test for 9th and 10th grade students in two large and two small Arkansas high schools.
3. No significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on literacy achievement measured by early ACT preparation for 12th grade students in two large and two small Arkansas high schools.
4. No significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on mathematics achievement measured by early ACT preparation for 12th grade students in two large and two small Arkansas high schools.

Description of Terms

Large school 6A/7A. The Arkansas Activities Association (2013) identified the size of schools mainly by enrollment figures. To be classified as 6A in the 2010-2012 cycle, a school needed an enrollment of at least 848 students. To be classified as 7A, a school needed an enrollment of at least 1,335 students.

Socioeconomic status (SES). In this study, the researcher selected schools that differed in their free and reduced lunch populations by approximately 20%. Despite this 20% difference in their free and reduced lunch population levels, the large schools were both 7A, and the small schools were each 3A.

Small school 3A/4A. The Arkansas Activities Association (2013) identified the size of schools mainly by enrollment figures. To be classified as 3A in the 2010-2012 cycle, a school needed an enrollment of at least 196 students. To be classified as 4A, a school needed an enrollment of at least 306 students.

Significance

Research Gaps

Researchers have written a significant amount on the effects of school size and SES on academic achievement. However, after reviewing some of the literature, there appeared to be at least two gaps in the research. First, although many have written about school size and SES, the research about how they interact with one another seemed to conflict or simply draw the conclusion that additional research in this area was required (Baxter et al., 2011). Second, although many have conducted studies in states such as Alabama, Iowa, Texas, etc. (Johnson, 2006; Lindahl & Cain, 2012; Stewart, 2009), there appeared to be little regarding the researcher's home state of Arkansas. Therefore, a study

was necessary to parallel the specific conditions of high schools in Western and Northwestern Arkansas.

Possible Implications for Practice

This study's completion has the potential to assist school administrators and staff of high schools throughout the state of Arkansas. This study will join the growing body of research and shed additional light on the effects of school size and SES. In addition, the study will determine how these two components interact with one another pursuant to student literacy and mathematics achievement. This objective examination will also have the potential to give state departments of education additional information when making difficult decisions regarding consolidation.

Process to Accomplish

Design

The researcher used a quantitative, causal comparative strategy in this study. All four hypotheses used 2 x 2 factorial between-groups designs. The independent variables for all the hypotheses were SES (comparison schools differing at least 20 percentage points in free and reduced lunch percentages) and school size (6A/7A versus 3A/4A). The dependent variables for the first two hypotheses were literacy and mathematics achievement measured by End-of-Course exams in literacy and geometry, respectively. The dependent variables for the last two hypotheses were literacy and mathematics achievement measured by early ACT preparation for ninth grade students, respectively.

Sample

The study used 9th, 10th, 11th, and 12th grade students in four Western and Northwestern Arkansas high schools. Two of the high schools chosen were large 6A/7A

schools. School A was a higher-SES high school with a free and reduced lunch percentage of 39%, and School B was a lower-SES high school with a free and reduced lunch percentage of 59%. The two other high schools used in this study were small 3A/4A schools. School C was a higher-SES high school with a free and reduced lunch percentage of 40%, and School D was a lower-SES high school with a free and reduced lunch percentage of 65%. All of these schools were located in the northwestern part of Arkansas and had largely White student populations with roughly equal numbers of males and females.

Instrumentation

The Arkansas Comprehensive Testing, Assessment, and Accountability Program includes a mid-year and spring geometry End-of-Course and Grade 11 literacy exam. The exams consist of multiple-choice and open-response questions that directly assess student knowledge. The Grade 11 literacy exam includes items that are aligned to the Arkansas English Language Arts Curriculum Framework. The Arkansas Geometry Mathematics Curriculum Framework is the basis for the development of the Geometry End-of-Course Examination. The Arkansas Department of Education has contracted with Questar Assessment, Inc. for the development, production, distribution, and collection of the Geometry End-of-Course Examination materials (Arkansas Department of Education, 2012).

In the Spring of 2012, the students took the ACT in mathematics and reading and End-of-Course exams in geometry and literacy. The ACT college readiness assessment is a curriculum- and standards-based educational and career planning tool that assesses students' academic readiness for college (ACT, 2013). It is a national college admissions

examination that consists of subject area tests in English, mathematics, reading, and science. For the purposes of this study, mathematics and reading scores were used. The ACT mathematics test is a 60-question, 60-minute test designed to measure the mathematical skills students have typically acquired in courses taken by the end of 11th grade. The test presents multiple-choice questions that require the use of reasoning skills to solve practical problems in mathematics. The breakdown of the mathematics test is as follows: 23% pre-algebra, 17% elementary algebra, 15% intermediate algebra, 15% coordinate geometry, 23% plane geometry, and 7% trigonometry. The reading test is a 40-question, 35-minute test that measures student's reading comprehension. Students are asked to read several passages and answer questions that show their understanding of what is directly stated and statements with implied meanings. The reading test breaks down as follows: 25% social studies, 25% natural sciences, 25% prose fiction, and 25% humanities.

Data Analysis

To address the first hypothesis, a 2 x 2 factorial analysis of variances (ANOVA) was conducted using school size and SES as the independent variables. Student literacy achievement as measured by student scores on the End-of-Course Grade 11 literacy exam served as the dependent variable. To address the second hypothesis, a 2 x 2 factorial ANOVA was conducted using school size and SES as the independent variables. Student mathematics achievement as measured by student scores on the End-of-Course geometry test for 9th and 10th grade students served as the dependent variable. To address the third hypothesis, a 2 x 2 factorial ANOVA was conducted using school size and SES as the independent variables. Student literacy achievement as measured by student scores on the

ACT for 12th grade students served as the dependent variable. To address the fourth hypothesis, a 2 x 2 factorial ANOVA was conducted using school size and SES as the independent variables. Student mathematics achievement as measured by student scores on the ACT for 12th grade students served as the dependent variable. To test the null hypotheses, the researcher used a two-tailed test with a .05 level of significance.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

School size and SES are two factors affecting schools today. Each of these issues possesses ramifications for how education is viewed in the United States and around the world. The comprehensive literature review in this chapter provides a research based foundation for this study and its findings and is organized into sections discussing school size and SES. First, this discussion encompasses school size and achievement and research favoring small and large schools, as well as research with mixed findings on the subject. Following the discussion about school size, SES and student achievement will be discussed reporting on research involving the early years, efforts made at combating SES, and the roles of parents and schools in ameliorating the effects of SES.

School Size, Achievement, and Other Factors

The effect of school size on student achievement has garnered an increasing amount of attention (Johnson, 2006; Stewart, 2009). Traditionally, a school in the United States is a large part of a community's identity, and the notion of a community not having its own school or having to share its school with another community is not a popular idea (Knupfer, 2013; Surface, 2011). Some school districts are re-examining the school size issue because of an increase in accountability demands placed on schools and because of the pressure to prepare students for an ever-changing world. Johnson (2006) noted that some circles perceive larger schools to be superior because they seem to offer more

opportunities for students and better prepare them for college and the world compared to smaller schools, which often lack comparable resources. On the other hand, Johnson argued that proponents of small schools fear not only losing their community's identity but also the intimacy that a larger school may simply be unable to provide.

Literature Concerning Smaller Schools

Duke, DeRoberto, and Thomas (2009) contended that education's problems from low achievement to high dropout rates could be traced back to large schools, especially high schools. In 2005, the largest American high schools ranged in size from 4,379 to 5,299. The researchers asserted that small schools address the need for small, intimate learning communities where students are well known and can be pushed by caring adults. They also argued that small schools reduce the isolation that can lead to alienation and violence. Small schools, the researchers believed, help to reduce the achievement gap among poorer students, especially those of color and to encourage teachers to use their intelligence and experience to help students succeed.

Jimerson's (2006) research came down squarely on the side of small schools. The researcher condemned states for moving to close small rural schools and to attempt to save money and boost efficiency in spite of what the researcher saw as "overwhelming evidence that smaller schools are beneficial for students, and that they frequently function as the glue that binds together small communities, serving as their economic and social hub" (p. 5). The researcher warned that this movement runs counter to the trend in urban areas of breaking down large schools and forming new, smaller learning communities. The researcher founded her results on the attributes of smaller schools that have a

positive effect on student learning and well-being. Specifically, the researcher identified 10 reasons for small schools' effectiveness.

1. Smaller schools provide greater participation in extra-curricular activities, which is linked to academic success.
2. Small schools are safer.
3. Small schools provide a sense of belonging.
4. Small class size allows for more individualized instruction.
5. Good teaching methods are easier to implement in small schools.
6. Teachers from small schools feel better about their work.
7. Mixed-ability classes avoid condemning some students to low expectations.
8. Multiage classes in small schools promote personalized learning and encourage positive social interactions.
9. Smaller districts mean less bureaucracy.
10. More grades in one school alleviate many problems of transitions to new schools.

Encompassing all 10 of these reasons is the importance of close relationships. Jimerson emphasized the reasons for her outlook by stating that schools usually are reflections of the communities in which they are located.

In addition, Jimerson (2006) noted that smaller communities are typically places that naturally result in close interpersonal connections where individuals know, share with, and care for each other. In many ways, Jimerson summarized the argument for small schools by stating the following:

> Smaller schools mirror these qualities and reduce student alienation, teacher isolation, and rigid boundaries between the administration and the rest of the staff. We believe the resultant culture of small schools is qualitatively and intrinsically different from that of larger schools and that this closeness permeates all areas of schooling and makes a huge difference for children. (p. 16)

Jimerson was also careful not to tout smallness simply for the sake of smallness. The researcher stated that smallness was important primarily because of its impact on positive student outcomes.

Leithwood and Jantzi (2009) examined 57 post-1990 empirical studies of school size effects on a variety of student and organizational outcomes. The researchers found that the evidence provided by the research favored smaller schools compared to their larger counterparts. Students who traditionally struggle at school and students from disadvantaged social and economic backgrounds were the major beneficiaries of smaller schools. The researchers set the number of students in elementary school with large proportions of disadvantaged and struggling students at no more than about 300 students. They believed an elementary serving economically and socially heterogeneous or relatively advantaged students should be closer to about 500 students. Regarding secondary schools, the researchers recommended those serving exclusively or largely diverse and/or disadvantaged students should be limited in size to about 600 students or fewer, and those secondary schools serving economically and socially heterogeneous or relatively advantaged students should be limited in size to about 1,000 students.

Bloom and Unterman (2012) studied New York City's high school graduation rates in the context of school size. From 2002 to 2008, the city closed 23 large high

schools, each of which had a graduation rate of less than 45%. In the place of the closed schools, the city opened 216 new smaller high schools. In the process, New York City also centralized the high schools' admissions system. Many of these schools were located in neighborhoods, purposely built small, and designed to serve the most disadvantaged students. It was not uncommon for these smaller schools to have 100 students per grade level in Grades 9-12. The schools were *non-selective* academic high schools because they did not screen students based on their academic backgrounds. The non-profit group, Manpower Demonstration Research Corporation, conducted follow-up research and released a report gauging the effectiveness of these reforms. They asked the following questions:

- Was the positive average effect of small schools of choice on 4-year graduation rates for the study's first student cohort sustained through the second cohort?
- Was this positive average effect sustained across subgroups of students with different prior academic proficiency, family income, race/ethnicity, and gender?
- Was the average 4-year graduation effect sustained after five years?

According to the non-profit group, all three of these questions were answered in the affirmative.

Not only did some research favor smaller schools, Kewaza and Welch (2013) noted that large classes in a large school could hinder learning. The researchers found that teachers in crowded classrooms in Uganda often found their teaching options were limited. The teachers employed chorus reading more often compared to individual

reading because it required the students to read simultaneously, which also aided in classroom control. One-on-one instruction and small group work, as well as diverse methods of reading instruction, were not as easily achieved with greater numbers of students in the classroom. In addition, teachers found the distribution of materials to be more time-consuming in these classrooms. Through surveys, teachers in such classrooms labeled teaching a "burdensome task" (p. 285). The researchers concluded that the teaching-learning process of reading in classes with greater numbers of struggling readers was substantially affected negatively by large classes. In the same vein, Hojo (2013) found class-size discussions were at least somewhat affected by school size. The regression results of Hojo's study suggested that the effect of class size varied across class size distribution, and the class-size effects in Japanese schools were mostly driven by the smaller schools in the lower part of the class-size distribution. The researcher suggested that a reduction in the upper class-size limit, for example, 35 to 40, would have a slightly positive influence on the academic performance of Japanese students. Hojo noted that his study was far from conclusive, and many issues must wait for resolution in future research.

The push for smaller schools has its advocates, and many re-structuring designs have arisen to decrease the size of schools in large districts across the United States. The Gates Foundation has worked to reduce the size of high schools due to their beliefs that large high schools cannot provide the caring environment needed to educate urban youth. According to Duke et al. (2009), districts have four options to "reduce the negative impact of large schools" and improve school safety and staff coordination. (p. 2). The first option in reducing the size of schools involves the renovation and redesign of

existing schools. School redesign could actually present hidden opportunities in that schools have the opportunity to make better use of physical space and reduce the negative effects of size. Examples of school redesign exist at all levels. Under this option, high schools would be divided into smaller units such as academies that have their own career focus or an individual grade level on its own floor. Schools-within-schools are small schools located within the host school. These possess a distinct curricular focus and can attract students from other high schools or students from within the host school. Alternative schools for expelled or suspended high school students are also part of this equation. Alternative schools can inhabit their own separate building, or they can exist within the high school as a separate entity during regular school hours or in the evening. Duke et al. noted that middle schools tend to be redesigned around pods or clusters. A pod or cluster would contain a common set of 80 to 120 students who have their English, social studies, science, and mathematics classes in this common area. The four teachers would work with this common set of students. Therefore, the students would spend approximately half of their day in this pod or cluster with adults who know them. Duke et al. pointed out that school officials could subdivide elementary schools into small groups of spaces. Some schools use what is called a family plan in this type of school redesign. A family might cover the classrooms on one side of the corridor and might include a kindergarten, first, second, third, fourth, and fifth grade class. When a group of students completes one grade, they move to the next room on their side of the corridor. The teachers in the family work together to plan and coordinate instructional activities. Within this redesign, a neighborhood could encompass two families or the classrooms on both sides of the corridor. Duke et al. argued that neighborhoods make it relatively easy

for two teachers at the same grade level to coordinate activities, group and regroup students, and conduct joint lessons. However, some elementary schools use other types of school designs including pods or clusters, similar to some middle school redesigns.

A second option proposed by Duke et al. (2009) to reduce negative effects of larger schools involved reorganizing existing schools. Reorganization is an inexpensive and popular option because it does not involve any major changes in physical structures. This idea got its start with New York City's need to separate ninth graders from the large high schools because of the older students' absentee and behavior problems. The reorganization was labeled a *house plan*. Under such a plan, Duke et al. noted that students, teachers, administrators, guidance personnel, support staff, and the school building itself are reorganized into small groups with which students can identify and feel a part. Ideally, students take all or the majority of their classes within their house, a group they belong to by choice and not by academic ability. This concept has since spread to high schools. Initially, Duke et al. noted that there was the issue of keeping the houses truly separated from one another so that each house could have its own identity and sense of togetherness. In New York City, for example, small learning communities and schools within schools have been carved out of larger schools. Duke et al. pointed out that a sense of identity could be carved out of a larger school to help create a sense of belonging and ownership. To address this same issue, Washington, D.C. officials have used what they call right sizing. Instead of closing schools, some schools have been modified by demolishing sections of some existing schools or reallocating some space to administration. Either way, the schools have reduced the number of students in them.

Duke et al.'s (2009) third option for reducing school size involves using satellite facilities. The researchers cited Danville, Virginia, as an example. That city had an overcrowded high school and was unable to build a new one. They did possess, however, a vacant junior high school. Teachers were encouraged to propose focus schools that could be housed in a vacant building. Four of these focus schools were accepted with each having its own unique curricular theme and each populated with 100 ninth graders. In each of the next three years, a different grade level was added with the target population of each focus school at 300 students. Duke et al. argued that the use of satellite facilities did a great deal to relieve the overcrowding at the high school. They acknowledged that transporting students to and from the building could be a challenge as was administrating it; however, the Danville staff quickly solved both of these issues. An assistant principal was assigned to the focus school to coordinate with the main high school.

Duke et al. (2009) contended that the fourth option was probably a bit more expensive because it required the building of new, smaller schools. Although this option is more costly, it does help districts avoid the problems of finding somewhere to put students during a renovation. In addition, a new building allows educators a modern facility to carry out new educational initiatives that might prove more difficult in an older, renovated building. Duke et al. reported on the Franklin County, Virginia school that had an overcrowded, outdated middle school and lacked support for a bond issue large enough to replace the large, county middle school. District officials opted to build a learning center about half the size of the middle school, which would provide career-oriented education. They hoped such a move would reduce the county's high dropout rate.

Their idea, however, turned into the Center for Applied Technology and Career Exploration and housed 500 students, or approximately half of the county's eighth and ninth grade students. The center was designed to resemble a high-tech business. A 64,000-square-foot facility was created without a cafeteria, gymnasium, or library. The facility consisted of eight career centers, each with a large multipurpose conference room, a commons area, and administrative offices. Every student had access to a computer workstation, and for exercise, students walked to a new YMCA, purposely located across the street from the center. Franklin County eighth graders spent a semester at the center engaged in practical, hands-on projects and spent a semester at the regular county middle school studying traditional subjects.

Attending small general education secondary schools has been associated with improved student achievement (Darling-Hammond, Ancess, & Ort, 2002). Research has also shown that small schools promote more equitable access to academically demanding courses (Bryk, Lee, & Holland, 1993), more equitable gains in achievement (Darling-Hammond et al., 2002; Lee & Smith, 1997), and lower dropout rates (Darling-Hammond et al., 2002). However, some do not agree with these results stating that larger schools are better equipped to offer more opportunities for students and to better prepare them for college and the world compared to smaller schools.

Literature Concerning Medium/Larger Schools and Mixed Findings

Since the 1950s, baby boomers have demanded more classroom space. In terms of school enrollment, bigger was thought to be better so that a generation of scholars could be served. Some educators believed small schools failed to provide students with enough opportunities. Bradley and Taylor (1998) studied the effect of school size on exam

performance in the United Kingdom. Not unlike the situation in the United States, general dissatisfaction regarding educational performance and the adverse effects school size was having on economic competitiveness prompted studies in the United Kingdom. Their findings revealed that school size in the United Kingdom was found to be non-linearly related to exam performance. They found that exam performance increased with school size but at a decreasing rate. The study went on to state that exam performance was maximized at a school of around 1,200 for schools housing students 11-16 years of age and 1,500 for students 11-18 years old. The researchers pointed out that the average school sizes at this time in the United Kingdom were 800 for 11-16 year olds and 1,000 for 11-18 year olds. They held that if officials went strictly by their findings, it would seem necessary to begin merging smaller schools. The researchers, however, cautioned against such a move.

In identifying potential limitations and pitfalls of the study, Bradley and Taylor (1998) conceded that they had focused only on the upper end of the exam results distribution and that schools might be equally concerned about the mean exam score and its variance, neither of which was investigated in their study. The researchers also acknowledged that some schools put more work into providing a "good all-around education by maximizing breadth of subjects" than solely preparing students for the exam (p. 318). They also expressed the view that small schools were valuable in ways that were not necessarily reflected in exam results alone. As examples, they cited the development of personal and social skills and a greater awareness of the needs of people rather than solely focusing on skills, which help students to pass exams. Bradley and Taylor also stated that schools are often an important part of the local community and that closing

one could be socially harmful to that community. In addition, closing and merging schools would increase travel time for students and transportation costs, which cannot be easily dismissed.

In discussing their findings, Bradley and Taylor (1998) acknowledged that their study suffered from the absence of prior academic achievement data of the participants. Other data such as family backgrounds of students and numbers of special needs students were useful but not the same as prior academic achievement. They also stressed the need for their readers to understand that, although the estimated relationship between exam performance and school size holds in general across all schools, it should not be taken to mean that all small schools had poor examination results. They wanted to guard against any sweeping generalizations about school mergers and closures based on the findings of their study, indicating that such decisions be made on a school by school basis. Even though small schools proportionately had fewer students scoring well, many small schools still performed well above average. The same could also be said about the performance of large schools.

Kantabutra and Tang (2006) investigated school size and school efficiency in their study based in Thailand. Their study focused on urban and rural schools, and their results indicated that rural schools operated less efficiently than urban ones. School size, they found, contributed positively to both types of schools, and class size had a positive effect on urban schools and a negative one on rural schools. The researchers concluded that a policy to improve school efficiency should focus on rural schools, expanding school size, and reducing class size. In discussing their findings further, the researchers attributed the lack of efficiency of rural schools to familiar reasons such as disadvantages

in students' SES and family status that tended to hinder the ability to learn, to provide unequal and inefficient public facilities and school environments, and to decrease the ability to attract professional teaching staff. The researchers reasoned that, based on the results of urban-rural effects and the given educational resource constraints, school officials needed to consider sharing some of the urban schools' resources, such as teaching staff, with rural schools. School size had a positive effect on both urban and rural schools, and class size had a positive effect on urban schools and a negative one on rural schools, according to the researchers.

In addition, Kantabutra and Tang (2006) also found that, for rural schools, smaller class size benefited students because of more teacher-student interaction and more one-on-one attention, which helped to relieve learning difficulties of rural students with lower SES. The researchers suggested that education officials might need to stop viewing rural and urban schools as the same and realize that they are different enterprises with different needs. Based on their findings, they believed educational leaders should consider varying policy considering urban-rural differences when dealing with issues like class size. For example, rural schools could have larger schools with smaller classes, and urban schools could have larger schools with larger classes. The researchers believed this model to be more efficient than the status of the country's schools. Based on the results of urban-rural and size effects on school efficiency, the researchers pressed for class size reduction for rural schools.

Stiefel, Iatarola, and Fruchter (1998) studied the effects of school size in New York City's secondary schools. Their study examined achievement, but it also took into account the size of a school's student body and its effect on school costs. The researchers

did not question the belief held by some school reformers that smaller schools help result in greater student performance; rather, they focused on the cost of this performance. For the purposes of their study, the researchers categorized the 133 high schools of less than 600 students as small, schools of 600-1,200 as smaller medium, schools with 1,200-2,000 as larger medium, and schools with 2,000 or more students as large. Stiefel et al. pointed out that their results indicated the size of the student body was an important factor in relation to costs and outputs. Although small academic schools had somewhat higher costs per student, they reasoned that the schools' much higher graduation rates and lower dropout rates produced among the lowest cost per graduate in the New York City system. Thus, the researchers found that small academic schools had among the lowest costs per graduate. They also found that the large high schools of greater than 2,000 students had the second lowest cost per graduate, with that cost being close to that of the small high schools. Smaller medium size vocational schools with 600 to 1,200 students and small transfer alternative high schools had the highest costs per graduate. Therefore, the researchers' findings on school size were somewhat mixed. They saw that their data indicated that the large high schools were nearly as cost-effective as the small high schools, but they still appeared to recognize that small schools served an important purpose. Stiefel et al. noted the following:

> The real question for policy makers involves the tradeoffs between budgets, units and outputs. To the extent that small schools are better places for disadvantaged youth, particularly poor students of color in urban districts, as the research literature indicates, the small additional budgets and units per student this study found invested in small New York City high schools seem well worth the

> improved outputs, particularly the low costs per graduate, that these small schools demonstrate. (p. 20)

Regardless of the results, the researchers appeared unwilling to dismiss categorically either larger or smaller schools. Both types of schools, it seemed, appeared to have advantages for the achievement of students.

The social aspect of school can weigh heavily on academic achievement. Tayli (2013) studied school size and bullying. Through data acquired via questionnaires, Tayli examined the size of school in which bullying was most likely to occur. The researcher used the number of 500 as a minimum school size and 900 as a maximum for high school. According to his findings, mid-size schools revealed the fewest numbers of students identified as bullies and victims, and small schools were the worst in terms of bullying. The researcher pointed out that this was a surprising development because students are believed to feel safer and run less of a risk of getting lost in the crowd in a small school with small classes compared to a large school with large classes. In such an environment, Tayli contended that education should be more personalized. Small schools and small classes were thought to produce closer teacher-student and student-student relationships. However, Tayli went on to point out that smaller schools often produce small levels of academic success. Educational programs, the researcher contended, are sometimes not of high quality in small schools. In addition, potentially damaging to students was the fact that students' economic backgrounds and family structures were more easily identified in small schools. He concluded that very small schools were undesirable for teenagers because of these academic and social concerns. However, Lay (2007) believed small schools to be appropriate for students from low income and

minority families. In addition, Lee (2008) considered very small schools advantageous for students of low income families, families from minority groups, and academically unsuccessful students.

Ramirez (1992) conducted research that he believed demonstrated that any type of school (small or large, urban, suburban, or rural) could achieve successful outcomes. He argued that much of the confusion around size issues is related to "asking the wrong questions or putting questions in the wrong context" (p. 88). The researcher stated that a school is not a building but rather a learning community and that the organization within the building is a key element to be considered. Although the learning community might be challenging to define, Ramirez believed that a school district's size was an even more elusive variable to judge because its nature and mission are not universal. Institutional arrangements peculiar to each state affect the resources and services available to small districts. New technologies, such as distance learning, could help to alleviate this issue. The researcher stated that the optimum size for educational institutions is an "elastic concept related to institutional mission and setting and available resources" (p. 89). He urged researchers and policymakers to consult those affected by size decisions to gain perspective on the historical, cultural, and political context of the affected community. Through his study, Ramirez arrived at the conclusion that a small rural school could be successful so long as it was focused around a clear mission and vision, had community support, and possessed sufficient resources. Likewise, he believed the same could be said for small urban alternative school. For Ramirez, it was all about a school finding its niche. He emphasized, however, that size is only one of many elements to consider when judging a school. Many of the best public schools, he contended, are large urban and

suburban public schools. In his view, these schools were not successful because of their size but because of their outcomes and how effectively they used the resources they were given. For Ramirez, the sheer size of a school was less important than how it was organized internally. The use of cohorts and schools within schools could provide a small feel to a school with a large number of students. "Too often, discussions about school or district size stem from established positions and grow to elaborate rationales to justify these positions. This approach can lead to losing sight of the student's interest" (p. 20). Again, he believed resource allocation was more of a factor than size alone. After discussion on this subject, the researcher conceded that what was best for students and how they were affected by school size was paramount.

Luyten (1994) investigated the relationship between size and mathematics and science achievement in schools in the Netherlands, Sweden and the United States. This research addressed four central topics. First, the researcher studied if school size was related to achievement independently of student background characteristics such as sex, achievement motivation, SES, and cognitive aptitude. Second, the researcher examined the effect of school size related to any of these background characteristics. Third, the researcher asked if the effect of school size on achievement differed among the educational systems of the Netherlands, Sweden, and the United States. Fourth, the researcher asked if the effect of school size was the same for different measures of student achievement, such as mathematics versus science. The researcher reported little empirical evidence for the existence of school size effects on achievement, in any, of the three countries, possibly because school size and curriculum comprehensiveness were not strongly related in these countries.

In another study, Bickel, Howley, Williams, and Glascock (2000) found that as school size increased, achievement test score costs associated with having economically disadvantaged students in schools increased, as well. Pointing to the scope of their research, the researchers reported that such findings have proven robust across seven states and at least four different regression model specifications. They emphasized that this degree of consistency is rare in educational research. The researchers attempted to explain to administrators and policy makers that the issue of school size and costs is far from the whole story, at least with regard to expenditure per pupil. Bickel et al. maintained that the negative relationship between size and expenditure per pupil becomes increasingly tenuous as school size increases, and eventually savings become negligible. Additionally, organizational factors revealed unanticipated relationships to cost reduction. The researchers noted, "If we were designing schools solely to minimize expenditure per pupil, the best configuration might very well be a large single-unit school" (p. 30). However, the researchers realized that the cost of education, in and of itself, is not the sole concern when evaluating whether a small or large school would be more appropriate for students.

SES, Achievement, and Other Factors

Compounding the possible negative effects of school size is the issue of student SES. SES, for students, has many faces. Students who do not come from print-rich homes and who do not have the same experiences in the world as their wealthier peers may have a difficult time succeeding in school no matter the size of the school (Gassama, 2012). Students coming to school without their other needs met are not prepared to learn and grow. They also have a difficult time remaining motivated and engaged (White, 2012). In

addition, low-SES students can suffer unwittingly due to the perceptions of others around them. For instance, some teachers may hold lower expectations for low-SES students because of their lack of opportunities (Speybroeck et al., 2012). Thus, with the combination of the perceived impersonalization of large schools, the perceived lack of resources to support learning in a small school, and some students' lack of preparation due to their low-SES backgrounds, does the issue of SES overshadow the effects of school size? In other words, to what degree do school size and SES combine to affect students' achievement and to what degree does SES alone play a role in students' performance?

SES and School Size

Johnson, Howley, and Howley (2002) saw a connection between SES and school size when studying the academic achievement of students. Their study examined how the relationship between size of school and achievement varied in Arkansas schools and districts that served students from a variety of SES backgrounds. The data they used from schools and districts in Arkansas included school district size, school size, standardized test scores, SES, and proportion of African American students. These researchers noted that unlike some other states previously studied, school and district size in Arkansas were negatively related to academic performance across the entire range of SES. They also noted that the negative influence of size was quite weak in affluent settings and comparatively strong in impoverished ones. Regarding achievement equity, the researchers found the negative effects of poverty on student achievement were considerably stronger in larger schools and districts than in smaller ones. They conducted a 4-group comparison and found "inequity of achievement to be magnified within larger

schools in larger districts, somewhat muted within smaller schools in larger districts, and dramatically disrupted within smaller schools in smaller districts" (p. 3). They also conducted a separate analysis that discovered that the negative effects of poverty, size, and the poverty-size interaction were compounded in schools and districts serving predominantly African American students.

Howley (1999) suggested a way to reduce the negative effects of large school size was by controlling for SES. He studied research from California, Alaska, and West Virginia, which suggested that school or school district size could influence student achievement indirectly by mediating the effects of SES on achievement. Howley's Matthew Project replicated key analyses of the West Virginia study in four strategically chosen states: Georgia, Ohio, Montana, and Texas. In Ohio and Montana, along with school district size, Howley included various methods for assisting low-SES students such as aid to dependent students in Ohio and free and reduced-price meal rates in Montana and their effects on grade-level measures of achievement from statewide data sets from 1996-1997. Specifically, the study used actual district size in Ohio and district enrollment in the grade under analysis in Montana, which had a multitude of district configurations. In each state, school districts were divided into two groups at the median for size. Howley's Ohio results indicated an overall interaction pattern in which lower poverty rates were associated with greater benefits from large district size. Smaller Ohio districts exhibited a weaker correlation between district level SES and aggregate student achievement at the ninth grade level. In Montana, he found the interaction effect was weak, but the main effect of district size had a direct negative effect on achievement.

Despite being somewhat poorer, Howley found that smaller Montana districts performed better than larger Montana districts.

Alspaugh and Gao (2003) examined elementary schools in looking for a link between SES and school size and their effects on achievement in Missouri. The researchers controlled for SES and found a general decline in achievement as the size of the school increased. The schools ranged in size from less than 200, 200-299, 300-399, 400-499, and 500 or more. The researchers also found that smaller schools tended to be in the older inner-city part of the district, and larger schools were found in the newer suburban parts of the district.

A study by Hansen, Rosen, and Gustafsson (2011) explored changes in between-school differences in reading achievement and the strength of the SES effect on reading in Swedish schools between 1991 and 2001. The researchers pointed out that their study went beyond looking at SES simply as a composite of parental education, occupation, and income and achievement as simply the average school marks or total test achievement. In lieu of this approach, they applied a multivariate 2-level analytical approach in the study. Such an approach, claimed the researchers, allowed them to investigate "the dimensionality of reading achievement and SES, determining the amount of achievement variance at individual and school levels, and identifying the major source of the reading achievement differences in terms of latent variables" (p. 208). Citing another advantage, the researchers stated their multivariate approach made it possible to study the effects of individual SES and collective SES simultaneously, and to separate the impact that different aspects of SES have on academic achievement. They reported no change in overall reading achievement variation, but they found an increase in between-

school differences in reading achievement between 1991 and 2001. They conceded the increase was relatively small and could just as well be attributed to chance.

SES and Parental Involvement

Some researchers have studied the effects of SES with other variables on students' performance, without connecting SES to school size. For example, some have studied SES with parental involvement. Stull's (2013) study used a nationally representative spring 2000 sample of students enrolled in kindergarten across the United States. Stull investigated how families' SES affected their expectations of students' educational achievements. Stull found the percentage of parents expecting their students to earn at least a Bachelor's degree rose with family SES. In fact, the percentage of high-SES parents of low-achieving students expecting their child to earn at least a Bachelor's degree is higher than that for low- and middle-SES parents of high-achieving students.

Another study examined how parents' expectations for their students affected the students' achievement (Ozturk & Singh, 2006). The researchers found a high positive correlation between the aspirations of students and the expectations of parents. One of the key questions in the study dealt with SES having a significant direct effect on mathematics courses taken after indirect effects were taken into account. According to Ozturk and Singh, their analysis found no direct effect of SES on mathematics course taking; however, its indirect effect of .14 was not to be totally dismissed. The researchers, therefore, concluded that this finding failed to support the claim that parents' SES plays a direct role in students' course placements. The findings also implied that there is no automatic privilege of being a student from a middle- or high-SES family; rather, parental involvement is critical in students taking advanced mathematics courses. The indirect

effect of .14 was subdivided into two components: .09 belonged to the indirect path from SES to educational aspirations of the student to mathematics course taking, and .05 belonged to the indirect path from SES to parental involvement to educational aspirations of the student to mathematics course taking. The genuine importance of parental involvement in education was found to be crucial, regardless of family SES. This can be seen given the fact that there was a significant relationship between parental involvement and student educational aspirations and the presence of a high correlation between the expectations of parents and the aspirations of students.

Szumski and Karwowski (2012) conducted a study dealing with parental involvement and SES. This Polish study examined whether mildly disabled students' school achievement and placement were associated with their families' SES and parents' engagement. According to the researchers, the study confirmed that mildly disabled students of parents with higher SES more frequently ended up in regular and inclusion-type schools than similar students of parents with lower SES, and those students of parents with higher SES more frequently receive the type of education that was considered better by the parents. Conversely, students of parents with lower SES were sent more often to special schools even when their parents planned otherwise. The researchers reported finding no significant relationship between SES and placement according to preferences, but they did find what they considered clear differences in parental status of students from special schools and their peers in integrated and regular schools.

Oxford and Lee's (2011) longitudinal study examined a model of early school achievement in reading and mathematics, as it varies by SES context, using data from the

National Institute of Child Health and Development Study of Early Child Care and Youth Development in 2011. The researchers used a single-group analysis and a multi-group analysis to test their model, which included features of family stress, early parenting, and school readiness. Oxford and Lee reported using latent profile analysis to identify subgroups of more advantaged and less advantaged families. They found that family stress and parenting were shown to operate differently depending on the SES context, whereas child-based school readiness characteristics were shown to operate similarly across demographic levels.

SES and Teachers in the Classroom

Other researchers have studied the effects of SES with other variables such as the positive effects teachers make in the classroom. McCoach and Colbert's (2010) research dealt with how teachers respond to their environment and their perceptions of their own competence. Because teacher competence is not strongly related to the SES of the school, the researchers believed it is more worthwhile to work on changing teacher competence rather than perceptions of their environment. Teachers can control increasing their competency and, therefore, their ability to effect the achievement of students from low-SES families.

The National Board for Professional Teaching Standards' (2011) Student Learning, Student Achievement Task Force set forth five core propositions, which it believed boosted the achievement of all students. The emphasis of these propositions would be particularly beneficial to students who come from low-SES families. The first proposition stated that teachers are committed to students and their learning. Wrapped up in this proposition are questions such as Who are they? Where are they now? What do

they need and in what order do they need it? Where should the teacher begin? Students from low-SES households often do not experience this type of attention in their homes. The second proposition stated that teachers knowledgeable of their subject matter and know how to teach the material to students. Under this proposition, teachers are encouraged to set high, worthwhile goals appropriate for these students at this time, in this setting. The third proposition stipulated that teachers were responsible for managing and monitoring student learning. They must design instruction designed to attain these goals. The fourth proposition stated that teachers must think systematically about their practice and learn from experience. In so doing, they evaluate student learning in light of the goals and instruction. The fifth and final proposition stated that teachers were members of learning communities. This involves reflecting on student learning, the effectiveness of the instructional design, and particular concerns and issues.

The Task Force (National Board for Professional Teaching Standards, 2011) also pointed out that although resources, approach, and materials were important, student understanding identifies effective teaching. The National Board for Professional Teaching Standards' approach also recognized that the achievement of students could take on multiple forms. For example, how much value did a teacher add to the life of a child? This outlook gauges what a teacher contributes to progress observed in students over time and is a noteworthy approach when educating economically disadvantaged students from low-SES conditions. The Task Force underscored the idea that traditional standardized measures assess schools based on the percentage of students who are proficient. This assumes that students in every school are the same at the beginning of the school year, even though students come to school with varying levels of readiness. A

value-added approach, believed the Task Force, provided better information about what schools contribute to student learning than snapshots of student achievement, which do not account for these external influences on student achievement.

Hagans and Good (2013) concentrated their study on students from low-SES backgrounds and their increased risk of reading problems and phonological awareness interventions. The researchers found a significant difference in the phonological awareness skills between low-SES students who received interventions in this area versus similar students who did not receive any such interventions. Although the gap in reading skills of students from the low-SES intervention group and the middle-high SES comparison group decreased, reading differences remained, according to the researchers. However, the role of the teachers decreasing the learning gaps was stressed.

SES and Other Variables Affecting Achievement

Some researchers have studied the effects of SES with several other variables in an attempt to improve students' performance in school such as summer reading interventions; delayed, early, and on-time kindergarten enrollment; and school and neighborhood contexts. First, Kim and Quinn (2012) conducted a meta-analysis, which provided evidence that summer reading interventions improved K-8 students' reading achievement, both in word reading and comprehension, regardless of school size. The researchers maintained the results indicated that studies with a majority of students from low-SES families yielded greater benefits on measures of reading comprehension compared to studies with socioeconomically mixed samples. Particularly, researchers found that school-based summer reading interventions generated significantly larger gains for studies with mostly low-SES students.

Second, Yesil Dagli and Jones (2012) studied the effect of delayed, early, and on-time kindergarten enrollment on students' kindergarten mathematics achievement. The researchers explored if the relationship between the kindergarten enrollment status and mathematics achievement varied by students' gender, race, and family SES. The findings of the study suggested that students with delayed enrollment in kindergarten had stronger mathematics skills compared to students with on-time enrollment in kindergarten, who had stronger skills compared to students with early enrollment. However, this pattern of relationship appeared to be different for students from lower SES background and students from racial minority groups by their gender. The data showed that approximately 6% of the students had their kindergarten enrollment delayed for a year or more. Greater percentages existed for male students, Caucasian students, and students from higher SES families in the delayed enrolled group. Yesil Dagli and Jones' findings also suggested that delayed enrolled students had stronger mathematics skills compared to the on-time enrolled students, who had stronger skills compared to the early-enrolled students. The researchers pointed out that the latter findings appeared to be a natural consequence because delayed enrolled students were mostly from the higher SES families. The study demonstrated that students from high SES, Caucasian families, in general, showed better performance compared to those who were from low SES, racial minority families. The researchers added that students' kindergarten enrollment status and SES interaction showed that delayed enrolled students had higher and early-enrolled students had lower mathematics skills compared to on-time enrolled students who were from the higher SES group and who were Caucasian. The mathematics achievements of students whose

enrollments were delayed, on-time, or early were similar for those from the lower SES families and for those who were African American.

In summary, Yesil Dagli and Jones' (2012) study revealed that the effects of SES were especially significant when compared to other factors' effects such as delayed, early, or on-time enrollment or race. The findings revealed that SES functioned differently for different races and gender when it interacted with the kindergarten enrollment status. The researchers concluded that the consequence of delaying the enrollment of students in kindergarten or enrolling early or on-time on students' mathematics skills must be considered within each child's demographic characteristics. Students' gender, race, and family SES are static variables that cannot be manipulated.

Third, Benson and Borman (2007) examined how family SES, school, and neighborhood contexts explained differences in students' achievement growth during kindergarten and first grade and the summer season between those years. The researchers acquired their data on student achievement, family background, and the school context from the Early Childhood Longitudinal Study-Kindergarten Cohort. They then linked information regarding neighborhood social context by merging data from Census 2000 with the Early Childhood Longitudinal Study-Kindergarten Cohort sample using students' home zip codes. Variation in reading and mathematics outcomes between the individual and organizational levels of analysis was divided by using 3-level growth models. Benson and Borman contended their findings provided strong evidence that differences in family SES were associated with reading and mathematics achievement gaps during the school year in both kindergarten and first grade for reading and in kindergarten for mathematics. The researchers reported that school year SES disparities were larger

compared to summertime disparities. They also stated that neighborhood social contexts influenced reading and mathematics achievement outcomes at the beginning of the school year and during the summer, and school social contexts were more relevant for reading than for mathematics achievement. The researchers concluded by suggesting that schools might not be able to close achievement gaps alone and that school and neighborhood social contexts exacerbated family-based learning inequalities in ways that resulted in a double disadvantage for many students from low-SES families and a double advantage for many students from high-SES families.

Conclusion

Although school size and SES have at least some bearing on the achievement of students, the question comes: to what degree do they influence achievement? The literature on the effects of school size is inconclusive at best. Many of the studies discussed in this literature review failed to reach any substantial conclusions about whether large or small schools were favorable for education. Repeatedly, the research found some good in each setting. Large and small school advocates still exist with each convinced of the correctness of its own position.

In discussing the role of SES in education, there was certainly more of a consensus. No piece of research disputed the potential negative effects that poverty can exact on young learners. Whether one focuses on literacy or mathematics, the research pointed to the importance of parental involvement, teachers, and school-based efforts to combat the negative effects that SES can have on the education of students. The research was clear on the point that students of all SES conditions benefited from parents who were active in the educational process. Although maintaining a focus on school size and

SES, researchers also investigated other factors that seemed to affect achievement such as gender, ethnicity, etc. These factors are also contributors alongside the variables addressed in this study. Not confined to the school, SES is an important factor in students' homes and neighborhoods. The research also indicated that there was at least some connection between these two variables.

CHAPTER III

METHODOLOGY

The review of literature presented conflicting evidence of how school size and SES affect the academic achievement of students. Exactly how much of an influence these variables have was inconclusive in the literature examined. School size and SES appear to interact with one another, at least to some degree. Some of the literature pointed in favor of large schools or were mixed in their findings. Bradley and Taylor (1998) studied the effects of school size on exam performance in the United Kingdom. Not unlike the situation in the United States, general dissatisfaction regarding educational performance and the adverse effects that school size was having on economic competitiveness prompted this study. Their findings revealed that school size in the United Kingdom was found to be non-linearly related to exam performance. Bickel et al. (2000) found that as school size increased, achievement test score costs such as test preparation programs and budgetary categories targeting low-SES students associated with having economically disadvantaged students in schools increased, as well.

The social aspect of school can weigh heavily on academic achievement. Tayli (2013) studied school size and bullying. According to his findings, mid-size schools revealed the fewest numbers of students identified as bullies and victims, and small schools were the worst in terms of bullying. Other studies noted benefits provided by smaller schools. Johnson (2006) defended smaller, rural schools and opposed the

consolidation movement in Iowa based on the perception that consolidation would enhance the achievement of students based on a greater variety of course offerings. Duke et al. (2009) contended that education's problems from low achievement to high dropout rates could be traced back to large schools, especially high schools. Jimerson's (2006) research came down squarely on the side of small schools when it came to student achievement and the overall benefit of binding communities together.

The research did appear, however, to be unified in identifying SES as a confounding variable and a challenge to the education of young people. Students who do not come from print-rich homes and who do not have the same experiences in the world as their wealthier peers might have a difficult time succeeding in school no matter the size of the school (Gassama, 2012). Students coming to school without their basic needs of food, clothing, and shelter met are not prepared to learn and grow. They also have a difficult time remaining motivated and engaged (White, 2012). In addition, low-SES students can suffer unwittingly due to the perceptions of others around them. For instance, some teachers might hold lower expectations for low-SES students because of their lack of opportunities (Speybroeck et al., 2012). Other variables associated with school size and SES were gender and race. In addition, teacher and family expectations played significant roles in how these variables effect student achievement. From the school size and SES variables, the researcher generated the following hypotheses.

1. No significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on literacy achievement measured by the End of Course literacy test for 11th grade students in two large and two small Arkansas high schools.

2. No significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on mathematics achievement measured by the End of Course geometry test for 9th and 10th grade students in two large and two small Arkansas high schools.
3. No significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on literacy achievement measured by the ACT for 12th grade students in two large and two small Arkansas high schools.
4. No significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on mathematics achievement measured by the ACT for 12th grade students in two large and two small Arkansas high schools.

The six goals of this chapter were to (a) explain the research design of this study, (b) describe the subject and explain the sample selection process, (c) identify and describe the instrumentation, (d) explain the data collection process, (e) provide a justification for the analytical methods used, and (f) note any limitations of this study.

Research Design

This quantitative research study employed a causal-comparative, nonexperimental design using 9th through 12th grade students in four school districts in northwest Arkansas who took End of Course and ACT exams in 2012 and attended either 6A/7A high schools or 3A/4A high schools. Because the assessments were already employed in the school and because no manipulation of the main independent variables was possible, the researcher adopted the causal-comparative approach for this study (Johnson &

Christensen, 2012). Each of the four hypotheses used a 2 x 2 factorial between-groups design. The independent variables for all the hypotheses were school size (6A/7A versus 3A/4A) and SES (comparison schools differing at least 20 percentage points in free and reduced lunch percentages). The dependent variables for the first two hypotheses were literacy and mathematics achievement measured by End-of-Course exams in literacy and geometry, respectively. The dependent variables for the last two hypotheses were student achievement in reading and mathematics measured by the ACT exam for 12th graders, respectively.

Sample

The study used 9th, 10th, 11th, and 12th grade students in four northwestern Arkansas high schools. Two of the high schools chosen were large 6A/7A schools. School A was a higher-SES high school with a free and reduced lunch percentage of 39%, and School B was a lower-SES high school with a free and reduced lunch percentage of 59%. The two other high schools used in this study were small 3A/4A schools. School C was a higher-SES high school with a free and reduced lunch percentage of 40%, and School D was a lower-SES high school with a free and reduced lunch percentage of 65%. All of these schools were located in the northwestern part of Arkansas and had largely White student populations with roughly equal numbers of males and females. Students from the four high schools in a Northwest Arkansas school district were identified to participate in this study. The 2011–2012 demographics of the districts as a whole were 50.75% free and reduced lunch status. There were approximately 92% White, 7% Black, and 8.5% Hispanic. Students with disabilities made up approximately 10% of the total population of approximately 19,000.

Instrumentation

In the Spring of 2012, the students took the ACT in mathematics and reading and End-of-Course exams in geometry and literacy. The ACT college readiness assessment is a curriculum- and standards-based educational and career planning tool that assesses students' academic readiness for college (ACT, 2013). The national college admissions examination consists of subject area tests in English, mathematics, reading, and science. For the purposes of this study, mathematics and reading scores were used. The ACT mathematics test is a 60-question, 60-minute test designed to measure the mathematical skills students have typically acquired in courses taken by the end of 11th grade. The test presents multiple-choice questions that require the use of reasoning skills to solve practical problems in mathematics. The breakdown of the mathematics test is as follows: 23% pre-algebra, 17% elementary algebra, 15% intermediate algebra, 15% coordinate geometry, 23% plane geometry, and 7% trigonometry. The reading test is a 40-question, 35-minute test that measures student's reading comprehension. Students are asked to read several passages and answer questions that show their understanding of what is directly stated and statements with implied meanings. The reading test breaks down as follows: 25% social studies, 25% natural sciences, 25% prose fiction, and 25% humanities.

The Arkansas Comprehensive Testing, Assessment, and Accountability Program includes a mid-year and spring geometry End-of-Course and Grade 11 literacy exam. The exams consist of multiple-choice and open-response questions that directly assess student knowledge. Only the multiple-choice part of the exams was used. The Grade 11 literacy exam includes items that are aligned to the Arkansas English Language Arts Curriculum Framework. The Arkansas Geometry Mathematics Curriculum Framework is the basis

for the development of the Geometry End-of-Course Examination. The Arkansas Department of Education has contracted with Questar Assessment, Inc. for the development, production, distribution, and collection of the Geometry End-of-Course Examination materials (Arkansas Department of Education, 2012).

Data Collection Procedures

After Institutional Review Board approval, the researcher physically obtained existing data from the district offices of the schools in this study. These data included school location, graded level, and free/reduced lunch status for the 9th through 12th grade students who took an End of Course or ACT exam in 2012. Names were replaced with numbers in order to maintain confidentiality. The Arkansas Department of Education Data Center (2014) emailed data from each district to the researcher; the data included the End of Course Geometry and Literacy exam scores and the ACT reading and mathematics data files. Excel spreadsheets were created for the data collected, and the samples were randomly drawn from each stratified grouping for equal-sized samples.

Analytical Methods

IBM Statistical Packages for the Social Sciences Version 21 was used for data analysis. Data collected for the hypotheses were coded according to school location and classification, grade, and free/reduced lunch status. The four hypotheses were analyzed using the following statistical analysis. A pre-analysis of the data was limited to verifying the number of participants by grade level, school classification, and free/reduced lunch status to ensure the correct number for sampling. A second analysis was conducted to check for outliers. Additionally, homogeneity of variances was checked using the Levene's statistic. To address the first hypothesis, a 2 x 2 factorial ANOVA was

conducted using school size and SES as the independent variables. Student literacy achievement as measured by student scores on the End of Course Grade 11 literacy exam served as the dependent variable. To address the second hypothesis, a 2 x 2 factorial ANOVA was conducted using school size and SES as the independent variables. Student mathematics achievement as measured by student scores on the End of Course geometry test for 9th and 10th grade students served as the dependent variable. To address the third hypothesis, a 2 x 2 factorial ANOVA was conducted using school size and SES as the independent variables. Student literacy achievement as measured by student scores on the ACT for 12th grade students served as the dependent variable. To address the fourth hypothesis, a 2 x 2 factorial ANOVA was conducted using school size and SES as the independent variables. Student mathematics achievement as measured by student scores on the ACT for 12th grade students served as the dependent variable. To test the null hypotheses, the researcher used a two-tailed test with a .05 level of significance.

Limitations

In most research studies, limitations need to be noted to help the reader determine how to interpret the results of the studies. The following limitations were associated with this study. First, this study was a causal comparative study and not experimental. This research design, therefore, was a limitation in itself. The researcher was unable to manipulate the independent variables or randomly assign participants, which produced less conclusive evidence. However, this and the other limitations did not seem to exceed the typical circumstances encountered in using schools for research purposes.

Second, this study was conducted with a limited number of participants in only four school districts in northwest Arkansas in Grades 9-12; thus, the research was

confined to students of those grade levels in those four school districts. The quantitative procedures, therefore, were limited and provided generalizations that are somewhat restricted in nature and cannot be applied to all schools and situations.

Third, testing may have affected internal validity. All of these students had previously taken standardized tests such as ACTAAP each year and may have recognized certain items or types of items on the tests even though formatting might have changed from year to year. However, with one full calendar year between the tests, this was not seen as a major limitation.

Fourth, the researcher had some difficulty finding larger differences in SES with certain school sizes. This particularly proved to be true when attempting to locate a 3A/4A high school with a lower free and reduced lunch percentage. Smaller schools tended to be found in rural, low-SES environments.

Regardless of the limitations, however, the researcher proposes that the results of this study might be used to inform decisions regarding the issues of school size and SES and how they affect the achievement of students. Providing quality instruction for all students in all types of schools is a goal for school systems across Arkansas. Results might also prove beneficial to schools and districts throughout Arkansas with demographics similar to the 6A/7A schools or the 3A/4A schools as they continue to grapple with meeting the demands of federal accountability to improve student learning for students of all income levels in schools of all sizes.

CHAPTER IV

RESULTS

The purpose of this quantitative study was fourfold. The first purpose was to determine the effects size of school and SES had on literacy achievement of 11th graders in four high schools in the state of Arkansas based on performance on the 11th Grade EOC Literacy Examination. The second purpose was to determine the effects size of school and SES had on mathematics achievement of 9th and 10th grade students in four high schools in the state of Arkansas based on performance on the EOC Geometry Examination. The third purpose was to determine the effects size of school and SES had on reading achievement of 12th grade students in four high schools in the state of Arkansas based on performance on the reading portion of the ACT. The fourth purpose was to determine the effects size of school and SES had on mathematics achievement of 12th grade students in four high schools in the state of Arkansas based on performance on the mathematics portion of the ACT. The independent variables were size of school and SES. The dependent variables were literacy and mathematics achievement as measured by scale scores from the 2012 Eleventh Grade Arkansas EOC literacy examination, the 2012 9th and 10th Grade Arkansas EOC geometry examination, and the reading and mathematics sections of the 2012 ACT. Using SPSS, a factorial ANOVA was run to look at each of the four null hypotheses. Prior to running the statistical analysis, assumptions of normality and homogeneity of variances, independence of groupings, and outliers were

checked. In addition, descriptive statistics were used to examine the research question. The results of this analysis are found in this chapter.

Demographics

For this study, four high schools from four districts in Western and Northwestern Arkansas were used. Each school consisted of grade configurations that included Grades 9-12, with enrollment ranging from 602 to 1,824 students. The student free and reduced lunch status ranged from 39% to 65% across the four high schools. Of the two 6A/7A high schools used in this study, School A was a higher-SES high school with a free and reduced lunch percentage of 39%, and School B was a lower-SES high school with a free and reduced lunch percentage of 59%. The two other high schools used in this study were small 3A/4A schools. School C was a higher-SES high school with a free and reduced lunch percentage of 40%, and School D was a lower-SES high school with a free and reduced lunch percentage of 65%. Their adequate yearly progress status ranged from achieving standards to needs improvement. All of their classes consisted of heterogeneous grouping of students.

Hypothesis 1

Hypothesis 1 stated that no significant difference will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on literacy achievement measured by the End of Course literacy test for 11th grade students in two large and two small Arkansas high schools. The population from which this sample was drawn was normally distributed. Kurtosis fell between 1.1 and -1.0. A Shapiro-Wilk test was used to test for normality with $p > .05$ for each group, indicating that the data was normally distributed across all groups. No participant contributed scores to more than one group.

Data for sample groups were normally distributed. Table 1 shows the group means and standard deviations.

Table 1

Descriptive Statistics from 11th Grade 2012 Arkansas End of Course Literacy Examination Scale Scores

	SES							
	Participant			Non-participant			Total	
School Size	*N*	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*
6A/7A	40	204.73	20.55	40	216.38	22.08	210.55	21.99
3A/4A	40	201.03	23.71	40	211.93	24.91	206.48	24.78
Total	80	202.88	22.12	80	214.15	23.49	208.51	23.44

Levene's test of equality of variances was conducted within ANOVA and indicated that the assumption of variances had not been violated. Levene's test was not significant, $F(3, 156) = 0.23$, $p = .881$. There were no outliers. To test this hypothesis, a 2 x 2 factorial ANOVA was conducted to evaluate the effects of size of school and SES on literacy achievement as measured by the 2012 Arkansas End of Course Literacy Examination. The results of the ANOVA are displayed in Table 2.

Table 2

Factorial ANOVA Results from 2012 Arkansas End of Course Literacy Examination Scale Scores

Source	*SS*	*df*	*MS*	*F*	*p*	*ES*
School Size	664.23	1	664.23	1.27	.262	0.01
SES	5085.03	1	5085.03	9.72	.002	0.06
Size*SES	5.63	1	5.63	0.01	.918	0.00
Error	81601.10	156	523.08			

Insufficient evidence existed based on the interaction of the variables to reject the null hypothesis, $F(1, 156) = 0.01$, $p = .918$, $ES = 0.00$. Given there was no significant interaction between the variables of size of school and SES, the main effect of each variable was examined separately. The main effect for size of school was not significant, $F(1, 156) = 1.27$, $p = .262$, $ES = 0.01$. The main effect for SES was significant and had a medium effect size, $F(1, 156) = 9.72$, $p = .002$, $ES = 0.06$ (see Figure 1).

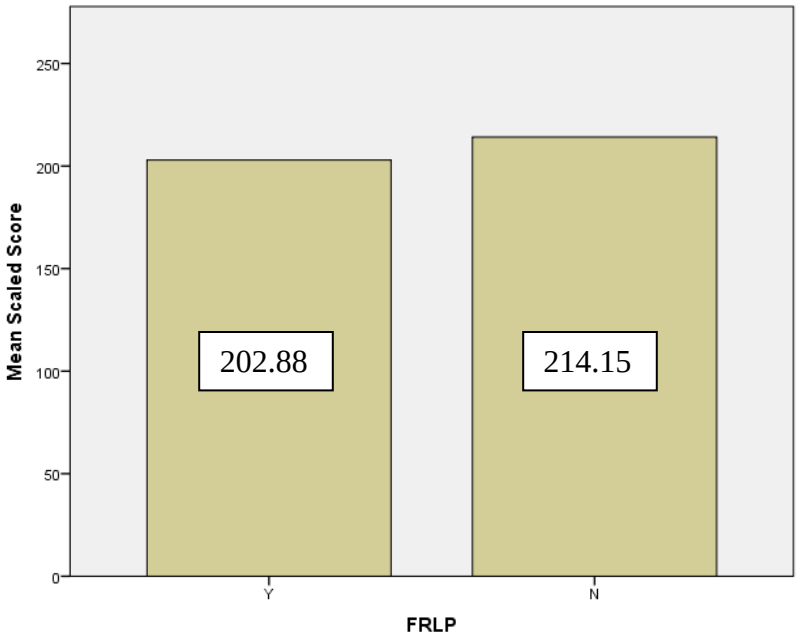

Figure 1. Mean EOC literacy achievement for SES main effect.

Evidence was found to reject the null hypothesis for the main effect of SES. Free/reduced lunch participants in 6A/7A schools scored about 12 points lower than did non-participants and about 10 points lower in 3A/4A schools. Students from high-SES families outperformed students from low-SES families by roughly the same margin in large and small schools on the EOC Literacy test.

Hypothesis 2

Hypothesis 2 stated that no significant difference will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on mathematics achievement measured by the End of Course geometry test for 9th and 10th grade students in two large and two small Arkansas high schools. Kurtosis fell between 1.0 and -1.0. A Shapiro-Wilk test was used to test for normality with $p > .05$ for two of the groups, indicating that the data was normally distributed across these groups. For the 3A/4A schools and the free/reduced lunch participants, the Shapiro-Wilk indicated that

the data was not normally distributed. No participant contributed scores to more than one group. Table 3 shows the group means and standard deviations.

Table 3

Descriptive Statistics from 9th-10th Grade 2012 Arkansas End of Course Geometry Examination Scale Scores

	SES							
	Participant			Non-participant			Total	
School Size	*N*	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*
6A/7A	40	206.10	38.65	40	247.58	33.18	226.84	41.43
3A/4A	40	206.48	38.43	40	236.68	38.42	221.58	41.09
Total	80	206.29	38.29	80	242.13	36.09	224.21	41.22

Levene's test of equality of variances was conducted within ANOVA and indicated that the assumption of variances has not been violated. Levene's test was not significant, $F(3, 156) = 0.58$, $p = .632$. There were no outliers. To test this hypothesis, a 2 x 2 factorial ANOVA was conducted to evaluate the effects of size of school and SES on mathematics achievement as measured by the 2012 Arkansas End of Course geometry examination scale scores. The results of the ANOVA are displayed in Table 4.

Table 4

Factorial ANOVA Results from 2012 Arkansas End of Course Geometry Examination Scale Scores

Source	*SS*	*df*	*MS*	*F*	*p*	*ES*
School Size	1107.76	1	1107.76	0.80	.373	0.01
SES	51373.06	1	51373.06	37.04	.000	0.19
Size*SES	1271.26	1	1271.26	0.92	.340	0.01
Error	216342.13	156	1386.81			

Insufficient evidence existed based on the interaction of the variables to reject the null hypothesis, $F(1, 159) = 0.92$, $p = .340$, $ES = 0.01$. Given there was no significant interaction between the variables of size of school and SES, the main effect of each variable was examined separately. The main effect for size of school was not significant, $F(1, 156) = 0.80$, $p = .373$, $ES = 0.01$. The main effect for SES was significant and had a large effect size, $F(1, 156) = 37.04$, $p = .000$, $ES = 0.19$ (see Figure 2).

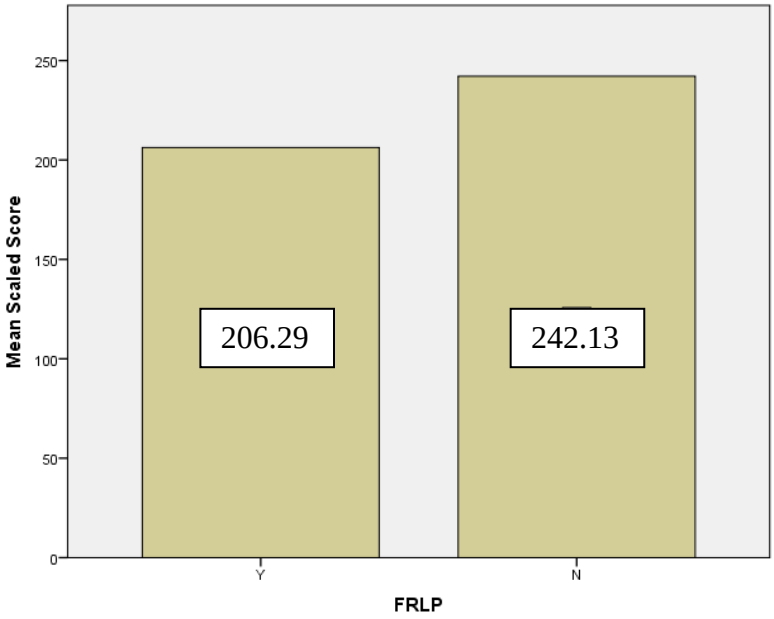

Figure 2. Mean EOC Geometry achievement for SES main effect.

Evidence was found to reject the null hypothesis for the main effect of SES. Free/reduced lunch participants in 6A/7A and 3A/4A schools scored about 31 points lower compared to non-participants. Students from high-SES families outperformed students from low-SES families by roughly the same margin in large and small schools on the EOC Geometry test.

Hypothesis 3

Hypothesis 3 stated that no significant difference will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on reading achievement measured by the ACT for 12th grade students in two large and two small Arkansas high schools. The population from which this sample was drawn was normally distributed. Kurtosis fell between 1.0 and -1.0. A Shapiro-Wilk test was used to test for normality with $p > .05$ for each group, indicating that the data was normally distributed across all

groups. No participant contributed scores to more than one group. Data for sample groups were normally distributed. Table 5 shows the group means and standard deviations.

Table 5

Descriptive Statistics from 12th Grade 2012 ACT Reading Scale Scores

	SES							
	Participant			Non-participant			Total	
School Size	*N*	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*
6A/7A	40	20.40	5.38	40	23.25	5.11	21.83	5.41
3A/4A	40	20.48	5.91	40	23.65	6.05	22.06	6.15
Total	80	20.44	5.61	80	23.45	5.57	21.94	5.77

Levene's test of equality of variances was conducted within ANOVA and indicated that the assumption of variances had not been violated. Levene's test was not significant, $F(3, 156) = 0.41$, $p = .745$. There were no outliers. To test this hypothesis, a 2 x 2 factorial ANOVA was conducted to evaluate the effects of size of school and SES on reading achievement as measured by the 12th grade 2012 ACT reading examination. The results of the ANOVA are displayed in Table 6.

Table 6

Factorial ANOVA Results from 12th Grade 2012 ACT Reading Scale Scores

Source	*SS*	*df*	*MS*	*F*	*p*	*ES*
School Size	2.23	1	2.23	0.07	.790	0.00
SES	363.01	1	363.01	11.48	.001	0.07
Size*SES	1.06	1	1.06	0.03	.855	0.00
Error	4932.18	156	31.62			

Insufficient evidence existed based on the interaction of the variables to reject the null hypothesis, $F(1, 156) = 0.03$, $p = .855$, $ES = 0.00$. Given there was no significant interaction between the variables of size of school and SES, the main effect of each variable was examined separately. The main effect for size of school was not significant, $F(1, 156) = 0.07$, $p = .790$, $ES = 0.00$. The main effect for SES was significant and had a medium effect size, $F(1, 156) = 11.48$, $p = .001$, $ES = 0.07$ (see Figure 3).

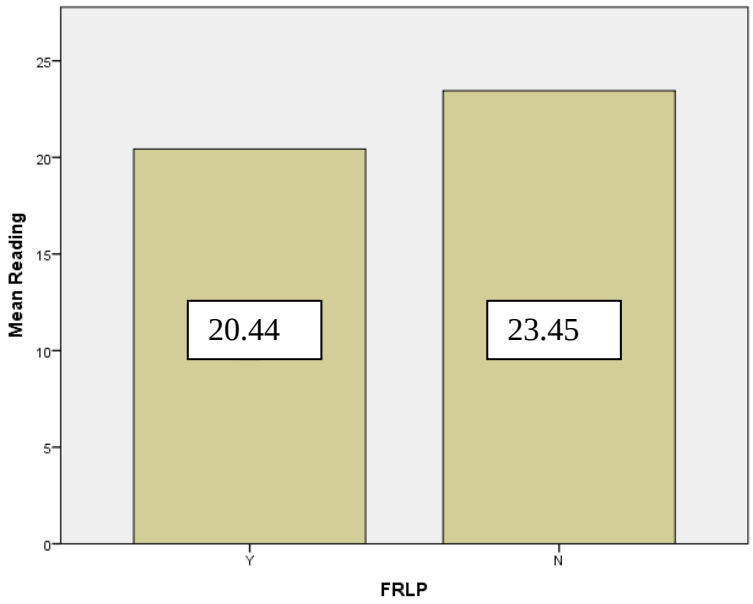

Figure 3. Mean ACT Reading achievement for SES main effect.

Evidence was found to reject the null hypothesis for the main effect of SES. Free/reduced lunch participants in 6A/7A and 3A/4A schools scored about 3 points lower compared to non-participants. Students from high-SES families outperformed students from low-SES families by roughly the same margin in large and small schools on the reading portion of the ACT.

Hypothesis 4

Hypothesis 4 stated that no significant difference will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on mathematics achievement measured by the ACT for 12th grade students in two large and two small Arkansas high schools. The population from which this sample was drawn was normally distributed. Kurtosis fell between 1.0 and -1.0. A Shapiro-Wilk test was used to test for normality with $p < .05$ for each group. This was due in part to the test's sensitivity to

larger groups. No participant contributed scores to more than one group. Table 7 shows the group means and standard deviations.

Table 7

Descriptive Statistics from 12th Grade 2012 ACT Mathematics Scale Scores

	SES							
	Participant			Non-participant			Total	
Size of School	*N*	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*
6A/7A	40	19.30	3.47	40	21.78	4.77	20.54	4.33
3A/4A	40	19.38	4.09	40	22.88	4.27	21.13	4.51
Total	80	19.34	3.77	80	22.33	4.53	20.83	4.42

Levene's test of equality of variances was conducted within ANOVA and indicated that the assumption of variances had not been violated. Levene's test was not significant, $F(3, 156) = 2.30$, $p = .08$. There were no outliers. To test this hypothesis, a 2 x 2 factorial ANOVA was conducted to evaluate the effects of size of school and SES on mathematics achievement as measured by the 12th grade 2012 ACT reading examination. The results of the ANOVA are displayed in Table 8.

Table 8

Factorial ANOVA Results from 12th Grade 2012 ACT Mathematics Scale Scores

Source	*SS*	*df*	*MS*	*F*	*p*	*ES*
School Size	13.81	1	13.81	0.79	.375	0.01
SES	357.01	1	357.01	20.45	.000	0.12
Size*SES	10.51	1	10.51	0.60	.439	0.00
Error		156				

Insufficient evidence existed based on the interaction of the variables to reject the null hypothesis, $F(1, 156) = 0.60$, $p = .439$, $ES = 0.00$. Given there was no significant interaction between the variables of race and gender, the main effect of each variable was examined separately. The main effect for size of school was not significant, $F(1, 156) = 0.79$, $p = .375$, $ES = 0.01$. The main effect for SES was significant and had a medium effect size, $F(1, 156) = 20.45$, $p = .000$, $ES = 0.12$ (see Figure 4).

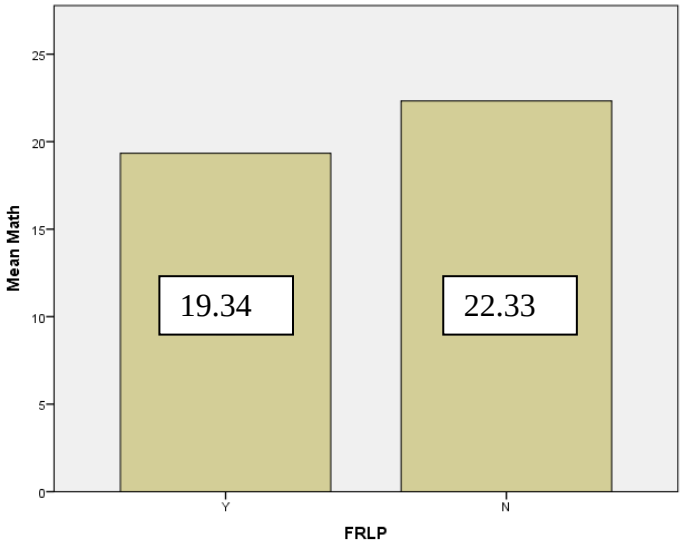

Figure 4. Mean ACT Mathematics achievement for SES main effect.

Evidence was found to reject the null hypothesis for the main effect of SES. Free/reduced lunch participants in 6A/7A schools scored about 2.5 points lower compared to non-participants and about 3 points lower in 3A/4A schools. Students from high-SES families outperformed students from low-SES families by roughly the same margin in large and small schools on the mathematics portion of the ACT.

Summary

The purpose of this study was to determine the effects of size of school and SES on literacy and mathematics achievement for high school students. Of the four hypotheses, none displayed a significant interaction between school size and SES. In addition, of the four hypotheses, none was significant on the main effect of school size. However, all four hypotheses were statistically significant on the main effect of SES; three had medium effect sizes and one had a large effect size.

CHAPTER V

DISCUSSION

Petty, Wang, and Harbaugh (2013) explored the potential impacts of school size and SES in their examination of Algebra II students in North Carolina. In their findings, the researchers noted that the main effect of lunch status was statistically significant between students with full-price lunch, reduced-price lunch, and free lunch status. They argued that the effects of poverty could be a hindrance to students' learning and achievement in school. Poverty is something that students bring to school with them, and educators must help these students to find ways to overcome it. However, the researchers did not include school size in their study because they determined that adding this variable would not make a significant difference.

There are passionate defenders of large and small schools. However, most research has not drawn a definitive conclusion as to which is more beneficial to students and their achievement. Some think that smaller schools are more effective in low-SES settings. Palardy (2013) used data from the Education Longitudinal Study of 2002 and examined the association between high school socioeconomic segregation and student achievement outcomes and factors that can mediate those relationships. Interestingly, the focus of the study seemed to be on school size, but the results led the researcher to recognize the importance of SES. Palardy asserted that results showed socioeconomic segregation has a strong association with high school graduation and college enrollment.

Additionally, the researcher found that students who attended high-SES high schools were 68% more likely to enroll at a 4-year college than students who attended a low-SES school. Palardy used the SES influences on peers and school effects and found that the association between SES and achievement was due more to peer influences, which tended to be negative in the low-SES setting. However, Palardy also argued that school practices, which emphasized academics, also played a major role in improving the relationship between SES and 4-year college enrollment. The researcher believed that integrating schools in terms of SES is likely necessary to address the negative consequences of attending a low-SES school. The researcher appeared to begin the study with the notion that smaller school size could improve the prospects of low-SES students. However, by the end of the research, Palardy focused more attention on the negative effects of low-SES situations and the need for such students to have strong role models and peers from a variety of SES backgrounds.

Conclusions

To address the four hypotheses, the following statistical analyses were used. Hypothesis 1 was analyzed by a 2 x 2 factorial ANOVA with size of school and SES as the between subjects independent variables with 11th grade literacy achievement measured by the 11th grade literacy EOC examination as the dependent variable. Hypothesis 2 was analyzed in the same manner as the first with mathematics achievement of 9th and 10th graders on the EOC geometry examination as the dependent variable. Hypothesis 3 was analyzed in the same manner as the first two with literacy achievement of 12th graders measured by the reading portion of the ACT acting as the dependent variable. Finally, Hypothesis 4 was analyzed in the same manner with mathematics

achievement of 12th graders measured by the mathematics portion of the ACT as the dependent variable. To test the null hypotheses, the researcher used a two-tailed test with a .05 level of significance. Interaction and main effects were examined in each of the hypotheses. The following hypotheses were tested and used to determine conclusions.

Hypothesis 1

Hypothesis 1 stated that no significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on literacy achievement measured by the EOC literacy test for 11th grade students in two large and two small Arkansas high schools. In analyzing the data, no significant interaction was found between the variables of type of size of school and SES. Together, size of school and SES did not combine to affect how individuals scored on the 2012 11th grade EOC literacy test. Based on these results, there was not enough evidence to reject the null hypothesis for the interaction effect. For the main effect of size of school, evidence was not substantial enough to reject the null hypothesis. In analyzing the means, the scores of the 11th students from 6A/7A schools were only about four points higher compared to the 11th grade students from 3A/4A schools. In contrast, evidence was found to reject the null hypothesis for the main effect of SES, with a medium effect size. On average, free/reduced lunch participants in 6A/7A schools scored about 12 points lower than did non-participants. This number was about 10 points in 3A/4A schools. Students from high-SES families outperformed students from low-SES families by roughly the same margin in large and small schools on the EOC literacy test.

Hypothesis 2

Hypothesis 2 stated that no significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on mathematics achievement measured by the EOC geometry test for 9th and 10th grade students in two large and two small Arkansas high schools. In analyzing the data, no significant interaction was found between the variables of type of size of school and SES. Together, size of school and SES did not combine to affect how individuals scored on the 2012 EOC geometry test. Based on these results, there was not enough evidence to reject the null hypothesis for the interaction effect. For the main effect of size of school, evidence was not substantial enough to reject the null hypothesis. However, in analyzing the means for school size, the scores of the 9th and 10th grade students participating in the free/reduced lunch program from 6A/7A schools were virtually identical to 9th and 10th grade students from 3A/4A schools, but non-participants in the program in 6A/7A schools scored roughly 11 points ahead of non-participants in 3A/4A. Among non-participants, size of school did appear to have some effect but not enough to make a significant difference. In contrast, evidence was found to reject the null hypothesis for the main effect of SES, with a large effect size. On average, free/reduced lunch participants in 6A/7A and 3A/4A schools scored about 31 points lower than did non-participants. Students from high-SES families outperformed students from low-SES families by roughly the same margin in large and small schools on the EOC geometry test.

Hypothesis 3

Hypothesis 3 stated that no significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on literacy achievement

measured by the ACT for 12th grade students in two large and two small Arkansas high schools. In analyzing the data, no significant interaction was found between size of school and SES. Together, size of school and SES did not combine to affect how individuals scored on the reading portion of 2012 ACT. Based on these results, there was not enough evidence to reject the null hypothesis for the interaction effect. For the main effect of size of school, evidence was not substantial enough to reject the null hypothesis. In analyzing the means, the scores of the 12th grade students from 6A/7A schools were virtually identical to the scores of the 12th grade students from 3A/4A schools, participants and non-participants alike. In contrast, evidence was found to reject the null hypothesis for the main effect of SES, with a medium effect size. On average, free/reduced lunch participants in 6A/7A and 3A/4A schools scored about three points lower than did non-participants. Students from high-SES families outperformed students from low-SES families by roughly the same margin in large and small schools on the reading portion of the ACT.

Hypothesis 4

Hypothesis 4 stated that no significant differences will exist by SES of students attending larger 6A/7A schools versus smaller 3A/4A schools on mathematics achievement measured by the ACT for 12th grade students in two large and two small Arkansas high schools. In analyzing the data, no significant interaction was found between size of school and SES. Together, size of school and SES did not combine to affect how individuals scored on the mathematics portion of 2012 ACT. Based on these results, there was not enough evidence to reject the null hypothesis for the interaction effect. For the main effect of size of school, evidence was not substantial enough to reject

the null hypothesis. In analyzing the means, the scores of 12th grade free/reduced lunch participants from 6A/7A schools were virtually identical to the scores of the 12th grade free/reduced lunch participants from 3A/4A schools. Regarding non-participants, students from 6A/7A schools scored just over one point better than did their counterparts from 3A/4A schools. In contrast, evidence was found to reject the null hypothesis for the main effect of SES, with a medium effect size. On average, free/reduced lunch participants in 6A/7A scored about two and a half points lower than did non-participants. In 3A/4A, students participating in free/reduced lunch scored about three points lower than non-participants. Students from high-SES families outperformed students from low-SES families by roughly the same margin in large and small schools on the mathematics portion of the ACT.

In summary, for all four hypotheses, no significant interaction effect existed. In addition, the main effect for size of school was not found to be significant for any of the four hypotheses involving students in 9th through 12th grade, regardless of the dependent variable. However, the results for Hypothesis 2, which dealt with the results for EOC geometry, were somewhat less conclusive though still not significant. In analyzing the means, the scores of the 9th and 10th grade students participating in the free/reduced lunch program from 6A/7A schools were virtually identical to 9th and 10th grade students from 3A/4A schools, but the non-participants in 6A/7A schools scored roughly 11 points ahead of non-participants in 3A/4A. Among non-participants, size of school did appear to make some impact but not enough to make a significant difference.

By contrast, the main effects for SES were statistically significant for all four hypotheses; three results had medium effect sizes, and one had a large effect size.

Whether it was 9th and 10th grade students taking the EOC geometry test, 11th grade students taking the EOC literacy test, or 12th grade students taking the reading or mathematics portion of the ACT, SES proved to be a significant factor whether the students attended a 6A/7A high school or a 3A/4A high school. Overall, students from high-SES families outperformed students from low-SES families in literacy and mathematics.

Implications

The interpretation of these results requires a comparison to the larger context of the review of related literature. When comparing large and small schools, most studies found no significant difference in their results. It was equally common to find a significant difference result when examining the effects of SES. Generally, students coming from higher-SES environments tended to outperform peers who come from underprivileged backgrounds. Although there might be some discrepancies here or there, it is difficult if not impossible to issue a blanket statement regarding the ability of size of school to mitigate the effects of SES. Regardless of the size of school, other factors such as teacher quality, peer interactions, parents' education and involvement, etc. inevitably play a role in how well a student does academically in school. In this study, SES, measured by free/reduced lunch, significantly affected students' performance. Students who did not participate in the reduced price lunches outperformed participants in the lunch program taking the 11th grade EOC literacy test, the 9th and 10th grade EOC geometry test, the reading portion of the ACT, and the mathematics portion of the ACT. However, the differences between school size, defined as 6A/7A and 3A/4A schools, were not significant. Only the results for the EOC geometry test displayed a noticeable

difference in performance regarding size of school. However, even this difference in performance did not rise to the level of significance.

Some research by Diaz (2008) indicated that recent national investigations continue to yield results that support the influence of school/district size, funding equity, and SES of students on student achievement. The researcher cited findings that indicated size was negatively associated with achievement among 6th through 10th grade for all students including economically disadvantaged students and English learners. Further, ANOVA results revealed advantaged and disadvantaged students' achievement increased in smaller school settings. Other aspects of the research on school size, however, were predictably mixed. Diaz commented on a meta-analysis that reviewed the literature on SES and academic achievement in journal articles published between 1990 and 2000. Diaz asserted the results indicated a medium to strong SES-achievement relationship and added that the strength of the relationship was also contingent upon school level, minority status, and the school's location. In other words, size alone was not deemed the sole difference in terms of achievement. Diaz pointed to other variables in the research that seemed to affect student outcomes such as school system size, ethnic composition, district financial resources, and parental income levels.

In his study of student achievement in New Jersey, Gemellaro (2013) believed SES to be important enough to add to the study even though New Jersey did not include that variable in its state report card. In conducting research on language arts and mathematics achievement in New Jersey, the researcher examined the effects of SES along with attendance rate, instructional minutes, teacher quality, and student-faculty ratio. The researcher found that SES was a statistically significant variable. In fact,

Gemellaro found that SES was the greatest predictive variable for both language arts and mathematics achievement among New Jersey students and asserted that such knowledge should be the basis of any education reform. Gemellaro went even further regarding his findings by stating the following.

> Policymakers who would like to believe that external mandates such as better qualified teachers, merit pay, charter schools, performance pay, smaller schools, vouchers, etc. are stronger predictors of achievement must revisit the research. The difference in test scores between SES groups is due to SES itself. Mandates targeted at poverty itself will likely have more of an influence on achievement than any other variable(s). (p. 24)

The researcher acknowledged that SES is not a factor that will simply go away on its own. In so doing, the researcher pointed to some historic Supreme Court decisions, which have dealt with not only SES, but were also tinged with racial concerns. Gemellaro first discussed the importance of school resources in education by mentioning the separate but equal decision of *Plessy v. Ferguson* in 1896. The researcher also added the desegregation of Trenton, New Jersey public schools in *Hedgepeth-Williams v. Board of Education, Trenton, NJ* in 1944; the overturning of separate but equal in *Brown v. Board of Education, Topeka* in 1954; and the 1990 *Abbott v. Burke* decision that struck down an unconstitutional school funding formula. Related to the importance of resources, the researcher also called for affordable housing as a vehicle to improve the conditions of low-SES families and their students.

Abbott, Joireman, and Stroh (2002) reported stable findings regarding the effects of SES and mixed findings for size of school on student achievement. This study was a

replication of the method used by Bickel et al. (2000), applying the approach to Washington state academic performance of fourth and seventh graders. Although Bickel et al. focused on the 8th grade Iowa Test of Basic Skills and the 11th grade Georgia High School Graduate Test, the study by Abbott et al. (2002) examined performance on the Washington Assessment of Student Learning. The researchers used hierarchical linear modeling to attempt to specify the joint relationships and cross-level interactions of district and school structural levels on academic performance. The researchers obtained their data from the Washington State Office of the Superintendent of Public Instruction and consisted of all fourth and seventh grade Washington Assessment of Student Learning scale scores in reading and mathematics. They reported findings showing that large school district size was detrimental to student achievement in fourth and seventh grades in Washington because it strengthened the negative relationship between school poverty and student achievement. This finding was similar to that of Bickel et al. (2000). However, the findings regarding size of school were not consistent all throughout their study. District affluence in the Abbott et al. (2002) study did not have a significant impact on the school size-student achievement relationship. The nature and configuration of Washington schools and the nature of the Washington Assessment of Student Learning might explain the discrepancy between the two studies. The researchers conceded that districts in Washington tended to be small, poor, single-school districts that were often rural. The Washington Assessment of Student Learning and the Iowa Test of Basic Skills have different correlations with school poverty, especially in mathematics. The researchers concluded by issuing a very familiar sentiment when equating size of school to achievement: "Multilevel findings of this study argue against the simplistic conclusion

that reducing school or district size will automatically improve student achievement or result in more educational equity" (p. 16). Thus, school size could not be the one and only factor that determines student achievement.

Zoda, Combs, and Slate (2011) asserted decisions about school size appeared to be complex and involved a variety of factors such as costs, community support, and students with special educational needs. These researchers reviewed the literature concerning the relationship between school size and student performance with a focus on determining the extent to which school size, particularly elementary school size, was related to student academic achievement. Most of the literature they examined was based on secondary school size because there were fewer studies published on elementary school size and even fewer studies published on middle school size. At the end of their study, the researchers asserted that, even though they had read a great deal of research and conducted their own, they could not definitively argue that small or large schools were better for student achievement.

Recommendations

Potential for Practice/Policy

This study was conducted in four school districts in west and northwestern Arkansas and was limited to two educational cooperative areas. The study compared the test scores of students in Grades 9 through 12 taking the EOC geometry test, EOC literacy test, and the reading and mathematics portions of the ACT. The study used two 6A/7A high schools and two 3A/4A high schools. The findings of the study might have implications on practices and policies in districts in west and northwest Arkansas. Given that numerous districts throughout Arkansas are faced with similar challenges in

combating the effects of SES, this study might have further implications on educational policies and practices related to student achievement in at least five different ways. First, schools and districts must determine whether the size of their schools is proving effective in educating their students. Communities and districts, urban and rural alike, should study their own demographics to determine what configuration and size of school would be best for their own community. Districts should also consider school district location, school system size, school level size, district financial resources, ethnic composition, and parental income levels as important factors in determining the best educational environment for learning. Thus, school size should be dealt with in everyone's unique school circumstance.

Second, schools and their leaders must be prepared to continue to stretch their abilities to address any negative effects of poverty. Because students from low-SES backgrounds are a part of the school environment, it behooves the state of Arkansas to develop ways of ameliorating the effects of poverty to provide opportunities for all students to succeed in school and beyond. An underserved population of students could become an unproductive segment of the population in adulthood. Schools should intentionally assess the needs of students from low-SES families who might be deemed at risk.

Third, the state legislature must determine whether consolidating smaller districts is truly a prudent strategy for those involved. The consolidation cutoff number of 350 may or may not be appropriate for every community and every school situation. Unforeseen consequences involved in consolidating districts, such as disruptions of extracurricular activities and related local traditions and high transportation costs, could

lead to optimal consolidation results. In addition, the legislature will need to provide needed funding to implement research-based strategies to educate all students effectively. Public schools cannot expect unlimited funding, and administrators need to spend those funds wisely. School leaders need to study up-to-date trends in education and spend funds in such a way as to positively influence student achievement. Schools are facing increasing demands of accountability from federal and state governments, and media are constantly commenting on school report cards. In such reports, schools are often portrayed as failures and unworthy of additional funding.

Fourth, schools must provide teachers with job-embedded, research-based professional development that equips them to serve students from all occupations. Raising teacher quality can obviously help student learning. Professional development's purpose must be to increase the knowledge base of teachers in a deliberate way so that they can better educate students. An increase in student achievement must be the ultimate goal of any professional development. Boosting teacher quality in this way would be a good way to combat the effects of poverty. Even before teachers step inside a classroom, university preparatory programs, as a whole, need to make would-be teachers aware of the realities inside today's classrooms and not send them in with unrealistic and overly idealistic notions of teaching and learning. As society and family structure continues to change, veteran and novice educators alike must not only be able to meet the academic needs of students but also be able to address the social and emotional needs of the students they teach.

Fifth, schools must continue to engage parents and the community and seek to increase parental involvement inside schools. Schools cannot educate students to the

degree necessary without the help of parents and families. As long as students see a gulf between the real world and school, they will most likely fail to see the relevance of education. Schools must collaborate with parents and the community in word and action. These stakeholders must be united to educate students as well as possible. This, of course, is a two-way street. Schools' attempts to engage parents and community members are often unsuccessful. Students sometimes go uncared for and unsupported outside of the school day. In fact, some see the answers to these issues answered outside of public education in the private and charter realm.

Future Research Considerations

The findings from this study do not support the idea that there is an optimum school size for every location and situation. Such decisions are by their very nature local and community-oriented matters that merit study for what would work best for individual districts and communities. The findings from this study do support the idea that SES makes a significant difference on student achievement. To evaluate the impact of efforts to determine what size of school works best for a given district and in closing the achievement gap in terms of SES, the researcher recommends that the following studies be considered:

1. An examination of the effects of teacher quality and targeted, job embedded professional development in literacy and mathematics aimed at supporting low-SES students
2. A 5- to 10-year longitudinal study to examine the sustainability of consolidated districts and their impacts on student achievement, compared to the previous districts' performance level before consolidation occurred

3. A study of the effects of poverty and different reading and mathematics instructional programs
4. A study of the effects of poverty in different school environments including urban and rural areas in addition to high poverty schools in low poverty environments and low poverty schools in high poverty environments
5. A study of the effects of size of school and size of class within the school
6. A study of the effects school size has on different school levels including elementary, middle, and high schools
7. A study of school size with other important factors such as costs, community support, and students with varied ethnic or special educational needs

The United States has much at stake when it comes to how the country educates students. Students are no longer merely competing with each other on a state or national level; competition has now moved to a global level (Douglass et al., 2011; Singh, 2011). Therefore, educators are constantly looking for ways to improve the learning environment of their students. One way of improving learning environments may lie in how schools are organized, and one facet of school organization is school size.

The topic of school size and its effect on student achievement has been a widely studied issue, with some taking a definite stance on the subject (Johnson, 2006; Stewart, 2009). An increase in the accountability demands placed on schools, along with the pressure to prepare students for an ever-changing world, has prompted some school districts and state departments of education to re-examine the school size issue. Johnson (2006) noted that, in some circles, larger schools are perceived to be superior because they offer more opportunities for students and can, therefore, better prepare them for

college and the world than can smaller schools, which might lack important resources. On the other hand, Johnson argued that proponents of small schools fear not only losing their community's identity but also the intimacy that a larger school may simply be unable to provide. The issue of size of school is one that appears to be district and community specific. This study has determined that no one ideal size or composition exists that will work for every school, everywhere; this is a very local decision.

To further complicate the matter is the issue of SES. Students who do not come from print-rich homes and who do not have the same experiences in the world as their wealthier peers might have a difficult time succeeding in school no matter the size of the school (Gassama, 2012). Students coming to school without their other needs met are not prepared to learn and grow; they also have a difficult time remaining motivated and engaged (White, 2012). In addition, students from low-SES families can suffer unwittingly due to the perceptions of others around them. For instance, teachers can have lower expectations of students from low-SES families (Speybroeck et al., 2012). Schools will have to deal with poverty continually. However, it will take society as a whole, and not just educators, to grapple with and solve this issue.

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APPENDIX

HARDING UNIVERSITY
INSTITUTIONAL REVIEW BOARD

Status of Request for Exemption from IRB Review

(For Board Use Only)

Date: 9/5/14

Proposal Number: 2014-063

Title of Project: Effect of School Size and Socioeconomic Status on Math and Literacy Achievement for Students in Arkansas

Principal Investigator(s) and Co-Investigator(s): Robert Childers rchilders@vbsd.us

■ Research exempted from IRB review.

☐ Research requires IRB review.

☐ More information is needed before a determination can be made. (See attachment.)

I have reviewed the proposal referenced above and have rendered the decision noted above. This study has been found to fall under the following exemption(s):

1 ☐ 2 ☐ 3 ☐ 4 ■ 5 ☐ 6 ☐

In the event that, after this exemption is granted, this research proposal is changed, it may require a review by the full IRB. In such case, a *Request for Amendment to Approved Research* form must be completed and submitted.

This exemption is granted for one year from the date of this letter. Renewals will need to be reviewed and granted before expiration.

The IRB reserves the right to observe, review and evaluate this study and its procedures during the course of the study.

Rebecca O Reaver

Chair
Harding University Institutional Review Board