

Impacts of School and Class Size on Student Outcomes

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In the following report, Hanover Research reviews the educational research and scholarly literature examining the effects that school and class size have on student outcomes. Additionally, this report presents information related to the cost-effectiveness of various school and class size models.

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EXECUTIVE SUMMARY AND KEY FINDINGS

INTRODUCTION

In recent decades, class-size reduction has become a popular state-level strategy to improve student outcomes. According to The Center for American Progress, 77 percent of Americans believe that educational funding should be spent on smaller classes rather than increased teacher salaries.¹ Meanwhile, within the past 50 years, the percentage of schools that enroll more than 1,000 students has increased substantially from 7 percent to 25 percent.² Within the available literature, reductions to class size are often presented as an expensive reform strategy, while larger schools are typically introduced as a means to reduce educational expenditures. Since both of these education reform strategies are prevalent, there is an extensive amount of research literature that examines the widespread effects that occur as a result of changes to class and school size.

This report provides an overview of the available research related to the impact of class-size reduction and increases in school size. Furthermore, it presents relevant information related to the cost-effectiveness of both smaller class sizes and larger school models. This report is organized into the following sections:

- **Section I: Class Size and Student Outcomes** provides an overview of relevant findings from the most rigorous research studies that focus on the relationship between class size and student outcomes.
- **Section II: School Size and Student Outcomes** presents findings from a number of studies that examine that impact that school size has on student outcomes.
- **Section III: Cost-Effectiveness of School and Class Size Models** provides background on class-size and school-size models and an overview of the relevant literature that deliberates the cost-effectiveness of class-size reduction and high enrollment schools.

¹ Chingos, M. "The False Promise of Class-Size Reduction." Center for American Progress, April 2011.
<https://www.americanprogress.org/issues/education/report/2011/04/14/9526/the-false-promise-of-class-size-reduction/>

² Nguyen, T. "High Schools: Size Does Matter." *Study of High School Restructuring*, March 2004, 1:1. p. 1.
<http://www.edb.utexas.edu/hsns/HSNSbrief1.pdf>

KEY FINDINGS

- **The available research literature related to the impact of class size on student achievement presents mixed findings.** Although the majority of studies report positive effects on student outcomes that stem from class-size reductions, a number of studies have also found mixed effects or no effect on student achievement levels. Moreover, the existing body of research is often criticized because many of the available studies do not effectively isolate the effects associated with the variation in class size.
- **Of the rigorous studies that cite a positive relationship between class size and student achievement, the effects were strongest among students in early grades, minority students, and students eligible for free- or reduced- price lunch.** These studies found that enrollment in smaller classes can lead to higher standardized test scores, an increased likelihood of taking college entrance exams, increased earnings, and higher college attendance rates, especially among certain subpopulations. A study by Krueger and Whitmore (2000) even found that student placement in a small class of 13-17 students narrowed the black-white gap in college test-taking by 54 percent.
- **The existing literature related to school size consistently reports positive effects associated with smaller schools, especially among low-income and minority students.** The available research indicates that student achievement at small schools is at least equal, and sometimes greater, than student achievement in larger schools. Additionally, small schools have been linked to a number of other beneficial schooling outcomes, including improved student behavior, higher attendance, fewer dropouts, and more positive teacher attitudes.
- **There are no studies that explicitly compare the cost-effectiveness of class-size reduction to the cost-effectiveness of alternative educational strategies designed to promote student achievement, but many researchers have examined the costs and benefits associated with a variety of educational policies.** Numerous researchers support smaller class sizes and argue that the future economic and educational benefits outweigh the costs and initial investment. Meanwhile, opponents argue that other education policies, such as increased teacher salaries or a focus on quality of instruction, are more worthwhile investments than class-size reduction.
- **Although the available literature cites a number of cost-savings that result from the employment of large schools, researchers that counter this point argue that the cost-savings do not outweigh other direct and indirect expenditures typically associated with high-enrollment schools.** Large schools effectively reduce spending via economies of scale related to educational services, units of capital, teacher specialization, purchasing power, and innovation. On the other hand, opponents of large schools argue that these savings do not offset the drawbacks of larger schools, which include higher transportation costs, decreased teacher and student motivation, and reduced parental involvement.

SECTION I: CLASS SIZE AND STUDENT OUTCOMES

There is an expansive amount of research literature that examines the relationship between class size and student outcomes. This section of the report presents an overview of the relevant findings from the most rigorous research studies currently available.

OVERVIEW OF RESEARCH LITERATURE

Throughout the past several decades, state-level policies designed to reduce class sizes have become an extremely popular reform strategy in an effort to increase student achievement levels. This is evidenced by the fact that at least 24 states have implemented policies in recent years that require a mandatory reduction in class size or provide incentives that encourage class-size reductions. Despite the popularity of this reform strategy, the available research does not provide a consensus on the overall effects on student outcomes.³

A 1978 meta-analysis by Glass and Smith examined 76 class size studies, and the number of existing studies has continued to increase in recent years as the topic remains a popular debate.⁴ Despite the extensive number of studies, many researchers have expressed concern about the validity of findings supporting smaller class sizes.⁵ For example, several of the existing studies are critiqued because they do not account for unobserved differences across classrooms that may also be responsible for improvements or reductions in student achievement. In fact, The Brookings Institution reports that “only a few studies are of high enough quality and sufficiently relevant to be given credence as a basis for legislative action.”⁶ In order to limit the number of studies covered in this report, Hanover Research focuses on a small number of U.S. studies that are determined to be most credible based on their use of randomized experiments, natural experiments, or mathematical models to estimate the effects of class size reductions.⁷

Although a notable portion of the available literature attributes positive effects to smaller class sizes, a number of other reliable studies have also found mixed effects or no effects on student outcomes.⁸ The following figure presents the effect, student level, and outcome measures used in the eight studies cited in our review (see Figure 1.1). It is important to

³ Chingos, M. and G.J. Whitehurst. “Class Size: What Research Says and What it Means for State Policy.” Brookings Institute, May 2011. p. 1. <http://www.brookings.edu/research/papers/2011/05/11-class-size-whitehurst-chingos>

⁴ Robinson, G. “Synthesis of Research on the Effects of Class Size.” *Educational Leadership*. p. 80. <http://www.lcsd.k12.ny.us/cms/lib/NY01001015/Centricity/Domain/366/synthesis%20of%20research.pdf>

⁵ Hanushek, E. “The Evidence on Class Size.” Institute of Political Economy at University of Rochester, February 1998. http://www.wallis.rochester.edu/WallisPapers/wallis_10.pdf

⁶ Chingos, M. and G.J. Whitehurst. Op. cit. p. 9.

⁷ Ibid.

⁸ Ibid.

note that the majority of high-quality studies related to class size focus on the early grades, and the available research that measures the impact on older students is fairly limited.⁹

Figure 1.1 Summary of Rigorous Class Size and Student Outcome Literature

STUDY			LEVEL	ACADEMIC OUTCOME MEASURE	EFFECT
AUTHOR	TITLE	YEAR			
Chetty, R. et al. ¹⁰	“How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project STAR”	2010	Long-term effects	Earnings, college attendance, home ownership, retirement savings	Positive
Krueger, A. ¹¹	“Experimental Estimates of Education Production Functions”	1999	Grades K-3	Standardized test scores	Positive
Krueger, A. and D. Whitmore ¹²	“The Effect of Attending a Small Class in the Early Grades on College-Test Taking and Middle School Test Results: Evidence from Project STAR”	2000	Grades 4-12	Standardized test scores, ACT or SAT scores	Positive
Rivkin, S., E. Hanushek, and J. Kain ¹³	“Teachers, Schools, and Academic Achievement”	2005	Grades 3-7	Standardized test scores	Positive
Dee, T. and M. West ¹⁴	“The Non-Cognitive Returns to Class Size”	2008	Grade 8	Subject test scores Measures of student engagement	Mixed
Jepsen, C. and S. Rivkin ¹⁵	“Class Size Reduction and Student Achievement: The potential Tradeoff between Teacher Quality and Class Size”	2009	Grades K-3	Math and reading achievement	Mixed

⁹ Schanzenbach, D.W. “Does Class Size Matter?” National Education Policy Center, February 2014. pp. 6-7. http://nepc.colorado.edu/files/pb_-_class_size.pdf

¹⁰ Chetty, R. et al. “How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project STAR.” National Bureau of Economic Research, September 2010. <http://www.nber.org/papers/w16381>

¹¹ Krueger, A. “Experimental Estimates of Education Production Functions.” *The Quarterly Journal of Economics*, 114:2. 1999. Pp. 497-532. <http://qje.oxfordjournals.org/content/114/2/497.short>

¹² Krueger, A. and D. Whitmore. “The Effect of Attending a Small Class in the Early Grades on College-Test Taking and Middle School Test Results: Evidence from Project STAR.” National Bureau of Economic Research, April 2000. <http://www.nber.org/papers/w7656>

¹³ Rivkin, S., E. Hanushek, and J. Kain. “Teachers, Schools, and Academic Achievement.” *Econometrica*, 73:2. March 2005. <http://www.econ.ucsb.edu/~jon/Econ230C/HanushekRivkin.pdf>

¹⁴ Dee, T. and M. West. “The Non-Cognitive Returns to Class Size.” National Bureau of Economic Research, May 2008. <http://www.nber.org/papers/w13994>

¹⁵ Jepsen, C. and S. Rivkin. “Class Size Reduction and Student Achievement: The Potential Tradeoff between Teacher Quality and Class Size.” *The Journal of Human Resources*, 44:1. 2009. <http://jhr.uwpress.org/content/44/1/223.refs>

STUDY			LEVEL	ACADEMIC OUTCOME MEASURE	EFFECT
AUTHOR	TITLE	YEAR			
Chingos, M. ¹⁶	"The Impact of Universal Class-Size Reduction Policy: Evidence from Florida's Statewide Mandate"	2010	Grades 3-8	Standardized test scores	No effect
Hoxby, C. ¹⁷	"The Effects of Class Size on Student Achievement: New Evidence from Population Variation"	2000	Grades 4-6	Student achievement scores	No effect

POSITIVE EFFECTS

The majority of studies suggest a positive relationship between class size and student achievement when class-size reduction initiatives are implemented well.¹⁸ One of the most heavily evaluated class-size reduction initiatives is the Student Teacher Achievement Ratio (STAR), which was implemented in Tennessee during the late 1980s. STAR began with students who entered Kindergarten in 1985 and randomly assigned students and teachers to a small class with an average of 15 students or to a normal-sized class with an average of 22 students for four years. Students were evaluated over the course of the program and numerous studies, even those not included in our analysis, attribute positive effects to the smaller class size.¹⁹ The original study by Krueger (1999) on the STAR initiative found that the standardized test scores among those students in the smaller classes increased by approximately four percentile points during their first year of small class enrollment and increased by about one percentile point during each subsequent year. The findings also establish that class size has a larger impact on minority students and on those students eligible for free- or reduced-price lunch.²⁰ Notably, Krueger also indicates that the greatest effects occurred when class size reductions were in increments of seven to eight students.²¹

A follow-up study conducted by Krueger and Whitmore reexamined those students who participated in STAR during Kindergarten through Grade 3 and evaluated their performance after returning to a regular size classrooms in subsequent years. The study sought to determine if small class sizes during early grades (K-3) impacts three future outcomes:

- 1) Standardized tests scores through Grade 8

¹⁶ Chingos, M. "The Impact of a Universal Class-Size Reduction Policy: Evidence from Florida's Statewide Mandate." Harvard University, Kennedy School of Government, August 2010. http://www.hks.harvard.edu/pepg/PDF/Papers/PEPG10-03_Chingos.pdf

¹⁷ Hoxby, C. "The Effects of Class Size on Student Achievement: New Evidence from Population Variation." *The Quarterly Journal of Economics*, 2000. <http://piketty.pse.ens.fr/files/Hoxby2000a.pdf>

¹⁸ "Class size and student achievement: Research review." Center for Public Education. <http://www.centerforpubliceducation.org/Main-Menu/Organizing-a-school/Class-size-and-student-achievement-At-a-glance/Class-size-and-student-achievement-Research-review.html>

¹⁹ Schanzenbach, D.W. Op. cit.

²⁰ Krueger, A. Op. cit.

²¹ "Chiefs' Pocket Guide to Class Size." The Council of Chief State School Officers, 2012. p. 8. http://www.ccsso.org/Documents/Class_Size_Pocket_Guide_for_LegCon.pdf

- 2) Students' decision to take the ACT or SAT college entrance exam
- 3) Students' performance on the ACT or SAT exam²²

The results suggest that enrollment in smaller classes in early grades is linked to slightly higher standardized test scores in future grades. Moreover, the findings indicate that small class sizes increase the likelihood that students take a college entrance exam, particularly among minority students. Krueger and Whitmore even note that enrollment in a small class effectively narrowed the black-white gap in college test taking by 54 percent.²³

Another evaluation of STAR by Chetty, et al. (2010) focused on the long term effects of STAR and examined future outcomes including earnings, college attendance, home ownership, and retirement savings. Overall, the study found that those students who were assigned to higher quality classrooms during early elementary grades ultimately had higher earnings, higher college attendance rates, and showed improvements in other outcomes as well. It is important to note that 'classroom quality' in this study was determined by the class' end-of-year test scores. Additionally, the findings concluded that students who were assigned to the smaller classes, regardless of quality, were 1.8 percentage points more likely to be enrolled in college at age 20.²⁴

Overall, the study found that those students who were assigned to higher quality classrooms during early elementary grades ultimately had higher earnings, higher college attendance rates, and showed improvements in other outcomes as well.

In another rigorous study that linked student achievement with smaller class sizes, Rivkin, Hanushek, and Kain (2005) examined class size variations in Texas. The study examined state standardized test scores of half a million students in Grades 3 through 7 to determine the impact of class size variation on student achievement. The results found statistically significant positive effects of smaller class sizes on both mathematics and reading achievement in early grades, but the positive impact tended to decline as students progressed through school. Furthermore, the findings indicate that teacher quality has a substantial impact on student achievement as well. Rivkin, Hanusek, and Kain established that **"the effects of a costly 10 student reduction in class size are smaller than the benefit of moving one standard deviation up the teacher quality distribution."**²⁵

²² Krueger, A. and D. Whitmore. Op. cit.

²³ Ibid.

²⁴ Chetty, R. et al. Op. cit. p. 1.

²⁵ Rivkin, S., E. Hanushek, and J. Kain. Op. cit. pp. 444-447.

MIXED EFFECTS

Although there are numerous studies that cite a positive relationship between reduced class size and increased student achievement, additional studies have found mixed effects. For example, Dee and West (2008) also examined the long-term effects of Tennessee’s STAR initiative. Their findings indicate that the class reductions did result in improved student engagement, but these positive effects did not persist in students by the time they reached Grade 8. Dee and West’s analysis also examined the effect that varying class sizes has on Grade 8 students and determined that small class sizes lead to improvements in older students’ engagement, but the positive effects also diminished over time.²⁶ Their study further explored the test scores of students who had different class sizes across subject areas, and found that overall, students did not perform better in the subjects in which they had smaller classes. Notably, however, there was a slight positive effect on test scores within urban schools.²⁷

The findings indicated that the benefits of the smaller classrooms were almost nullified by the academic disadvantages caused by teachers’ lack of experience.

Jepsen and Rivkin (2009) evaluated California’s class-size reduction program to determine its impact on student outcomes and teacher quality. The California initiative was enacted in 1996 and sought to reduce class sizes in K-3 classrooms statewide by 10 students, with an overall decrease from 30 to 20 students per class.²⁸ Jepsen and Rivkin found that the smaller class sizes increased student achievement in reading and mathematics, but the gains in student achievement were diminished by teachers’ classroom inexperience.²⁹ During its first two years of implementation, the class-reduction program generated 25,000 new teaching positions throughout the state of California and many positions were filled by inexperienced teachers.³⁰ The findings indicated that the benefits of the smaller classrooms were almost nullified by the academic disadvantages caused by teachers’ lack of experience, and these negative effects were particularly evident in schools with high proportions of minority and economically disadvantaged students.³¹

NO EFFECT

Other studies present in the body of literature have found no evidence to support the positive impact of class-size reduction initiatives. The Center for Public Education found that studies that did not show any gains in student achievement often involved programs that:

²⁶ Dee, T. and M. West. Op. cit.

²⁷ Chingos, M. and G.J. Whitehurst. Op. cit. p. 8.

^{28,29} Ibid. p. 7.

²⁹ Jepsen, C. and S. Rivkin. Op. cit.

³⁰ Chingos, M. and G.J. Whitehurst. Op. cit. p. 7.

³¹ Jepsen, C. and S. Rivkin. Op. cit.

included reduced classes that still contained 20 or more students, were short term programs, were not implemented properly, or met unexpected consequences that impacted students' overall outcomes.³²

The Brookings Institute notes that there are two credible studies that do not find any positive effects associated with class-size reduction.³³ One of the two studies was developed by Hoxby (2000) and evaluated the impact of natural variations in class size among students in elementary school. For the purpose of this analysis, Hoxby measured achievement using student test scores in reading, math, and writing. Notably, Hoxby finds no statistically significant relationship between student achievement and class size, even at schools that serve large proportions of minority or economically disadvantaged students.³⁴

Overall, the findings conclude that the Florida CSR program had little, if any, positive effect on the cognitive and non-cognitive outcomes of students in Grades 3 through 8.

A fairly recent study by Chingos (2010) examined Florida's statewide class-size reduction policy to determine its effect on students' cognitive and non-cognitive outcomes. The Florida initiative reduced core class sizes for students in Kindergarten through Grade 12 between 2004 and 2009.³⁵ Chingos' analysis at the district- and school-level utilized FCAT scores in reading and math to test the effect on cognitive outcomes, and focused on other non-cognitive indicators

such as student absenteeism, suspensions, and incidents of violence. Overall, the findings conclude that the Florida CSR program had little, if any, positive effect on the cognitive and non-cognitive outcomes of students in Grades 3 through 8.³⁶

Although class-size reductions may result in positive cognitive and non-cognitive outcomes for students, the aforementioned literature suggests that small reductions in classroom size are not likely to have a substantial impact on student outcomes; the most effective reductions are those that decrease class-sizes by seven to 10 students. It also appears that class-size reduction initiatives are most cogent for students in early elementary grades and those students from underprivileged backgrounds. Moreover, measures of teacher quality continue to have a noticeable impact on student achievement, even following a decrease in class size.³⁷

³² "Class size and student achievement: Research review." Op. cit.

³³ Chingos, M. and G.J. Whitehurst. Op. cit. p. 8.

³⁴ Hoxby, C. Op. cit.

³⁵ Chingos, M. and G.J. Whitehurst. Op. cit. p. 9.

³⁶ Chingos, M. Op. cit. pp. 4-27.

³⁷ Chingos, M. and G.J. Whitehurst. Op. cit. p. 9.

SUMMARY

In summary, the Center for Public Education provides the following findings from an extensive review of the research, which echoes the analysis provided above:

- Smaller classes in the early grades (K-3) can boost academic achievement;
- A class size of no more than 18 students per teacher is required to produce the greatest benefits;
- A program spanning the grades K-3 will produce more benefits than a program that reaches students in only one or two of the primary grades;
- Minority and low-income students show even greater gains when placed in small classes in the primary grades;
- The experience and preparation of teachers is a critical factor in the success or failure of class size reduction programs;
- Reducing class size will have little effect without enough classrooms and well-qualified teachers; and
- Supports, such as professional development for teachers and a rigorous curriculum, enhance the effect of reduced class size on academic achievement.³⁸

STATE-LEVEL CLASS-SIZE REDUCTION INITIATIVES

During recent decades, a number of states have made widespread changes to class-size standards. The Education Commission of the States reports that 13 states implemented class-size reduction initiatives between 1998 and 2000 alone. Although various states have employed or continue to employ class-size reduction measures, some programs are more heavily evaluated than others. For example, class-size reduction reforms in Tennessee and Wisconsin were developed as research designs, while programs in Texas and Florida collected longitudinal student data that were available to the research community.³⁹ Figure 1.2 highlights some of the most analyzed state class-size reduction initiatives and denotes whether the general research findings associated with each program indicate positive, negative, or mixed effects.

³⁸ Bulleted points taken verbatim from: "Class size and student achievement: Research review." Op. cit.

³⁹ "Chiefs' Pocket Guide to Class Size." Op. cit. p. 4.

Figure 1.2: Timeline of State-Level Class-Size Reduction Initiatives

STATE	YEAR	EFFECT	NOTES
Texas	1983	Positive	<ul style="list-style-type: none"> Notable education reforms were passed by the state legislature, including a statewide program to reduce class size to no more than 22 students in kindergarten classrooms.
Indiana	1984	Positive	<ul style="list-style-type: none"> The state of Indiana funded a two-year initiative, Project Prime Time, to reduce class sizes in grades K-2 from 25 students to an average of 18 students.
Tennessee	1986	Positive	<ul style="list-style-type: none"> The Student/Teacher Achievement Ratio (STAR) was a four-year longitudinal study conducted by the Tennessee Department of Education. K-3 students and teachers in 76 schools were randomly assigned to classes of varying size that ranged from 13 to 25 students.
Nevada	1989	No effect	<ul style="list-style-type: none"> The Nevada Legislature enacted the Class-size Reduction Act, which reduced the student-teacher ratio in select classrooms to 16:1 beginning in the 1991-1992 school year.
California	1996	Mixed	<ul style="list-style-type: none"> The California Legislature passed a reform measure to cut class size in K-3 classrooms from an average of 28 students to a maximum of 20 students.
Wisconsin	1996	Mixed	<ul style="list-style-type: none"> The state enacted the Wisconsin's Student Achievement Guarantee in Education (SAGE) program as a five-year pilot to student the effects of CSR on the academic achievement of disadvantaged students in grades K-1. The program reduced the student-teacher ratio to 15:1 in participating schools with poverty rates of 30 percent or more.
Florida	2002	Negative	<ul style="list-style-type: none"> State citizens approved an amendment to the Florida constitution that limited the number of students in core classes in state public schools to the following ratios: 18:1 for grades K-3, 22:1 in grades 4-8, and 25:1 in grades 9-12.

Source: Council of Chief State School Officers⁴⁰

⁴⁰ Ibid. p. 5.

SECTION II: SCHOOL SIZE AND STUDENT OUTCOMES

There is a variety of available literature that focuses on school size and the effects that it has on student outcomes at all levels. This section of the report provides an overview of the relevant studies that examine the relationship between school size and student outcomes.

OVERVIEW OF RESEARCH LITERATURE

The impact that school size has on students is an area of concern for parents, teachers, administrators, and education policymakers. Within the past 50 years, the number of schools nationwide has decreased by 70 percent while the average school size has increased by five times.⁴¹ The creation of larger schools was a nationwide trend that occurred through consolidation and restructuring initiatives, but questions have been raised about the impact that school size has on student outcomes.⁴² More recently, larger schools have been attributed to lower levels of student achievement, student isolation, and increased occurrences of school violence.⁴³

The available literature does not come to consensus on what constitutes a large school versus a small school, though many researchers argue that no school should enroll more than 400 to 500 students. On average, the research concludes that an effective elementary school should have been 300 to 400 students, while a secondary school should enroll somewhere between 400 and 800 students.⁴⁴

In addition to the research available on optimal school size, there are an extensive number of existing studies that analyze the link between school size and student outcomes. The available research is fairly consistent and confirms that school size does have a positive impact on student outcomes, but the type of effects tends to vary across studies. The majority of findings indicate that smaller schools result in more positive schooling outcomes when compared to larger schools.⁴⁵

In order to limit the number of studies included in this section of the report, Hanover Research will provide an in-depth analysis of several widely-cited studies contained in the literature and also present an overview of key findings drawn from the comprehensive

⁴¹ Nguyen, T. "High Schools: Size Does Matter." Op. cit., p. 1.

⁴² Stevenson, K. "School Size and Its Relationship to Student Outcomes and School Climate." National Clearinghouse for Educational Facilities, April 2006. p. 1. http://www.ncef.org/pubs/size_outcomes.pdf

⁴³ "School/District Structure/Operations School Size." Education Commission of the States. <http://www.ecs.org/html/issue.asp?issueid=104&subissueID=295>

⁴⁴ Summary of: Cotton, K. "Affective and Social Benefits of Small-Scale Schooling." Educational Resource Information Center, July 2007. http://www.education.com/reference/article/Ref_Affective_Social/

⁴⁵ Cotton, K. "Affective and Social Benefits of Small-Scale Schooling." ERIC Digest, December 1996. <http://eric.ed.gov/?id=ED401088>

research base. Figure 2.1 presents a summary and describes the effect, student level, and outcome measures used in the seven specific studies detailed in our literature review. The denotation of a “positive” effect indicates that the study found favorable outcomes associated with smaller sized schools when compared to larger ones.

Figure 2.1 Summary of School Size and Student Achievement Literature

STUDY			LEVEL	OUTCOME MEASURE	EFFECT
AUTHOR	TITLE	YEAR			
Fowler, W. and H. Walberg ⁴⁶	School Size, Characteristics, and Outcomes	1991	High school	Standardized test scores Retention rates Suspensions Employment, etc.	Positive
Haller, et al. ⁴⁷	School Size and Program Comprehensiveness: Evidence from High School and Beyond	1990	High School	Program comprehensiveness	Mixed
Howley, C. and R. Bickel ⁴⁸	The Matthew Project: National Report	1999	All levels	Standardized test scores	Mixed
Lee, V. and J. Smith ⁴⁹	High School Size: Which Works Best and for Whom?	1997	High school	Reading and mathematics achievement	Positive
Lee, V. and S. Loeb ⁵⁰	School Size in Chicago Elementary Schools	2000	Elementary School	Teacher surveys Standardized test scores	Positive
Leithwood, K. and D. Jantzi ⁵¹	“A Review of Empirical Evidence about School Size Effects: A Policy Perspective.”	2009	All levels	Meta-analysis	Positive
Pittman, R. and P. Haughwout ⁵²	Influence of High School Size on Dropout Rate	1987	High school	Academic offerings School climate Dropout rate	Positive

⁴⁶ Fowler, W. and H. Walberg. “School Size, Characteristics, and Outcomes.” *Educational Evaluation and Policy Analysis*, 13:2. June 1991. <http://epa.sagepub.com/content/13/2/189.short>

⁴⁷ Haller, et al. “School Size and Program Comprehensiveness: Evidence from High School and Beyond.” *Educational Evaluation and Policy Analysis*, 12:2. June 1990. <http://epa.sagepub.com/content/12/2/109.short>

⁴⁸ Howley, C. and R. Bickel. “The Matthew Project: National Report.” Ohio State University, August 1999. <http://eric.ed.gov/?id=ED433174>

⁴⁹ Lee, V. and J. Smith. “High School Size: Which Works Best and for Whom?” *Educational Evaluation and Policy Analysis*, 19:3. September 1997. <http://epa.sagepub.com/content/19/3/205.short>

⁵⁰ Lee, V. and S. Loeb. “School Size in Chicago Elementary Schools: Effects on Teachers’ Attitudes and Students’ Achievement.” *American Educational Research Journal*, 37:1. March 2000. <http://aer.sagepub.com/content/37/1/3.short>

⁵¹ Leithwood, K. and D. Jantzi. “A Review of Empirical Evidence About School Size Effects: A Policy Perspective.” *Review of Educational Research*, 79:1. March 2009. <http://rer.sagepub.com/content/79/1/464>

⁵² Pittman, R.B. and P. Haughwout. “Influence of High School Size on Dropout Rate.” *Educational Evaluation and Policy Analysis*, 9:4. December 1987. <http://epa.sagepub.com/content/9/4/337>

SUMMARY OF FINDINGS

Proponents of small- scale schooling argue that a multitude of research confirms that student achievement in small schools is equal, if not greater, to student achievement in large schools. A 1991 study by Fowler and Walberg summarized the findings of school size effects studies published between the 1960s and 1980s, and reported the following key points:

- There is a negative relationship between math and verbal achievement tests and school size.
- Increase in size of school is detrimental to test scores.
- Smaller schools increase learning at elementary and senior levels. African-American elementary students seem particularly to benefit from being in smaller schools and low achievers benefit from being in smaller senior high schools.
- School size is negatively related to grade 3 reading and mathematics achievement when controlling for student socioeconomic status.
- As school districts increase either the number of schools in the district or the size of the school, supervisory services were being financed at the expense of students' instructional services.⁵³

In addition to their literature review, Fowler and Walberg further analyzed the effect that secondary school size has on a number of other educational outcomes, including standardized test scores, retention rates, suspensions, employment, and college enrollment. In addition to school size, they accounted for a variety of influential characteristics, such as district socioeconomic status and teacher qualifications. The results from the analysis found that school size was one of the most significant factors correlated with school outcomes, and the two had a negative relationship. The findings from their analysis supported the previous body of research they cited which suggests that smaller schools at all levels may be more effective at improving students' educational outcomes.⁵⁴

The results from the analysis found that school size was one of the most significant factors correlated with school outcomes, and the two had a negative relationship.

A more recent meta-analysis by Leithwood and Jantzi (2009) reviewed 57 studies published after 1990 that observe the relationship between school size and various student and organizational outcomes. The majority of evidence included in the analysis reflects favorably on smaller schools, and determined that students who typically struggle in school and students from disadvantaged backgrounds benefit most from enrollment in small schools. They conclude that the ideal size for an elementary school serving a large number of

⁵³ Bulleted points taken verbatim from: Nguyen, T. Op. cit. pp. 2-3.

⁵⁴ Fowler, W. and H. Walberg. Op. cit.

disadvantaged students is 300, students while the best size for an elementary school with a more diverse population is 500. The same recommendation applies at the secondary level, where the exemplar size is 600 and 1,000 students, respectively.⁵⁵

Education scholars continue to expand on the available body of research related to the effects of school size, and a number of additional studies corroborate the academic advantages of small-scale schooling. A study by Lee and Smith (1997) sought to answer several research questions related to school size and student learning including:

- 1) What size high school is most effect for students' learning?
- 2) In which size high school is learning most equitably distributed?
- 3) Are size effects consistent across high school defined by their social compositions?⁵⁶

In order to answer these questions, Lee and Smith examined students' growth in reading and mathematics achievement throughout high school to measure changes in student learning. Their findings reveal that small schools tend to have more equitable learning

Researchers discovered that secondary students in schools smaller than 600-900 students tend to learn less and students in larger schools learn significantly less, especially in schools that enroll over 2,100 students.

across students, and conclude that enrollment size has a greater impact on learning in schools with higher proportions of minority and low-income students. The results of their analysis resolved that the ideal high school size ranges from 600 to 900 students based on the level of student learning. They discovered that secondary students in schools smaller than this tend to learn less and students in larger schools learn significantly less, especially in schools that enroll over 2,100 students.⁵⁷

Another secondary-level study conducted by Pittman and Haughwout (1987) evaluated the relationship between high school size and the dropout rate. The study found that school size has a direct influence on the diversity of academic offerings and on the overall school climate. The findings indicate that the relationship that exists between school size and dropout rate is a result of various elements related to school climate, particularly those associated with student participation and quality of the school's environment. The conclusion suggests that school climate outcomes resulting from school consolidations may contribute to the dropout rate.⁵⁸

Although the preponderance of available literature related to school size focuses on high schools or students at all levels, there are a number of studies that focus on elementary students exclusively. One such student was conducted by Lee and Loeb (2000) to examine how elementary teachers and students are impacted by the size of their school. They

⁵⁵ Leithwood, K. and D. Jantzi. Op. cit.

⁵⁶ Numbered points taken verbatim from: Lee, V. and J. Smith. Op. cit.

⁵⁷ Ibid.

⁵⁸ Pittman, R.B. and P. Haughwout. Op. cit.

utilized teacher surveys to measure attitudes and students' growth on standardized math tests to measure achievement. The results specify that small schools enrolling less than 400 students produce more favorable effects on teacher attitudes and student learning when compared to medium- or large-sized schools. In small schools, teachers are more positive about their level of responsible over students' learning and students also learn more, concluding that "school size influences student achievement directly and indirectly, through its effect on teachers' attitudes."⁵⁹

The Matthew Project extended the availability of research related to school size at all grade levels and aimed to determine if small school size could mitigate the negative effects traditionally associated with poverty. Howley and Bickel (1999) gathered relevant school and testing data in four states: Ohio, Georgia, Texas, and Montana, and found that school size had a large impact on academic achievement in Ohio, Georgia, and Texas at all grade levels. The findings submit that low-income students in these states benefited from enrollment in smaller schools, while students from more affluent communities benefited from larger schools. The effect was not as strong in Montana, where there are a large number of small schools. Overall, the study found that small school size effectively reduced the negative academic effects associated with poverty, but discredited the idea that there is a universally optimal school size.⁶⁰

Proponents of large schools often argue that they provide a wider variety of programming for students that small schools are not capable of offering. Based on this idea, Haller, et al. (1990) examined the available programming at an assortment of schools to determine the comprehensiveness of programs offered at large schools compared to those at small schools. The study focused specifically on math, science, and foreign language programs. Overall, Haller, et al. determined that large schools tend to offer more comprehensive programs in these areas than small schools, but there is a large variation in the quality of the three programs at any given school size.⁶¹

In 1996, Kathleen Cotton reviewed 103 literature documents related to school size and schooling outcomes for a study sponsored by the Rural School and Community Trust. The conclusions across the available literature consistently favored smaller schools versus larger schools in most areas of interest. A summary of the overall findings from her extensive evaluation are included in Figure 2.2.

⁵⁹ Lee, V. and S. Loeb. Op. cit.

⁶⁰ Howley, C. and R. Bickel. Op. cit.

⁶¹ Haller, et al. Op. cit.

Figure 2.2 Major Findings from Literature Related to School-Size

OUTCOME AREA	FINDINGS
Academic Achievement	<ul style="list-style-type: none"> ▪ Academic achievement in small schools is at least equal- and often superior- to that of large schools. ▪ Student attendance is better in small schools than in large ones. ▪ A smaller percentage of students drop out of small schools than large ones.
Student's Feelings, Attitudes, and Behavior	<ul style="list-style-type: none"> ▪ Student attitudes toward school in general and toward particular school subjects are more positive in small schools. ▪ Student social behavior- as measured by truancy, discipline problems, violence, theft, substance abuse, and gang participation- is more positive in small schools. ▪ Levels of extracurricular participation are much higher and more varied in small schools than in large ones, and students in small schools receive greater satisfaction their extracurricular participation. ▪ Students have a greater sense of belonging in small schools than in large ones.
Equity	<ul style="list-style-type: none"> ▪ Poor students and those of racial and ethnic minorities are more adversely affected- academically, attitudinally, and behaviorally- by attending large schools than are other students.
Higher Education	<ul style="list-style-type: none"> ▪ Students from small and large high schools do not differ from one another on college-related variables such as entrance examination scores, acceptances rates, attendance, grade point average, and completion.
Teacher Attitudes	<ul style="list-style-type: none"> ▪ Interpersonal relations between and among students, teachers, and administrators are more positive in small schools than in large ones. ▪ Teacher attitudes toward their work and their administrators are more positive in small schools than in large ones.

Source: The Rural School and Community Trust⁶²

⁶² Cotton, K. "School Size, School Climate, and Student Performance: A Summary of Research by Kathleen Cotton." The Rural School and Community Trust. http://www.ruraledu.org/user_uploads/file/cotton.pdf

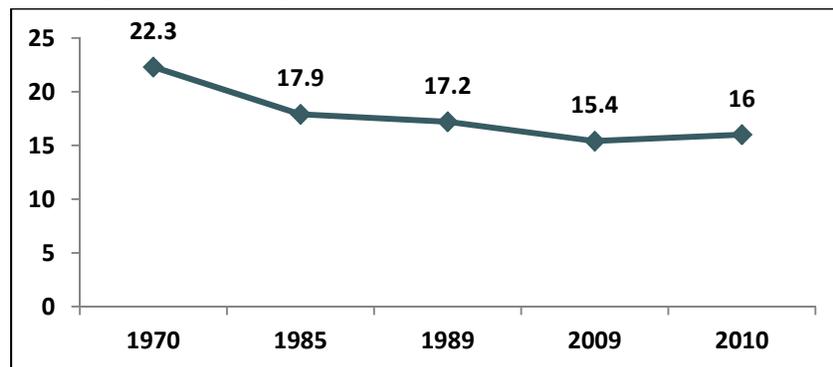
SECTION III: COST-EFFECTIVENESS OF SCHOOL AND CLASS SIZE MODELS

The costs associated with reductions to class- and school-size are frequently discussed in the available literature. Reductions to class size are often presented as an expensive reform strategy, while larger schools are typically introduced as a means to reduce educational expenditures. This section of the report presents a background of class-size and school-size models and provides an overview of the relevant literature that deliberates the cost-effectiveness of class-size reduction and high enrollment schools.

CLASS SIZE MODELS

Since the 1970's, the teacher to student ratio in schools nationwide has declined drastically, partially in part to class-size reduction policies (see Figure 3.1).⁶³ As education budgets grow tighter, more districts consider increases in class sizes as a means to save money. According to an American Association of School Administrators survey, 62 percent of school districts reported that they were planning to increase class sizes during the 2010-2011 school year; a substantial rise from only 26 percent in the previous year.⁶⁴ Meanwhile, Education Resource Strategies estimates that increasing class size by one student could save \$6 billion nationwide.⁶⁵ Despite the popularity of class-size reduction policies, many critics question the cost-effectiveness of such models.

Figure 3.1 Changes in Student/Teacher Ratio over Time



Source: National Center for Education Statistics⁶⁶

⁶³ Chingos, M. and G.J. Whitehurst. Op. cit.

⁶⁴ "Cutting to the bone: How the economic crisis affects schools." Center for Public Education. <http://www.centerforpubliceducation.org/Main-Menu/Public-education/Cutting-to-the-bone-At-a-glance/Cutting-to-the-bone-How-the-economic-crisis-affects-schools.html>

⁶⁵ Koebler, J. "Increasing Class Sizes Could Save \$6 Billion." *U.S. News & World Report*, 2011. <http://www.usnews.com/education/blogs/high-school-notes/2011/06/29/increasing-class-sizes-could-save-6-billion>

⁶⁶ "Fast Facts: Teacher Trends." National Center for Education Statistics. <http://nces.ed.gov/fastfacts/display.asp?id=28>

COSTS ASSOCIATED WITH CLASS-SIZE REDUCTION

The largest costs associated with class-size reduction initiatives stem from the expenses related to additional teacher salaries. The marginal costs of additional classrooms must also be a primary funding consideration, which can vary from district to district depending on teacher salaries, the presences of teacher aides, and associated facility costs. The implementation cost of class-size reduction measures is also directly impacted by the class size goal, the number of students that will be affected by the policy, and the method used to measure class size.⁶⁷ WestEd introduces the following outline as basic elements that determine how much a statewide class-size reduction program will cost:

- Initial average class size. The larger the drop to “small,” the greater the cost.
- Whether there is a rigid cap or flexibility in the number of students per teacher. A rigid cap will increase the costs by decreasing the final average class size. Schools will keep numbers down to ensure staying below the cap.
- The costs of teachers hired for CSR. This depends on the salary scale of each district and the experience level of the teachers hired. Teacher costs will increase with time as teachers move up the salary ladder. And costs of teacher support may need to be factored in.
- The cost of facilities for providing new classrooms.
- Added operational costs such as costs for utilities and for custodial and clerical services when a once-closed school is reopened.
- Potential cost offsets, e.g. due to less grade retention.⁶⁸

The RAND Corporation developed a guide for determining the monetary costs associated with the implementation of class-size reduction policies. RAND utilized data from seven Florida school districts and used multivariate regression models to develop “rules of thumb about the costs of CSR (class-size reduction) that can be applied for policy situations outside of the Florida sample.”⁶⁹ These ‘rules of thumb’ used to determine the average costs per student of class-size reduction strategies are included in Figure 3.2 on the following page. The following figures were calculated based on a cost of \$53,000 per new classroom.

⁶⁷ Reichardt, R. “The Cost of Class Size Reduction, Chapter 3: The Dollar Cost of CSR.” RAND Corporation, 2000. http://www.rand.org/content/dam/rand/pubs/rgs_dissertations/RGSD156/RGSD156.ch3.pdf

⁶⁸ Bulleted points taken verbatim from: McRobbie, J., J. Finn, and P. Harman. “Class Size Reduction: Lessons Learning from Experience.” WestEd, August 1998. p. 5. <http://files.eric.ed.gov/fulltext/ED423600.pdf>

⁶⁹ Ibid. p. 1.

Figure 3.2 Estimated Costs of Class-Size Reduction

COSTS	EXPLANATION
Base Cost	There is a base cost of about \$435 per student for a reduction from 24 to 20 students using the target method. The target method is a flexible class-size reduction policy wherein schools focus on minimizing the difference between their actual class size and their class size goal. ⁷⁰ Notably, the base costs double for a reduction to 17 and triple for a reduction to 15.
Class Size Cost	Each increase or decrease of existing class size about or below 24 adds or subtracts \$80 to the base cost. This class size cost is about 20 percent of the base cost for a reduction to 20.
Ceiling Penalty	Using the ceiling method adds about \$240 to the base costs for enrollment of 100. The ceiling option means that the class size goal is the largest size that classes can be and counters the more flexible target option. ⁷¹ The ceiling penalty declines somewhat linearly as enrollment increases to about \$370. Above \$370 the penalty is a constant \$40.
Low-Enrollment Penalty	Costs are higher for schools with low enrollments, 10 percent above the sum of base costs, class size costs, and ceiling penalty for reduction to 20 and 5 percent higher for a reduction to 17.

Source: Rand Corporation⁷²

COST EFFECTIVENESS OF CLASS-SIZE REDUCTION STRATEGIES

Although class-size reduction may have positive effects on student achievement, critics question whether it is the most productive use of limited educational funding. It is important that the impact of each dollar spent on class-size reduction be weighed against a dollar spent on other educational investments that may prove more effective, such as increases to teacher salaries, more professional development spending, or investments in technology. Unfortunately, there are no available studies that compare the cost-effectiveness of educational spending on class-size reduction to educational spending in other areas aimed at increasing student achievement levels.⁷³

Despite the lack of comparison style studies, many researchers have examined the cost versus benefit elements of class-size reduction. Numerous scholars argue that the long-term benefits of class-size reduction outweigh the costs and initial investment. This belief is supported by the idea that smaller classes in early elementary years lead to a number of future educational benefits that translate into monetary savings. Some of these long-term benefits that are specially cited by the research include: a reduction in the number of special

Numerous scholars argue that the long-term benefits of class-size reduction outweigh the costs and initial investment.

⁷⁰ Reichardt, R. Op. cit., p. 43.

⁷¹ Ibid.

⁷² Ibid. p. 72.

⁷³ Chingos, M. and G.J. Whitehurst. Op. cit.

education students, less grade repetition, fewer disciplinary referrals, and an increased likelihood of graduation.⁷⁴

In addition to the benefits cited by the existing research, The SERVE Center at the University of North Carolina points out numerous direct and indirect cost-savings that can occur as a result of smaller class sizes in elementary grades. The areas of potential cost-savings that are associated with a well-implemented class-size reduction strategy are organized in Figure 3.3. SERVE recommends that reductions start in Kindergarten and grow gradually with the students, adding one grade per year until Grade 3 or Grade 4.⁷⁵

Figure 3.3 Potential Direct and Indirect Cost-Savings of Elementary Class-Size Reduction

EDUCATIONAL AREA	POTENTIAL COST-SAVINGS
Grade Retention	<ul style="list-style-type: none"> ▪ Number of students held back decreases ▪ Later drop-out rate decreases, graduation increases
Improved Student Behavior in School	<ul style="list-style-type: none"> ▪ Vandalism costs decrease ▪ Required corrective actions, such as Saturday school or detention decrease ▪ Classroom disruptions decrease
Remediation and Special Projects	<ul style="list-style-type: none"> ▪ Fewer expensive special projects required ▪ Concentrate on fewer students for shorter duration
Early Identification and Correction of Learning Problems	<ul style="list-style-type: none"> ▪ Special education programs reduced in later years ▪ Programs accurately “targeted” to most needy students ▪ More effective use of inclusion ▪ Note possibility of increased costs in K and 1
Teacher Morale	<ul style="list-style-type: none"> ▪ Increase attendance; reduced substitute costs ▪ Reduced “burn-out” ▪ Incentive value of small classes
Creative Space Use	<ul style="list-style-type: none"> ▪ Transportation-related costs ▪ Flexibility and “found” space ▪ Partnerships with business ▪ Remodel, re-open sites ▪ Portable units as last option
Community, Parent, Involvement, Volunteers	<ul style="list-style-type: none"> ▪ Small classes attract parents and volunteers ▪ Field trips are less congested ▪ Teachers get to know parents well
Teacher Assistants	<ul style="list-style-type: none"> ▪ Research suggest reducing the number of assistants and assigning those remaining to non-class work ▪ Remove “general” assistants through attrition

Source: The SERVE Center⁷⁶

⁷⁴ Normore, A. and L. Ilon. “Cost-Effective School Inputs: Is Class Size Reduction the Best Educational Expenditure for Florida?” *Educational Policy*, 20:2. May 2006. p. 434.

<http://www2.fiu.edu/~ilon/publications/cost%20effective%20school%20inputs.pdf>

⁷⁵ Achilles, C.M. “Financing Class Size Reduction.” The SERVE Center, 2005. p. 6.

<http://www.serve.org/FileLibraryDetails.aspx?id=79>

⁷⁶ Ibid. p. 7.

It is important to note that numerous other researchers argue that funding can be better invested in alternative educational policies that might have a greater impact on student achievement. For example, Hanushek (2002) argues that teacher quality and experience have a substantial impact on school value and student outcomes.⁷⁷ Results from his 2005 study suggest that a small increase in teacher quality has a greater effect on student achievement than a costly 10-student reduction in class size.⁷⁸ Similarly, the findings of McIntyre and Scott (1989) do not support the costs associated with universal class-size reduction, and note that “smaller investments in other educational strategies may yield similar or greater achievement gains.”⁷⁹ Additional research by Stern (1987) postulates that increases in teacher salaries are positively associated with student achievement and are a more cost-effective solution than class size reductions.⁸⁰ Similarly, Harder (1990) agrees that other factors have a greater impact on student outcomes and contends that quality of instruction is a more important factor to invest in than class size.⁸¹

McRobbie, Finn, and Harman (1998) propose a variety of strategies that can lessen some of the costs associated with reducing class size. Firstly, they recommend that class-size reduction strategies be targeted at those students that need it most. For example, they suggest strategic distribution of class-size reduction funding to schools that have high populations of low-income and/or minority students, as those students have been shown to reap greater benefits. Additionally, smaller class sizes could occur only in certain subject areas or focus only on those students who struggle academically. There are a variety of ways that schools or districts can strategically target the available monetary resources. As an additional means to reduce costs, they propose the development of creative scheduling that reduces class sizes for portions of the school day. Although little research has been conducted on this type of class-size reduction strategy, it may allow students to achieve some of the benefits associated with smaller class sizes.⁸²

SCHOOL SIZE MODELS

The practice of school consolidation has become more prominent nationwide in recent decades, and as the number of schools declines, the size of schools increases. Between 1945 and 1980, the number of schools in the United States decreased from 185,000 to 86,000,⁸³ and according to the U.S. Department of Education, roughly 70 percent of high school students attend schools that enroll more than 1,000 students.⁸⁴ Figure 3.4 illustrates

⁷⁷ Normore, A. and L. Ilon. Op. cit. p. 435.

⁷⁸ Rivkin, S., E. Hanushek, and J. Kain. Op. cit.

⁷⁹ McIntyre, W.G. and M.F. Scott. “The Relationship of Class Size to Student Achievement: What the Research Says.” Maine University. 1989. <http://eric.ed.gov/?id=ED323643>

⁸⁰ Stern, D. “Teachers’ Salaries, Class Size, and Student Achievement in Grades 3 and 6: Some New Evidence.” University of California, Berkeley, April 1987. <http://files.eric.ed.gov/fulltext/ED288241.pdf>

⁸¹ Harder, H. “A Critical Look at Reduced Class Size.” *Contemporary Education*, 62:1. 1990. <http://eric.ed.gov/?id=EJ431935>

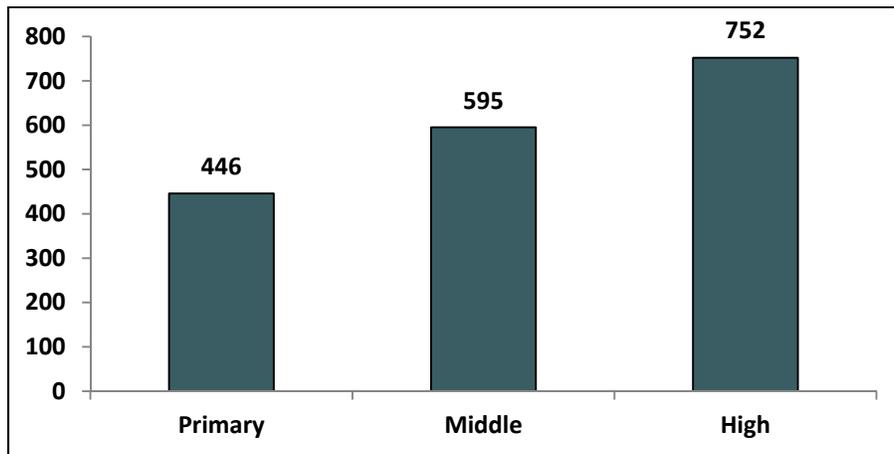
⁸² McRobbie, J., J. Finn, and P. Harman. Op. cit. p. 6.

⁸³ Nelson, E. “School Consolidation.” ERIC Digest, 1985. <http://www.ericdigests.org/pre-925/school.htm>

⁸⁴ “School Size: Archived Information.” U.S. Department of Education. <http://www2.ed.gov/about/offices/list/ovae/pi/hs/schoolsize.html>

the average school size nationwide at each instructional level. The research highlighted in the previous section of this report indicates that large schools might not be the most beneficial model for students, but many states and districts have turned to larger schools as a means to reduce costs.⁸⁵

Figure 3.4 Average School Size by Grade Level Served (1999-2000)



Source: National Center for Education Statistics⁸⁶

SAVINGS AND COSTS ASSOCIATED WITH CHANGES TO SCHOOL SIZE

The justification for the creation of larger schools usually emphasizes various cost savings that are expected to occur as a result on the expansion. This belief is based on the idea that larger schools can operate more efficiently than small schools, otherwise known as economies of scale. The available research highlights five overarching economic benefits associated with the use of large schools:

- **Indivisibilities** relates to the idea that the quality of the educational services provided to students does not diminish as the number of students increases, to a certain extent. For example, the central administration of a school can serve a varying range of students before they require additional administrators.
- **Increased dimension** refers to the efficiency of the “larger units of capital,” meaning that large school buildings can operate at a lower costs because they typically employ superior equipment.
- **Specialization** is related to the cost-savings that arise from the full use of teachers who specialize. For example, in a small school, a specialized science teacher may have to teach outside her area of expertise for several classes a day, but in a larger school, the benefits associated with specialization are more readily realized.

⁸⁵ Duncombe, W. and J. Yinger. “School District Consolidation: The Benefits and Costs.” *The School Administrator*, May 2010. <http://www.aasa.org/SchoolAdministratorArticle.aspx?id=13218>

⁸⁶ “Overview of Public Elementary and Secondary Schools and Districts: School Year 1999-2000.” National Center for Educational Statistics. <http://nces.ed.gov/pubs2001/overview/table05.asp>

- **Price benefits of scale** are associated with a larger school's ability to save on the costs of supplies, equipment, and labor through bulk purchasing power.
- **Learning and innovation** refers to the idea that high-enrollment schools are more productive because they can foster a collaborative culture within their large community of staff that benefits teachers and students alike. Moreover, a large school may have a greater capacity to implement widespread, innovative curriculum at a lower cost.⁸⁷

Although these cost-savings measures are valid, there are also a number of direct and indirect expenditures associated with larger schools that are identified in the literature. Typically, experts that oppose large schools argue that the potential savings highlighted above do not offset the negative effects commonly associated with high-enrollment schools.⁸⁸ The available literature cites several factors that may negatively impact the anticipated cost-savings:

- **High transportation costs** are usually a result of larger schools because students from a wider area are merged into one school. Moreover, this often results in longer travel and transportation time for students who may not live close to the school.
- **Inferior staff motivation** can be a consequence of large schools. As stated previously, teachers and administrators in small schools tend to have a more positive attitude when compared to educators in large schools. Researchers hypothesize that this stems from the increased flexibility within small schools and the more direct relationship that exists between teachers and school administrators.
- **Decreased student motivation** can be a product of larger schools, as research indicates that students feel more involved in small schools; they are more likely to participate in extracurricular activities and they have a stronger connection with teachers and administrators that positively impact their school experience.
- **Reduced parental involvement** is often associated with larger schools because parents have a difficult time making connections with teachers and administrators in such a setting. Additionally, parents are more prone to participate when they find their involvement rewarding, which is also more challenging in high-enrollment schools.⁸⁹

COST-EFFECTIVENESS OF SCHOOL SIZE MODELS

The theory that large schools are more economically efficient than small schools has been tested in a number of research studies. Many early studies conclude findings that support

⁸⁷ Bulleted points adapted from: Duncombe, W. and J. Yinger. "Does School District Consolidation Cut Costs?" Center for Policy Research at Maxwell School of Citizenship and Public Affairs, January 2001. pp. 3-4.
<http://surface.syr.edu/cgi/viewcontent.cgi?article=1121&context=cpr>

⁸⁸ Duncombe, W. and J. Yinger. "School District Consolidation: The Benefits and Costs." Op. cit.

⁸⁹ Bulleted points adapted from: Duncombe, W. and J. Yinger. "Does School District Consolidation Cut Costs?" Op. cit. pp. 5-6.

this concept, but other researchers argue that extenuating factors must be considered in order determine the cost-effectiveness of large school models. Generally, the findings are mixed, but currently available research does not support school enrollment that exceeds more than 1,000 students.⁹⁰

Fox actually determined that educational costs take a U shape, meaning that schools below an optimal level are more expensive per pupil, but schools above an optimal level also increase per pupil expenditures.

Early research supports the idea that large schools are more economically efficient based on the economies of scale assumption. For example, research by Morris (1964) found that high schools that enroll less than 500 students pay higher costs per student than larger schools.⁹¹ Subsequent research conducted by McGuffey and Brown (1978) also found a negative relationship between per pupil cost and school size, meaning as school size increases, per pupil cost decreases.⁹²

Despite these findings, other studies have produced divergent outcomes that counter the cost-effectiveness of large schools. Monk (1987) examined school size and discovered that “the sources of scale economies are largely exhausted by the time enrollments reach relatively small levels.”⁹³ His findings indicate that once school enrollment exceeds 400 students, the economic benefits of larger enrollment are no longer realized.⁹⁴ A similar realization was discussed by Turner and Thrasher (1970), who found that cost-savings per student become negligible once enrollment surpasses 1,000 students.⁹⁵ Further research by Fox (1981) actually determined that educational costs take a U shape, meaning that schools below an optimal level are more expensive per pupil but schools, above an optimal level also increase per pupil expenditures.⁹⁶

Fox expanded on his findings in an attempt to determine why the economies of scale cost-savings were lost at a certain point. He concluded that schools reach a juncture where maximum capacity for teachers and administrators is reached. After that point, savings decline while administrative costs increase. Monk (1992) further supported this idea,

⁹⁰ Slate, J. and C. Jones. “Effects on School Size: A Review of the Literature with Recommendations.” P. 4.
<http://www.usca.edu/essays/vol132005/slate.pdf>

⁹¹ Ibid. p. 3.

⁹² McGuffey, C. and C. Brown. “The Relationship of School Size and Rate of School Plant Utilization to Cost Variations of Maintenance and Operation.” *American Educational Research Journal*, 15:3. June 1978.
<http://aer.sagepub.com/content/15/3/373.short>

⁹³ Monk, D. “Secondary school size and curriculum comprehensiveness.” *Economics of Education Review*, 6:2. 1987.
<http://www.sciencedirect.com/science/article/pii/0272775787900471>

⁹⁴ Slate, J. and C. Jones. Op. cit. p. 3.

⁹⁵ Turner, C. and J. Thrasher. “School Size Does Make a Difference.” Institute for Educational Management, 1970.
<http://eric.ed.gov/?id=ED043946>

⁹⁶ Slate, J. and C. Jones. Op. cit. p. 3.

wherein he concluded that the anticipated magnitude of certain savings was not realized in larger schools.⁹⁷

In conclusion, the available research tends to show that while there are financial benefits to larger schools, the cost-savings are only realized until a certain point, and very small schools and very large schools are generally the most expensive to operate.⁹⁸ Although there is a lack of agreement on optimal school size, it is important to consider the unforeseen costs associated with extremely large schools. These expenditures might include other direct, monetary costs, such as increased transportation needs, or indirect costs associated with the negative impact that large schools can have on various student outcomes.

⁹⁷ Ibid.

⁹⁸ Ibid.

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