Thank you for your request to our REL Reference Desk regarding appropriate sizes of schools at the elementary, middle school and high school levels. Ask A REL is a collaborative reference desk service provided by the ten regional educational laboratories (REL) that, by design, functions much in the same way as a technical reference library. It provides references, referrals, and brief responses in the form of citations on research based education questions.

The information below represents the most rigorous research available. Researchers consider the type of methodology and give priority to research reports that employ well described and thorough methods. The resources were also selected based on the date of the publication with a preference for research from the last ten years. Additional criteria for inclusion include the source and funder of the resource.

Question: *What is the appropriate size for a school at the elementary, middle school and high school levels?*

Key words and search strings used in the search: *school size* AND *elementary schools;* OR *middle schools;* OR *academic achievement; optimal number of students in a school; school size* AND *school effectiveness; high school size*

Search databases and websites:

1. ERIC: http://www.eric.ed.gov/
2. JSTOR: http://www.jstor.org/action/showAdvancedSearch
3. Google Scholar: www.google.com/scholar
4. Institute of Education Sciences (IES) Resources: http://ies.ed.gov/pubsearch/
5. What Works Clearinghouse: http://ies.ed.gov/ncee/wwc/

Citations Retrieved: (NOTE: Abstracts and executive summaries are copied directly from the reports when possible to ensure accuracy):

Ares Abalde, M. (2014). School size policies: A literature review. *OECD Working Papers*, No.106, OECD Publishing. doi: 10.1787/19939019

Abstract/Summary: Recent demographic, economic and political trends have placed the issue of school size at the heart of school effectiveness and efficiency discussions. The subject of school size is particularly salient in remote and rural areas where the viability of small schools has been questioned. In spite of the relevance of school size policies, the literature on this issue is quite fragmented with few studies taking a comprehensive view on the implications of school size policies. This literature review attempts to bridge different strands of relevant research and describes existing country practices in order to provide a broader picture of the benefits and costs associated with different school sizes. The paper describes the different trends that have affected school enrolment and how different countries have managed school size policies, with a particular

focus on school consolidation. It discusses the consequences of school consolidation and the alternatives to consolidation when schools are facing declining enrolment. It also reviews the different mechanisms through which school size affects the quality and efficiency of schools, and the existing empirical evidence on these effects.

Borland, M. V., & Howsen, R. M. (2003). An examination of the effect of elementary school size on student academic achievement. *International Review of Education*, 49(5), 463-474. www.jstor.org/stable/pdf/3445310

Abstract/Summary: Prior studies that have investigated the relationship between school size and student academic achievement have produced conflicting results. For example, some studies found a positive relationship between school size and student achievement; other studies found that the relationship is negative. Typically, however, these past studies have not accounted for the influence of student ability in their analysis of the impact of school size on student achievement. The purpose of this paper is to examine the effect of school size on student achievement while accounting for student ability, among other variables. The results reported in this paper suggest that school size has a nonlinear relationship with respect to student achievement. Thus, there is an optimal school size with respect to the maximization of student achievement.

Gershenson, S., & Langbein, L. (2015). The effect of primary school size on academic achievement. *Educational Evaluation and Policy Analysis*, 37(1) Supplement 135S-155S. http://eric.ed.gov/?id=EJ1058626

Abstract/Summary: Evidence on optimal school size is mixed. We estimate the effect of transitory changes in school size on the academic achievement of fourth-and fifth-grade students in North Carolina using student-level longitudinal administrative data. Estimates of value-added models that condition on school-specific linear time trends and a variety of teacher-by-school, student, and school-by-year fixed effects suggest that, on average, there is no causal relationship between school size and academic performance. However, two subgroups of interest are significantly harmed by school size: socioeconomically disadvantaged students and students with learning disabilities. The largest effects are observed among students with learning disabilities: A 10-student increase in grade size is found to decrease their math and reading achievement by about 0.015 test-score standard deviations.

Kuziemko, I. (2006). Using shocks to school enrollment to estimate the effect of school size on student achievement. *Economics of Education Review*, 25(1), 63-75. http://eric.ed.gov/?id=EJ724520

Abstract/Summary: Previous studies of the connection between school enrollment size and student achievement use cross-sectional econometric models and thus do not account for unobserved heterogeneity across schools. To address this concern, I utilize school-level panel data, and generate first-differences estimates of the effect of school size on achievement. Moreover, to account for the possibility that trends in both achievement and enrollment size are jointly determined, I exploit shocks to enrollment provided by school openings, closings, and mergers in a two-stage-least-squares estimation. The results suggest that smaller schools increase both math scores and attendance rates and that the benefit of smaller schools outweigh the cost.

Leithwood, K., & Jantzi, D. (2009). A Review of empirical evidence about school size effects: A policy perspective, *Review of Educational Research*, 79(1), 464-490. http://eric.ed.gov/?id=EJ879147

Abstract/Summary: This review examined 57 post-1990 empirical studies of school size effects on a variety of student and organizational outcomes. The weight of evidence provided by this research clearly favors smaller schools. Students who traditionally struggle at school and students from disadvantaged social and economic backgrounds are the major benefactors of smaller schools. Elementary schools with large proportions of such students should be limited in size to not more than about 300 students; those serving economically and socially heterogeneous or relatively advantaged students should be limited in size to about 500 students. Secondary schools serving exclusively or largely diverse and/or disadvantaged students should be limited in size to about 600 students or fewer, while those secondary schools serving economically and socially heterogeneous or relatively advantaged students should be limited in size to about 1,000 students. (Contains 6 notes.)

Newman, M., Garrett, Z., Elbourne, D. Bradley, S., Noden, P., Taylor, J., & West A. (2006). Does secondary school size make a difference? A systematic review. *Educational Research Review*, 1(1) 41-60. http://eric.ed.gov/?id=EJ800597

Abstract/Summary: There is a vast body of literature on school size but comparatively few high quality empirical studies comparing outcomes in schools of different sizes. This systematic review synthesizes the results of the published research from 31 studies on the effects of secondary school size from OECD countries since 1990. Overall the directions and patterns of effect vary for different outcomes. For pupil attainment measured by exam results, and for attendance, larger schools appear to do better up to some optimal school size but estimates of this point or range are insufficiently precise to be useful. The implications of different school sizes on student behaviours are equivocal, but teachers and pupils at smaller schools are more likely to have a positive perception of their "school environment". Costs per pupil appear to decrease as school size increases. The results of the review suggest that there is little empirical evidence to justify policies that aim to "change" or mandate particular school sizes. However, given the evidence that there do

appear to be optimal sizes for some outcomes, stakeholders should be made aware that dramatic changes in a school's size may change the characteristics of a school's learning environment. (Contains 1 figure and 4 tables.)

Ready, D. D., & Lee, V. E. (2006). Optimal context size in elementary schools: Disentangling the effects of class size and school size. *Brookings Papers on Education Policy*, 9, 99–135. http://eric.ed.gov/?id=EJ896636

Abstract/Summary: Young children's learning--and how their learning is distributed by social background--may be influenced by the structural and organizational properties of their school. This study focuses on one important structural dimension of these educational contexts: "size." This study differs from extant studies linking size to student outcomes in four important respects. First, the authors focus on elementary school size. Second, they conceptualize the size of educational contexts quite broadly, focusing on the relative impacts of class size and school size, while simultaneously accounting for grade span. Third, they explore the effects of these structural characteristics of elementary schools on both learning and the equitable distribution of that learning by children's social background, particularly race or ethnicity and socioeconomic status. Fourth, their research design provides considerable methodological leverage with which to disentangle the confounding effects on student learning of student background and the size of elementary school contexts. In this study, the authors employ data from the Early Childhood Longitudinal Study, Kindergarten Cohort (ECLS-K). They also employ hierarchical linear modeling (HLM) within a three-level growth-curve framework. They present both descriptive and multivariate results. Their descriptive results provide information about both children and schools, organized by the size of their classes and schools. They also present their within-school and between-school multivariate and multilevel HLM results separately. Their within-school results describe the relationships between child-level characteristics and student learning. Their between-school models explore the effects of elementary school organizational size on student learning. The results suggest robust class-size effects, net of school size, the types of students enrolled, and other school-level characteristics; the effects of both class size and school size are estimated in the same models. That is, the class-size effects the authors report here are independent of school size, and vice versa. In this study, the authors find that organizational size--of both classes and schools--influences children's learning in literacy and mathematics in both kindergarten and first grade. (Contains 5 figures, 4 tables, and 40 notes.)

Schwartz, A. E., Stiefel, L., & Wiswall, M. (2011). Do small schools improve performance in large, urban districts? Causal evidence from New York City. (Working Paper No. 04-11). http://eric.ed.gov/?id=ED556798

Abstract/Summary: We evaluate the effectiveness of small high school reform in the country's largest school district, New York City. Using a rich administrative dataset for multiple cohorts of

students and distance between student residence and school to instrument for endogenous school selection, we find substantial heterogeneity in school effects: newly created small schools have positive effects on graduation and some other education outcomes while older small schools do not. Importantly, we show that ignoring this source of treatment effect heterogeneity by assuming a common small school effect yields a misleading zero effect of small school attendance. The following are appended: (1) Regents Examinations; (2) Definition of variables; (3) First stage, likelihood of attending a small high school; (4) Relationship between minimum distance to small schools and average student characteristics, by residence zip code; and (5) Full OLS and IV regression results.

Stevenson, K. R. (2009). School size: Why "smaller" may not be the answer. *ERS Spectrum*, 27-(2), 1-10. http://eric.ed.gov/?id=EJ864643

Abstract/Summary: School districts, and even states, striving to identify optimal school size are confounded more often than not by the conflicting research findings and theoretical arguments presented throughout the literature. Some writers adamantly declare that smaller schools are a "must" if educational opportunity is to be optimized. Others argue that school size itself has little impact on student performance, suggesting that other variables "masked" in school size are the real factors affecting student success. Yet others imply that smaller schools may make a difference in student performance, but the excessive cost to move in that direction is not warranted. They postulate that similar, if not better, results may be produced at less expense through enhanced technology, better instructional materials, and further professionalizing the teaching corps. Finally, some researchers studying school size indicate that, if school size does affect learning, its influence may vary greatly, depending upon the clientele served. The truth is, however, that the real effects of school size, if any, are not yet fully known--and may never be. While the topic has been studied extensively, the findings have been mixed, and often contradictory. Part of the reason for such varied results rests with differences in research methodologies. However, there are also some other common sense explanations as to why school size research findings diverge, sometimes significantly. This article is an inventory of factors that affect school size research findings, along with suggested implications for districts and states making decisions about how many students their schools should house.

Stiefel, L., Schwartz, A. E., & Wiswall, M. (2015). Does small high school reform lift urban districts? Evidence from New York City. *Educational Research*, 44(3) 161-172. http://eric.ed.gov/?id=EJ1057869

Abstract/Summary: Research finds that small high schools deliver better outcomes than large high schools for urban students. An important outstanding question is whether this better performance is gained at the expense of losses elsewhere: Does small school reform lift the whole district? We explore New York City's small high school reform in which hundreds of new small

high schools were built in less than a decade. We use rich individual student data on four cohorts of New York City high school students and estimate effects of schools on student outcomes. Our results suggest that the introduction of small schools improved outcomes for students in all types of schools: large, small, continuously operating, and new. Small school reform lifted all boats.

Weiss, C. C., Carolan, B. V., & Baker-Smith, E., C. (2010). Big school, small school: (Re)testing assumptions about high school size, school engagement, and mathematics achievement. *Journal of Youth and Adolescence,* 39(2) 163-176. http://eric.ed.gov/?id=EJ873790

Abstract/Summary: In an effort to increase both adolescents' engagement with school and academic achievement, school districts across the United States have created small high schools. However, despite the widespread adoption of size reduction reforms, relatively little is known about the relationship between size, engagement and outcomes in high school. In response, this article employs a composite measure of engagement that combines organizational, sociological, and psychological theories. We use this composite measure with the most recent nationally-representative dataset of tenth graders, Educational Longitudinal Study: 2002, (N = 10,946, 46% female) to better assess a generalizable relationship among school engagement, mathematics achievement and school size with specific focus on cohort size. Findings confirm these measures to be highly related to student engagement. Furthermore, results derived from multilevel regression analysis indicate that, as with school size, moderately sized cohorts or grade-level groups provide the greatest engagement advantage for all students and that there are potentially harmful changes when cohorts grow beyond 400 students. However, it is important to note that each group size affects different students differently, eliminating the ability to prescribe an ideal cohort or school size.

Zoda, P., Combs, J. P., & Slate, J. R. (2011). Elementary school size and student performance: A conceptual analysis. *International Journal of Educational Leadership Preparation,* 6(4). http://eric.ed.gov/?id=EJ974350

Abstract/Summary: In this article, we reviewed the empirical literature concerning the relationship between school size and student performance with a focus was on determining the extent to which school size, specifically elementary school size, was related to student academic achievement. Most of the extant literature was on secondary school size with fewer studies published on elementary school size and even fewer studies published on middle school size. In this review, we provide a critical analysis of the available research on school size. Moreover, the benefits and disadvantages of small versus large schools were analyzed. Despite an abundance of published research studies, definitive answers regarding school size and student performance remain unanswered. Decisions about school size appear to be complex and involve a variety of factors such as costs, community support, and students with special educational needs. (Contains 2 tables.)

Referrals

Federally Funded Resources:

- Institute of Education Sciences (IES), public search engine available at: http://ies.ed.gov/pubsearch/
- What Works Clearinghouse: http://ies.ed.gov/ncee/wwc/\\
- National Center for Education Statistics: https://nces.ed.gov/
- Schools and Staffing Survey (SASS): https://nces.ed.gov/surveys/sass/

Disclaimer:

This Ask A REL response was developed by REL-SE under Contract ED-IES-12-C-0011 from the U.S. Department of Education, Institute of Education Sciences. The content does not necessarily reflect the views or policies of IES or the U.S. Department of Education, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. government.