



Thank you for your request to our REL Reference Desk regarding evidence-based information about the relationship between class size and student achievement. 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: *Is there research on the relationship between class size and student achievement?*

Search Process

Key words and search strings used in the search: *class size AND student achievement*

Search databases and websites:

- Google Scholar (<http://scholar.google.com>)
- ERIC (<http://www.eric.ed.gov>)
- JSTOR (<http://www.jstor.org/action/showAdvancedSearch>)
- Institute of Education Sciences (IES) Resources: <http://ies.ed.gov>
- What Works Clearinghouse: <http://ies.ed.gov/ncee/wwc/>

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

Borland, M.V., Howsen, R.M., & Trawick, M.W. (2005). An investigation of the effect of class size on student academic achievement. *Education Economics*, 13(1), 73-83. doi: 10.1080/0964529042000325216

Abstract/Summary: Despite the existence of a considerable and current educational literature concerned with the effect of class size on student achievement, the results of attempts to empirically identify the relationship between the variables class size and student achievement are mixed at best. These attempts have typically been hindered, however, by the existence, at least, of one of four factors: (1) the use of a student /teacher ratio as the measure of class size resulting in measurement error; (2) the estimation of a mis-specified model resulting from the failure to control for family effects (i.e., student innate ability); (3) the general failure to take into account the endogeneity of class size with respect to student achievement; and (4) the employment of an incorrect functional form when specifying the relationship between class size and student



achievement. The purpose of this paper is to investigate the effect of class size on student achievement, unhindered by the existence of the four factors typically associated with prior attempts. The results of this reinvestigation suggest that the relationship between class size and student achievement is not only non-linear, but non-monotonic.

Chingos, M. M. (2013). Class size and student outcomes: Research and policy implications. *Journal of Policy Analysis and Management*, 32(2), 411-438. doi:10.1002/pam.21677

Abstract/Summary: This article reviews the evidence base available to inform such policy decisions. It divides the review of the high-quality evidence on class size into three sections. First, it discusses the Tennessee STAR experiment, which is the most important and influential study because it is the only modern randomized experiment conducted at a significant scale. Second, it reviews the quasi-experimental evidence based on naturally occurring variation in class size that is credibly exogenous to student achievement. Finally, it reviews the quasi-experimental evaluations of two statewide class-size reduction policies. These studies are examined separately because in addition to offering evidence about class size, they also raise important issues related to the design and implementation of class-size policies.

Ehrenberg, R. G., Brewer, D. J., Gamoran, A., & Willms, J. D. (2001). Class size and student achievement. *Psychological Science in the Public Interest*, 2(1), 1-30. doi: 10.1111/1529-1006.003

Abstract/Summary: Reports on the significance of class size to student learning. Includes an overview of class size in various countries, the importance of teacher adaptability, and the Asian paradox of large classes allied to high test scores.

Januszka, C., & Dixon-Krauss, L. (2008). Class size: A battle between accountability and quality instruction. *Childhood Education*, 84(3), 167-170.

Abstract/Summary: A substantial amount of controversy surrounds the issue of class size in public schools. Parents and teachers are on one side, touting the benefits of smaller class sizes (e.g., increased academic achievement, greater student-teacher interaction, utilization of more innovative teaching strategies, and a decrease in discipline problems). On the other side, many legislators and policymakers doubt the benefits, claiming that smaller classes produce minimal results while incurring large costs. Those who oppose decreasing class sizes believe that funds could be more wisely spent on programs that show greater benefits. This argument is framed between two opposing perspectives: accountability versus quality instruction. Policy analysts refer to accountability as a cost-benefit analysis of a program. Cost-benefit analyses are often used to examine education policy issues with a focus on school administration, finance, and leadership. Another form of analysis, experimental analysis, tests the integrity of a policy. Experimental analyses are commonly used to examine school curricular issues focusing on



pedagogy and student achievement. Experimental analysis requires random assignment of subjects to experimental and control groups, a treatment for the experimental group, and an evaluation to determine which group performed better. This article addresses the feasibility of reducing class size by reviewing the literature, using experimental and cost-benefit analyses. The experimental analysis includes a review of class size studies and their application on large samples. The cost-benefit analysis examines class size policies, initiatives, and costs involved for one state--Florida.

Jepsen, C. & Rivkin, S. (2009). Class size reduction and student achievement: The potential tradeoff between teacher quality and class size. *Journal of Human Resources*, 44(1), 223-250. doi: 10.1353/jhr.2009.0008

Abstract/Summary: This paper investigates the effects of California's billion-dollar class-size-reduction program on student achievement. It uses year-to-year differences in class size generated by variation in enrollment and the state's class-size-reduction program to identify both the direct effects of smaller classes and related changes in teacher quality. Although the results show that smaller classes raised mathematics and reading achievement, they also show that the increase in the share of teachers with neither prior experience nor full certification dampened the benefits of smaller classes, particularly in schools with high shares of economically disadvantaged, minority students.

Milesi, C., & Gamoran, A. (2006). Effects of class size and instruction on kindergarten achievement. *Educational Evaluation and Policy Analysis*, 28(4), 287-313. doi: 10.3102/01623737028004287

Abstract/Summary: Although experimental results indicate that smaller classes promote higher achievement in early elementary school, the broader literature on class-size effects is inconclusive. This seeming contradiction raises questions about the generalizability of experimental evidence, an issue that this article addresses by examining the effects of class size on achievement in kindergarten with data from a nationwide survey, the Early Childhood Longitudinal Study-Kindergarten Class of 1998-99. To distinguish class-level from individual-level effects, this analysis utilizes hierarchical linear models. In response to concerns about selectivity, teacher fixed-effects models are also estimated. In an effort to understand the inconsistent findings of the past, the authors examine classroom conditions that may affect the link between class size and academic achievement, and also consider whether class size has different effects for different groups of students. The authors find no evidence of class-size effects on student achievement in either reading or mathematics, and results indicate that class size is equally insignificant for students from different race/ethnic, economic, and academic backgrounds. Teacher fixed-effects analyses also yield null findings for class size. Instructional activities offer significant boosts to achievement, but the effects of instruction do not differ between small and large classes. The authors discuss why the small class size advantage



evidenced by experimental research might not generalize to non-experimental, naturally occurring settings throughout the nation.

Shin, Y., & Raudenbush, S. W. (2011). The causal effect of class size on academic achievement: Multivariate instrumental variable estimators with data missing at random. *Journal of Educational and Behavioral Statistics*, 36(2), 154-185. doi: 10.3102/1076998610388632

Abstract/Summary: This article addresses three questions: Does reduced class size cause higher academic achievement in reading, mathematics, listening, and word recognition skills? If it does, how large are these effects? Does the magnitude of such effects vary significantly across schools? The authors analyze data from Tennessee's Student/Teacher Achievement Ratio study (STAR) of 1985, where students and teachers are randomly assigned to a small or regular class. The authors propose a three-level multivariate simultaneous equation model with an instrumental variable (IV) and estimation via maximum likelihood (ML) to analyze the data under an assumption of data missing at random (MAR). The IV, random assignment of students to a small or regular class, reduces class size which, by hypothesis, improves academic achievement in these domains. The authors extend Rubin's Causal Model (RCM) by involving a modified Stable Unit Treatment Value Assumption (SUTVA), requiring no interference between classrooms and intact schools. The method accommodates data with a general missing pattern and extracts full information for analysis from the STAR data. The authors investigate both homogenous and heterogeneous causal effects of class size on academic achievement scores across schools. The results show that reducing class size improves reading, mathematics, listening, and word recognition test scores from kindergarten to third grade, although the effects appear relatively small in second grade. The authors find no evidence that the causal effects vary across schools.

Watts, R. S., & Georgiou, A. (2008). A study on the effects of smaller class size on student achievement. *ERS Spectrum*, 26(4), 21-30.

Abstract/Summary: Since the passage of No Child Left Behind, schools have been looking for resources that are proven, through research, to improve student achievement. The purpose of this article is to determine if there is a relationship between class size and student achievement among 137 school systems in Tennessee. The authors provide a review of the literature on student achievement, including studies on the Student/Teacher Achievement Ratio (STAR) and the National Child Development Study (NCDS). Using a hierarchical regression analysis, the authors examined four achievement measures, controlling for the influence of socioeconomic background. The authors conclude that economic background has a greater influence on academic achievement of elementary school students in Tennessee than high school students; and that after controlling for socioeconomic status, the student-teacher ratio was not significantly related to the four achievement measures.



Whitehurst, G. J. & Chingos, M. M. (2011). *Class size: What research says and what it means for state policy*. Washington, DC: The Brookings Institution. Retrieved from http://www.brookings.edu/~media/research/files/papers/2011/5/11%20class%20size%20whitehurst%20chingos/0511_class_size_whitehurst_chingos.pdf

Abstract/Summary: Class size is one of the small number of variables in American K-12 education that are both thought to influence student learning and are subject to legislative action. Legislative mandates on maximum class size have been very popular at the state level. In recent decades, at least 24 states have mandated or incentivized class-size reduction (CSR). The current fiscal environment has forced states and districts to rethink their CSR policies given the high cost of maintaining small classes. The substantial expenditures required to sustain smaller classes are justified by the belief that smaller classes increase student learning. The authors examine "what the research says" about whether class-size reduction has a positive impact on student learning and, if it does, by how much, for whom, and under what circumstances. Despite there being a large literature on class-size effects on academic achievement, only a few studies are of high enough quality and sufficiently relevant to be given credence as a basis for legislative action.

Referrals

Organizations:

- Center for Educational Reform: <http://edreform.com>
- National Education Policy Center: <http://nepc.colorado.edu>

Federally Funded Resources:

- **US Department of Education, Institute of Education Sciences (IES) Resources:** <http://ies.ed.gov>
- **What Works Clearinghouse:** <http://ies.ed.gov/ncee/wwc/>

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