

Chiefs' Pocket Guide
to

CLASS SIZE

A synthesis of current and historical class size research literature for use by Chief State School Officers and state education agency staff

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Chiefs' Pocket Guide to Class Size: A Research Synthesis to Inform State Class Size Policies

Few questions in public education discourse benefit as much from research-based evidence as the question of class size — the pursuit of the ideal number of students that should be co-located for any particular period of instruction. But for policymakers, research on class size can be an embarrassment of riches, and much of the research appears to conflict — literature reviews often find that the number of studies boasting significant returns on investment offered by class size reduction (CSR) equals the number citing its ineffectiveness. Still more reports suggest no significant effects at all.

In this *Chiefs' Pocket Guide*, we draw from the major studies and literature reviews of CSR to find that, **when viewed in isolation – a practice not recommended – dramatic reductions in class size are associated with desirable outcomes, including higher levels of student learning, and the typically modest effects are more pronounced in the early grades and for low-income minority students. When viewed from a whole-systems perspective, however, CSR efforts require a comprehensive consideration of resources, and therefore may not be the most cost-effective approach to improving student learning.**

This *Chiefs' Pocket Guide* will examine

- A brief history of high-profile CSR efforts
- A synthesis of research on the effects of CSR efforts
- Policy considerations for state education chiefs who may be implementing, considering, or reconsidering CSR as part of their reform agenda
- Arguments for designing systems that move beyond the “class size” construct

Brief history of high-profile class size reduction efforts

Several states have made modifications to class size in the past several decades (Figure 1). Best known of these studies is the Tennessee Student Teacher Achievement Ratio (STAR) study, one of few instances of a state-level policy intervention designed as a randomized control trial, implemented over a three-year period by then Governor Lamar Alexander in 1986. The Tennessee experiment actually relied on early studies from Project Prime Time in Indiana, initiated a year earlier, and from Texas interventions that had been underway for three years. In 1996, California mandated a phased-in CSR effort that focused on class-size in the early grades. Also in 1996, Wisconsin implemented its own CSR effort, termed Project Student Achievement Guarantee in Education (SAGE), with nine low-income schools piloting the CSR reform as part of a package of reforms meant to address the achievement of underperforming subgroups. Florida citizens, in 2002, approved an amendment to the state constitution that set limits on the number of students in core classes (such as math, English, science, etc.) in the state's public schools. The amendment set varying class size maximums for early primary, upper primary, and secondary education classrooms. The migration to smaller class sizes was to be complete by the 2010-2011 school year.

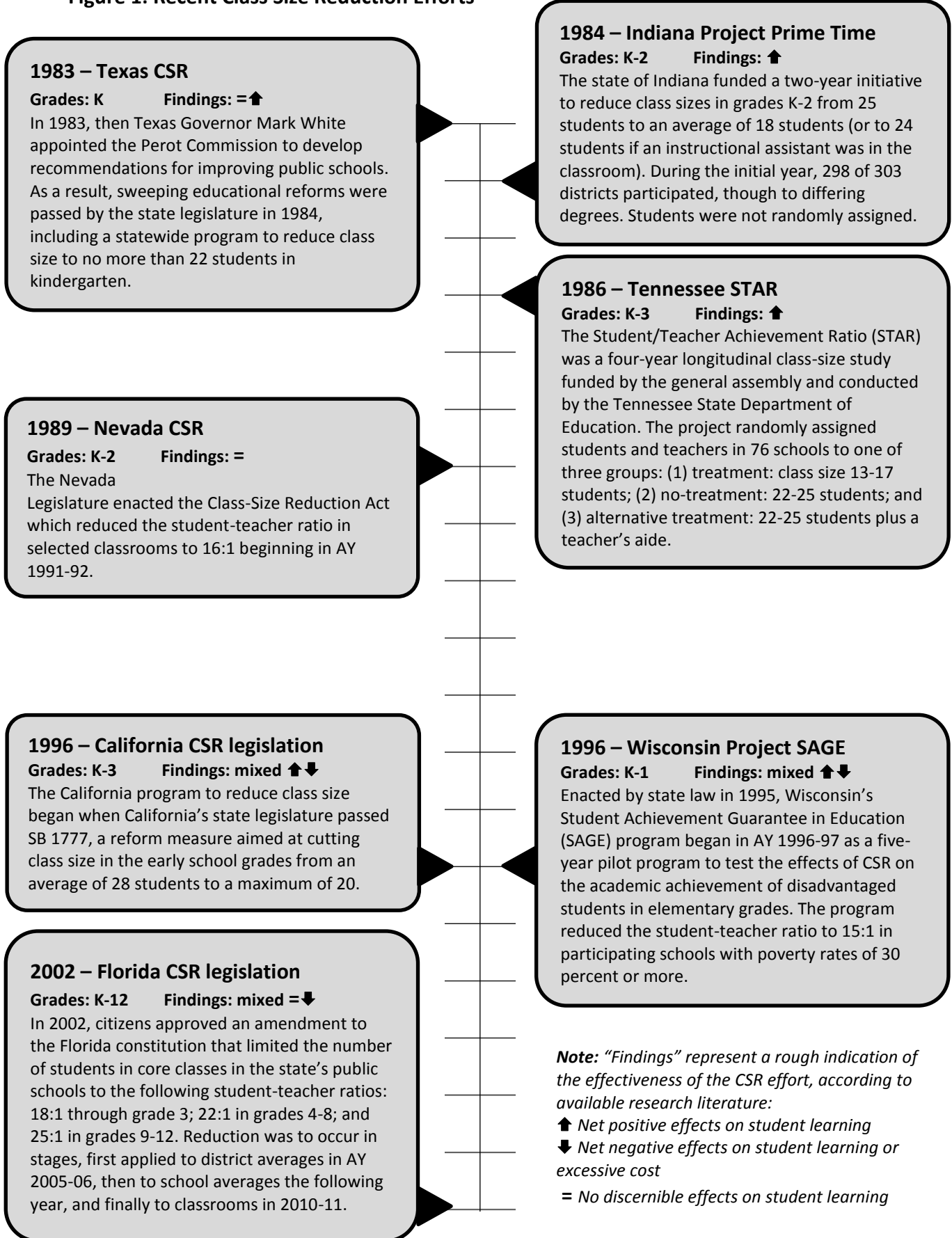
Notes on the focus and approach of this *Chiefs' Pocket Guide*

Adherent to professional standards for evaluation and review, our internal effort to make sense of the class size literature was mindful of three core principles.

1. *We committed to understanding – to the extent possible – the context of the study.* The educational research community has recently been persuasive and forceful in arguing for mechanisms that allow us to know what works, when, for whom, and under what sets of circumstances (Bryk, Gomez, & Grunow, 2010). By viewing studies on the effectiveness of class size reduction efforts through this lens, many (though not all) of the apparent contradictions in findings are resolved, and more effective, nuanced policy directions avail themselves to interested policymakers.
2. *We committed to an examination of international evidence.* While context is highly variable from nation to nation, it is also highly variable from state to state, and often the variability in context between a US state and a nation will be less than the context variability between two US states. In other words, we think international evidence can often be just as guiding as US evidence. To that end, we examined studies from the Organisation for Economic Cooperation and Development (OECD); the World Bank; the Consortium for Research on Educational Access, Transitions and Equity (CREATE) at the University of London; and other studies from international researchers.
3. *We committed to focusing on implications for policymakers.* This guide does not attempt a full, formal review of the literature on class size, nor does it offer original, primary insights for the research community. Instead, it intends to make sense of the argumentation in the research literature for policymakers. Furthermore, given that our membership directs the activity of state education agencies, we have focused our sense-making on influencing state-level policy.

The CSR efforts highlighted in this research synthesis, however, are just the most analyzed reforms, due either to a deliberate research design (as was the case for Tennessee and Wisconsin), an activated research community (as was the case for California), or a longitudinal data system that makes the data available routinely to a research community (as was the case in Texas, and is the reason for much interest in Florida's reform, long seen as the leader in state education data system design). According to the Education Commission of the States, 13 states passed some form of CSR in just the two-year window between 1998 and 2000, but many of these efforts have not attracted as much research attention and are therefore not reflected in this *Chiefs' Pocket Guide*. A more in-depth table of several of the most influential studies on state-level reforms also accompanies this guide, and is available upon request.

Figure 1: Recent Class Size Reduction Efforts



Synthesis of research on the effects of class size reduction efforts

Our review of available literature, including over 30 articles, a dozen primary research studies, and several meta-analyses, suggests that *all other things being equal, smaller class sizes tend to facilitate a number of desirable outcomes, including higher levels of student learning*. Effects tend to be modest, and more pronounced for large reductions (7-10 students), for low-income minority students, and for early primary grades. Findings showing greater effects among low-income minority students are consistent with other research literature that suggests stronger than average school effects for these when compared with the overall population. In other words, if a student is poor, what happens in the school matters more than what happens if the student is middle-class.

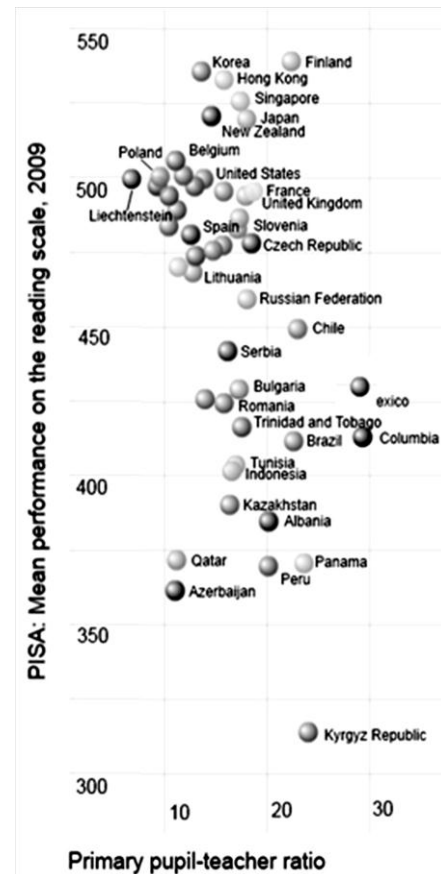
To be certain, however, “*all other things*” are almost never equal in schools, and policymakers considering changes to class size policies should consider both contextual challenges faced by schools and districts within the system, as well as the accompanying requirements for implementation. Depending on local circumstances, CSR may be less effective and more expensive than other improvement efforts a given school might undertake. One study showed that the class size reduction in the Tennessee STAR project was more cost-effective in math but less cost-effective in reading when compared to the Success For All early intervention program (Borman, 2001). Two additional studies used alternative methods to identify strategies that are respectively more effective and more cost-effective than CSR: curriculum reform, education workforce reconstitution, and charter school enrollment (Whitehurst, 2009); and computer-aided instruction, cross-age tutoring, early childhood programs, and increased instructional time (Harris, 2009).

Almost all of the research on CSR efforts that also examined the influence of teacher quality concedes that the gains created in a smaller class do not match the gains created by ensuring the presence of an effective teacher. In fact, in those instances where CSR efforts have failed to produce significant improvements, it is often because the policy shift failed to account for the recruitment of additional qualified personnel. As a result, the quality of the teaching force was diluted, and any effects that may have been realized by the CSR initiative were erased.

The effects of class size on teacher quality are also the likely reason that, in the most developing of countries, larger class sizes tend to lead to *increased* achievement — an apparent contradiction of most United States and developed-world findings. In Bangladesh, for instance, teachers are appointed *only* when the class size exceeds 60 (Little, 2008). Students

Figure 2: Relationship Between Pupil-Teacher Ratio and Reading Performance Among Nations

Source: World Bank EdStats 2009



in smaller classes thus lack access to prepared teachers because their low numbers have not triggered the need for a trained instructional leader.

Additional international comparisons performed using data collected by the World Bank demonstrate that lower student-teacher ratios do correlate with increased academic performance in reading (Figure 2). These data, however, are in no way causal, and are likely confounded by the fact that the nations at the lower end of the performance spectrum also experience contextual factors typically associated with lower performance – factors like lower national incomes, inadequate access to quality facilities, and a dearth of qualified instructional leaders.

In a more rigorous analysis of the differential impact of a range of interventions across international contexts, the Organisation for Economic Co-Operation and Development (OECD) found that while class size reductions are modestly effective, they are less effective than increasing teacher compensation, making extra-curricular classes available, or raising the average expenditure rate per student (OECD, 2010). Another study from the United Kingdom ranked 138 interventions on their level of positive impact on student learning. CSR efforts ranked 106th (Hattie, 2009). Thus most studies suggest a positive impact for class size reduction efforts, but perhaps not as powerful an impact as may be socially hoped for and imagined.

Considerations for class size policy

There appear to be six critical takeaways for policymakers contemplating class size reductions or increases.

1. **Any changes in class size policies should be accompanied by steps to maintain or improve teacher quality.** Class size is inextricably linked to the size of the teaching force: a one-student change in the student-teacher ratio can impact the size of the teaching force by as much as 7 percent (Whitehurst, 2011). Therefore, when reducing class size, states should enact a strategy for attracting and/or training the required numbers of high-quality teachers. When increasing class size, on the other hand, states should simultaneously implement effective dismissal policies that preserve the quality of the teaching staff.
2. **CSR efforts require a robust consideration of cost and available facilities.** The range of cost estimates (when adjusted to 2010 dollars) associated with CSR varies anywhere from \$273 per student to \$1160 per student. Given that the average expenditure per student in the 2006-2007 school year (the most recent year from which data are available from the National Center for Education Statistics) was \$9,683 (\$10,400 in 2010 dollars), the upper range of the estimate predicts an average increase of 11 percent in expenditures. Rigorous state and local-context based financial modeling should accompany any policy proposal to manipulate class size, as the actual expenditures will vary significantly based on ambient teacher salaries, the size of the reduction or increase adjustment, the availability of facility space, and the size of the enrollments in the targeted populations.

Again, the California experience is illuminating. Already dealing with burgeoning state enrollments, in just the second year of implementation the California CSR had caused conversions of dedicated space for music and art instruction, special education, and child care to regular classroom space in approximately one quarter of California schools. Many were required to buy or rent portable classrooms. There is some research to suggest that such facilities are sub-optimal for supporting learning.

3. **Prioritize smaller class sizes for the populations that have been shown to reap the most benefits: early grades and low-income minority students.** If possible, class size reduction should be targeted toward the populations for which it is known to work best. Conversely, policymakers considering class size increases may wish to maintain current class sizes for the most economically challenged of schools, or to shield the early grades from dramatic increases.
4. **When making modifications to class size, small increments are unlikely to lead to substantial shifts in student achievement patterns.** Changes in the average class size – modifying class loads by one or two students in a given direction – do not seem to lead to significant improvements or detriments to student achievement in most analyses of class size manipulations. The greatest effects recorded were for class size reductions of 7-8 students per class (Krueger, 1999).
5. **Given that effects are highly context-specific, policymakers may wish to craft funding formulas that allow for flexibility at the local level.** A review of state implementation strategies suggests that enabling legislation or policy can help lower costs by allowing for local decision-making flexibility. In particular, a review of the California CSR examined the state decision to set class size as a maximum, rather than as an average for a school or district. The California funding formula only paid districts for classes with 20 students or less – initially \$650 per student in a small class, and later \$800 per student.

An early evaluation of the state's class size reduction efforts by the California Legislative Analyst's Office found that lack of flexibility raised implementation costs by 21 percent. Thus the Legislative Analyst's Office recommended that *average* class size remain 20, but no *individual* class could be larger than 22; however, this recommendation was not adopted (Reichardt, 2001).

6. **Treat each policy implementation as an opportunity to test a hypothesis.** Despite some limitations from the Tennessee STAR experiment, it invited much analysis and yielded more credible results precisely because it was policy with an implementation plan designed for evaluation. Policy leaders should consult with researchers *a priori* to help develop an implementation strategy that will enable others to learn about the true effectiveness of the intervention.

Moving beyond the “class size” construct

Over the past two years, CCSSO has engaged with schools, districts, and state education agencies in its Innovation Lab Network to work toward identifying new designs for public education that empower each individual student to thrive as a productive learner, worker, and citizen. Comprised of eight states including Kentucky, Maine, New Hampshire, New York, Ohio, Oregon, West Virginia, and Wisconsin, the network strives to support programmatic, policy, and structure design work within each participating state and across the network.

While the Innovation Lab Network is positioned to directly challenge the status quo, it anchors its work using six critical attributes as initial design principles for large-scale systems transformation. Those critical attributes include world-class knowledge and skills; comprehensive systems of support; personalized learning; performance-based learning; anytime, anywhere learning; and student ownership of learning. Collectively, the participants in the network use these attributes to pressure test new, student-centered policies and practices; promote success stories and experiences; and identify the components of infrastructure needed to support their work. By demonstrating and learning from their work at the state, district, and classroom levels, the Innovation Lab Network seeks to catalyze thinking across all states about how to ensure each child's educational experience is successful and enduring.

In such reimagined learning environments, constructs like “class-size” may cease to be meaningful. Learners may be co-located for various periods of time and in various configurations, based on emergent needs generated by personalized learning profiles. Or, learning may occur temporally or geographically outside of school, assisted by adaptive online curricula. Clearly, reorganizing the system in such a way will require innovative state financial models and formulas that are independent of class size calculations. For this reason, the partnership is deliberately tri-level, involving local practitioners, district administrators, and state policymakers and implementers, networked together to produce blueprints for a system transformed from the inside — the learner center — out (Pittenger, 2010).

Finally, while “class size” may not be a meaningful way of organizing thinking in the next generation of learning, findings from class-size literature can still be useful to new system architects. Most research that hazards causal reasons for why CSR tends to support higher levels of learning cites the enhanced ability of the teacher to be able to personalize instruction for the student. Moreover, given that the search for new and better models for supporting learning is likely to be driven by a research and development habit of mind, policy implementations like the Tennessee STAR project or Wisconsin's project SAGE should be analyzed for their treatment of policy interventions as testable hypotheses.

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