Class Size

Class size has been studied in the United States since about 1900, yet it was still in limbo by 2008. An early econometric study tied small classes to improved student outcomes. Fredrick Mosteller, Richard J. Light, and Jason A. Sachs’s study discussed only two topics as sustained inquiry in education: skill grouping and class size. They sought empirical evidence about education outcomes from heterogeneous or skill-grouped classes and about the impact of class size on student learning.

The authors found a few well-designed studies on benefits of skill grouping, and results were equivocal. They then described the Student Teacher Achievement Ratio (STAR) randomized, large-scale class-size experiment (1984–1990) that demonstrates convincingly that student achievement is better supported in smaller classes in Grades K–3, and that this enhanced achievement continues...
when the students move to regular-size classes in
the fourth grade and beyond.

Mosteller and colleagues’ finding is mysterious
juxtaposed with a Gene Glass comment in 1992 of
which he asserted that of all the areas omitted from
deliberation in previous encyclopedia publications,
none is more unusual than that of school class size.
According to Charles M. Achilles, between the
Encyclopedia of Education, any understanding of
class size and its actual uses have arguably seen both
the greatest and least change among the fundamen-
tals of education. Achilles has made that claim for
the past 5 years. Even with huge increases in knowl-
edge based upon robust research about what small
classes achieve, how and why gains occur, about
policy and implementation strategies, the ideologies
that Glass described still hinder using small classes
to improve education processes and outcomes.

With full data on 11,601 of approximately
15,000 students involved, the STAR database has
been used in secondary analyses to demonstrate
small-class, K–3 benefits on student long-term
improvements, including large social and economic
benefits such as high school graduation, college
admissions, improved health, decreased grade
retentions, and closing achievement gaps.

STAR, in its Lasting Benefits Study (LBS), fol-
lowed students in Grades 4–8 combined with the
large K–3 small-class implementation in 16 of
Tennessee’s poorest counties (1990–1995); this
study provided a base for burgeoning U.S. and
international class-size studies. Small classes were
court-mandated remedies in the New Jersey
Supreme Court case Abbott v. Burke (1990, 1994,
1997) and in the Campaign for Fiscal Equity in
New York. After noting that Title I had failed in
its mission to address equity issues, Isabel Sawhill
commented on education’s role for opportunity in
America and identified good teaching and small
classes as two measures that have been shown to
improve educational outcomes. Small classes
should be the cornerstone of education improve-
ment, not ubiquitous Title I–type approaches such
as projects, pull-outs, and teacher assistants.

The profound and durable effects of small class
size on students’ opportunity to learn and achieve
in Grades K–3 are well documented. The STAR
experiment and follow-up studies such as Challenge,
Enduring Effects, and other initiatives such as
Wisconsin’s Student Achievement Guarantee in
Education, consistently demonstrated positive
short- and long-term small-class effects. No nega-
tive effects on student behaviors, attitudes, or
achievement were found. Less is known about how
small classes influence achievement in the middle
grades.

A search of the education database Academic
Search Premier and the social sciences section of
the economics database PAIS International and
Archives produced 874 peer-reviewed articles that
contained the key words class size. Most articles
presented or discussed research on class size in the
United States, Western Europe, and Asia at the
elementary level. A few dozen articles explained
the influence of class sizes on student attitudes,
perceptions, and achievement at high school and
university levels. A Boolean search of both data-
bases using class size and middle school produced
24 results. We found no experimental, quasi-ex-
perimental, or well-developed nonexperimental
studies in the United States on outcomes of class-
size reduction on middle school student achieve-
ment. An obvious dearth of empirical research
exists in the knowledge dynamic.

An occasional study and some practice sug-
gested that small classes are important in later
years of schooling and can influence learning
without extra costs. When one considers that
apprenticeships, internships, and seminars in
high school are typically small groups, as are
Advanced Placement and International
Baccalaureate, and Title I remediation courses,
reducing class sizes in middle school to produce
increases in the cognitive and affective outcomes
seems reasonable. An investigation of class size
on student achievement in middle school might
be moot if education leaders and policymakers
implemented class-size reforms appropriately in
elementary grades; unfortunately that is currently
not the case.

Middle school principals seek ways to address
student achievement and behavior in their schools.
Ideas like additional professional development,
homogeneous grouping, and pull-out programs
Class Size

are widely used, with limited or no positive large-scale results. Daniel Tanner and Laurel Tanner declared the principle is clear: Class-size controls the nature of instruction and form of assessment. William Ouchi wrote, structure must change before culture can change. W. Edwards Deming demonstrated through his work in Japan and America that administratively mutable structural changes account for 85% to 94% of an organization’s effectiveness. While class size in middle schools should not be a targeted intervention, it holds promise as a middle school reform while policy and education leaders demonstrate the leadership to support appropriate implementation in the primary school years.

Helen Pate-Bain renewed national interest in class size while president of the National Education Association. As professor of education administration and director of the Center of Excellence for Research in Basic Skills at Tennessee State University, she initiated the STAR experiment and served as one of the four STAR principal investigators. As a co-chair of HEROS, Inc., she has advanced class-size research by housing STAR follow-up studies and developing the Reduce Class Size Now Web site, which makes structured abstracts related to class size available to the public. Her work has contributed to the STAR and Beyond database and the National Class Size database.

Project STAR and Beyond:
A 13-Year Database

STAR data are available to researchers through the STAR and Beyond database. This public data set contains student- and school-level data. Although the experiment ended in 1989, researchers continued to collect student achievement data through high school and beyond. The primary student–level data file contains information on 11,601 students who participated in the experiment for at least 1 year. Information for each grade, K–3, includes

- Demographic variables
- School and class identifiers
- School and teacher information
- Experimental condition (“class type”)
- Norm-referenced and criterion-referenced test scores
- Motivation and self-concept scores

Additional data, for some or all students, include

- Achievement test scores for students, Grades 4–8
- Teachers’ ratings of student behavior in Grades 4 and 8
- Students’ self-reports of school engagement and peer effects in Grade 8
- Course taking in mathematics, science, and foreign language in high school
- SAT/ACT participation and scores
- Graduation and drop-out information

The sample-size ranges for each stage of data are shown below.

- Grade K–3 Achievement tests 5,907–6,684
- Grades K–3 Motivation, self-concept 5,038–6,129
- Grades 4–8 Achievement tests 2,593–6,441
- Grade 4 Participation ratings 2,217
- Grade 8 Participation ratings 2,978
- Grade 8 Identification self-reports 3,648
- High school courses and grades 3,922
- High school graduation status 4,992
- SAT/ACT College entrance scores 3,880
- SAT/ACT participation (yes/no) 11,601

The online User’s Guide provides details about each file and the variables, such as stages of data collection, codebooks with frequencies for all variables in the files, recommendations about approaches for analyses, and a bibliography of studies from the STAR and Beyond data.

National Class Size Database

Education researchers, policymakers, and practitioners commonly misuse the terms class size and pupil–teacher ratio (PTR) as synonyms. Class size and PTR are different concepts and cannot validly be used interchangeably. Class size is the number of students who regularly appear in a teacher’s classroom and for whom that teacher is primarily responsible and accountable. PTR is a derived estimate commonly computed by dividing the number of students at a site by the number of professionals who work there, including counselors, special teachers, administrators, classroom teachers, and librarians. Typically, the difference between average
class size in a school and PTR in the same school for K–3 would be 9 or 10 students, and up to 15 in some sites.

Researchers, policymakers, and practitioners need to understand and carefully maintain the distinction between class size and PTR when studying class size and/or class-size reduction. Available public information on education often adds to the confusion, as federal, state, and local agencies typically report PTRs whereas class-size data are extremely difficult to obtain, if available at all.

Educators need to collect and report actual class-size data as well as PTR data. HEROS, Inc., a nonprofit independent research agency, has designed the National Class Size database so actual class sizes can be collected at the school level. Security has been set up so only individual schools and HEROS can access the actual data. School systems, state departments, and so forth cannot perform data entry or change data in any way. However, anyone (parent, legislator, teacher, state department staff, and others) with an Internet connection can access this database to run a report. The National Class Size database will help researchers to analyze class-size data with achievement data or other pertinent variables.

Table 1  Class-Size Studies and Initiatives, 1978–2009

<table>
<thead>
<tr>
<th>Dates</th>
<th>Study/Focus</th>
<th>Grades</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978–1980</td>
<td>Meta-analyses (Glass &amp; Smith; Smith &amp; Glass, et al.)</td>
<td>Multiple Studies</td>
<td></td>
</tr>
<tr>
<td>1985–1989</td>
<td>Project STAR (TN) (42 districts, 79 schools) The Experiment</td>
<td>K–3</td>
<td>11,600 tested*</td>
</tr>
<tr>
<td>1990–1995</td>
<td>Lasting Benefits Study (LBS; TN) to follow STAR Students</td>
<td>4–8</td>
<td>5,000–6,000/year</td>
</tr>
<tr>
<td>1990–1995</td>
<td>Project CHALLENGE (TN; 16 districts)</td>
<td>K–3</td>
<td>58,000 (est.)</td>
</tr>
<tr>
<td>1993–1994</td>
<td>SSS, High Point (NC)</td>
<td>K–3</td>
<td>145</td>
</tr>
<tr>
<td>1994–2009</td>
<td>SAGE (WI; statewide)</td>
<td>K–3</td>
<td>?</td>
</tr>
<tr>
<td>1995–2009</td>
<td>Enduring Benefits</td>
<td>8–12</td>
<td>4,000–6,000/year</td>
</tr>
<tr>
<td></td>
<td>• High school courses, ACT/SAT</td>
<td></td>
<td>(STAR data)</td>
</tr>
<tr>
<td></td>
<td>• College, etc. (TN)</td>
<td>1–Adult</td>
<td>(STAR data)</td>
</tr>
<tr>
<td></td>
<td>• STAR reanalyses</td>
<td></td>
<td>K–12, Adult</td>
</tr>
<tr>
<td>1981–1985</td>
<td>Prime Time (IN)</td>
<td>K–3</td>
<td>?</td>
</tr>
<tr>
<td>1996–2002</td>
<td>CA Class–Size reduction (CSR)</td>
<td>K–3</td>
<td>?</td>
</tr>
<tr>
<td>1988–2009</td>
<td>Burke Co., NC*</td>
<td>K–4</td>
<td>?</td>
</tr>
</tbody>
</table>

*Students had to be in class by November of the year tested. Total (N) of students in STAR sometimes was 15,000* (est.).
* * *(N = 15,000 in district)

Other Major Class-Size Work

UK: KS1, KS2, Ages 4–11 or so (N = 20,000 est.)
Canada: British Columbia, Alberta, Ontario
New Zealand (RR), Sweden, Australia, Netherlands, Far East (e.g., Hong Kong)
Numerous states: e.g., CA, FL, IA, MI, MS, NC, NE, NY, OK, TX (1982.HB72)
Serve Work: NC, several districts
Head Start: USA, since 1965
Perry Preschool: MI, N = 123
Abecedarian: NC, N = 109

Court Cases With Class Size*** Abbott v. Burke (NJ), CFE v. State (NY), Hancock v. Driscoll (MA)

***In remedy: Often PTR (pupil–teacher ratio) is incorrectly “substituted” in implementation.
In looking ahead, educators may find the joining of studies by researchers in other disciplines helpful in advancing the acceptance of small classes, at least in early grades. Studies by economists, physicians, and organization theorists on indoor air quality (carbon dioxide) and space use, teaching and teaching processes, and the increasing diversity in classes may coalesce so that appropriate-sized classes become a common phenomenon.

Charles Achilles, Jane Boyd-Zaharias, and Christopher Tienken

See also Age Grading; Assessment; Differentiated Instruction; Differentiated Staffing; School Size

Further Readings


Class Size Matters: http://www.class sizematters.org


HEROES, Inc.: http://www.heros-inc.org/data.htm


Reduce Class Size Now: http://www.reduceclasssizenow.org


