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AUTHOR	Achilles, C. M.; Finn, J. D.
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ABSTRACT

The core work of educational administration is school improvement, especially improved school outcomes. The leader must know what to do, why some interventions work better than others, and how to implement them. Longitudinal experimental research, meta-analyses, and evaluations have definitely shown that small classes, at least in K-3, provide an array of positive schooling outcomes. Part of the "what-to-do" dimension. Drawing on 15 years of analyzing class-size effects, this synthesis situates small-class outcomes in research and theories to explain why small classes provide initial, increasing, and long-term benefits. Supporting research includes Head Start, Perry Pre-School, and the Abecedarian Projects. Using Brookfield's (1993) definition of professional "impostorship," impostorship in educational administration will not sell in the face of increasing public demands, scrutiny, and alternatives to public schooling. A recent survey showed that fewer than 30 percent of educational administrators (average of 10 years' experience) could list even one research-driven education improvement effort they learned in educational administration preparation programs. Without clearly knowing what, why, and how of education, educational administration cannot improve school, an ever-present task. (Author)

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C. M. Achilles, Professor
Education Administration, Porter 304
Eastern Michigan University
Ypsilanti, MI 48197

J. D. Finn, Professor
State University of New York
Buffalo, NY

Future Leaders Beware: Impostorship Won't Sell *

Synthesis/Abstract

The core work of Education Administration (EdAd) is school improvement, especially improved school outcomes. The leader must know what to do, why some interventions work better than others, and how to implement them. Longitudinal, experimental research, meta-analyses, and evaluations have definitely shown that small classes, at least in K-3, provide an array of positive schooling outcomes. (Part of the "what to do" dimension).

Describing nurses who "at some level they know that they don't really deserve to be regarded as competent professionals," Brookfield defined professional "impostorship." As in nursing, impostorship in EdAd won't sell in the face of increasing public demands, scrutiny, and alternatives to public schooling.

A recent survey showed that fewer than 30% of education administrators (average of 10 years experience) could list even one research-driven education improvement effort they learned in EdAd preparation programs. Without clearly knowing the what, why, and how of education, EdAd can't improve schools, an ever present task.

Drawing on 15 years of analyzing class-size effects, this synthesis situates small-class outcomes in research and theories to explain why small classes (grades K-3) provide initial, increasing, and long-term benefits. Supporting research includes Head Start, Perry Pre-School, and the Abecedarian Projects. Explanatory theories include:

- Group Dynamics
- Academic Individualization
- Time on Task
- Personal Attention/Family
- Immediate Reinforcement
- Task Induction
- Classroom Management
- Increased Parent Interest
- Early Diagnosis Of Learning Difficulty
- Classroom Environment: Air Quality, Materials, Space/Crowding
- Opportunity for Peer Interaction
- Engagement/Participation
- Use of More Teaching Methods
- Teach to Mastery
- Less Indiscipline
- Teacher Morale/Energy
- Accountability/Responsibility

How can administrators "lead" if they do not know what improves schools? How close are impostorship and malpractice?

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* C. M. Achilles, Professor, Eastern Michigan University, Ypsilanti, MI 48197, and J. D. Finn, Professor, SUNY Buffalo. Material presented here is from work supported in part by a grant from the Spencer Foundation entitled "A Study of Class Size and At-Risk Students."

Future Leaders Beware: Impostorship Won't Sell

The title and inspiration for this have come from Brookfield (1993). To initiate this idea with educators, not nurses, we'll start with a fairly long quote whose purpose and meaning are clear. By emphasizing NURSES, we avoid the idea that this criticism/problem really might relate to Educators. Consider that this initial and descriptive presentation is anthropological in nature. We're studying another culture—maybe a "third World" group, even—and certainly NOT the sophisticated group or culture called Education Administration (EdAd) in advanced societies. Here's Brookfield's presentation. (1993, p. 198).

> Impostorship
>
> Impostorship is the awareness in many nurses that at some level they know they don't really deserve to be regarded as competent professionals. This sense of being an impostor—of being able to carry off looking and acting like a professional in front of one's students and peers, all the while knowing that this is a façade—does not seem to fade with experience.
>
> Impostorship is often spoken about as the public presentation of what is known to be a false self. Many nurses and nurse educators say that they pretend to their patients, students, and colleagues that they know what they're doing, that their actions are the result of thoughtful deliberation and pre-planning. Initially this presentation of a false self is done for reasons of survival. We believe that if we don't look like we know what we're doing, then our students, colleagues, and administrative superiors will eat us alive. Hospital organizational cultures don't generally reward those who appear unable to control all the variables that affect practice. (Emphasis Added).

The emphasis in Brookfield's assessment of impostorship is ". . . say that they pretend to their patients, students, and colleagues that they know what they're doing . . ." (p. 198, Emphasis Added). Investment in such behavior does not allow the "impostor" to do other than what has been done, for to do so would open the person to criticism—"You mean that you've been doing that all this time, and now you say that it is wrong?" Brookfield

defines some "triggers" that set off near panic attacks about impostorship among those who worry that they may be, well, impostors.

- Fear of a public unveiling (p. 199)
- Being evaluated (p. 199)
- Prospect of peer visitation (p. 200)
- Experimentation. "The moments of failure that inevitably accompany experimentation increase the sense of impostorship." (p. 200)

To get out of the impostorship box, some professionals work critically; they regularly employ critical thinking and "critique" in their practice. Alas, this also has great potential for conflict: Cultural Suicide. In industry the person might be tagged as a "rate buster." In government, this might be "whistle-blowing." Once more, in fine qualitative fettle, let's offer some "thick Description" directly from the "field notes" (Brookfield, pp. 201-202, Emphasis Added).

> Nurses publicly engaged in critical process—in examining assumptions and practices critically, in experimenting in their work, and in trying to realize democratic values—are an affront to those who have settled for the illusion of control and predictability.
>
> Nurses working critically remind those who are in stasis of their own sloth.
>
> As we speak about how we're critically reevaluating our practice, or how we're doing things differently these days, we run a real risk of being seen by our former colleagues as somehow breaking with good form, or as leaving them behind in an act of betrayal. (p. 201).
>
> Nurses in critical process are sometimes seen as turning into subversive troublemakers whose professional *raison d'être* seems to be to make life as difficult as possible for those around them. It is a common experience for nurses who move into a critical mode in their work to be marginalized. Their critical questions regarding commonly held assumptions and their challenges to aspects of group-think are often met with suspicion from colleagues who see these activities as a betrayal. (p. 202, Emphasis Added).

Now, From Nursing and On to Education.

The critical parallel moves from the culture of nursing to the culture of education, and builds on ". . . that they know what they're doing . . ." (p. 198, Emphasis Added). Because of personal experience, professional work, and current professional and political discourse we'll extend the parallel between impostorship in nursing and in education through use of recent class-size research. The main body of the work will be the longitudinal (1984-2000), extensive (30,000-plus students in 5 major studies) and somewhat influential research on class size that has been conducted in Tennessee or that is related to the Student Teacher Achievement Ratio (STAR) research. Results of the class-size research have resulted in new laws in states, including the high-profile Federal Class-size Initiative (1998) and work in California (CSR, 1996), Texas (HB 72), Oklahoma (HB 1017), Tennessee (1993, Education Improvement Act), Wisconsin (SAGE, 1996), Michigan's class-size pilot efforts (1998), and efforts in other states.

Does anyone in education (or any parent, for that matter) believe that there should be an increase in elementary class size (Bigger classes for little children)? Well, anyone except some school administrators, policy people, rich parents who send their children to small-class expensive private schools and who want public support for their "choice?"

Those who do oppose small classes, usually do so by mindlessly parroting some old, and very suspect data by economists, such as Hanushek, who try to draw prestige for their work by tracing claims to the deservedly prestigious "Coleman Report." You know, don't discuss education inputs; only outputs count, so "Money Doesn't Matter" in education. It is strange, isn't it, that money does seem to matter in most other things! Let's consider the class-size issue within the Impostorship/Cultural suicide frame, and then suggest education-

improvement processes that are strongly supported by research and practice as ways to get out of the traditional "Box."

Some school administrators and policy people say that class size doesn't matter, and this story line gets transmitted by media. Consider headlines in newspapers pointing out EdAd response to substantial research evidence that in the past they (EdAd folks) have not been doing their work real well. (Achilles, 1999, p. 123).

Table 1. Selected Headlines/Educator Claims About Class Size

"Educators Wary of Clinton's Plan to Trim Class Size." (Toledo Blade, 2/8/98)

"Small Classes: Popular but still Unproven." (Education Week, 2/18/98)

"Old Education Reform Idea Recycled." (Greenville News, 2/25/98)

"Education Falsehoods." (Savannah Morning News, 3/6/98)

"The Education Wars." (The National Journal, 3/7/98)

"Does Class Size Matter?" (US News and World Report, 10/13/97)

"Smaller class sizes fail to help most students." (Detroit News, 11/2/98)

"Do Smaller Classes Mean Better Schools? Economists Aren't So Sure." (The Chronicle of Higher Education, 4/3/98, 17-18).

Buckeye Institute, Policy Note (1999, May). "Two new studies cast doubt on benefits of class-size reduction."

Rees, N. S. & Johnson, K. A. (2000, May) "A lesson in smaller class sizes", Heritage Foundation. OpEd.

"Trimming class size is popular, but the benefits are debatable. (1998, March 3). The Seattle Times.

Class Size and Pupil-Teacher Ratio: Exploring the myths. (1999, May 5) Edmonton, Alberta. Legislative Library. Sessional Paper 715 (99).

Each of these stories cited or referred to economist Hanushek's (purported) many "studies" (277 to over 300, depending on the article) that he has used to explain that a) money doesn't matter, b) pupil-teacher ratios have been declining for years, but scores are not going up, c) U.S. education does not do well when compared to other countries that have larger classes.

In fact, economist Alan Krueger of Princeton obtained and re-analyzed Hanushek's data for his continuing claims. "Hanushek's approach equally weights 277 estimates . . ." (Krueger, 2000, p. 19). Note that these were not 277 studies, but estimates that, contrary to meta-analytic methods were weighted equally (vote-counting methodology). Because Hanushek had only 59 sources from which to extract estimates, it is clear that he "double counted" some to get n= 277 data entries that he called "studies." Thus, not only was the original methodology highly suspect and not corrected when newer, meta-analytic methods were available, he "double counted" his "estimates" (not studies). If that were not enough to invalidate his work in the minds of critical educators, then consider that Hanushek did not have class-size data. His "estimates" were derived by computations that yielded, at best, Pupil-Teacher Ratio (PTR) information, not class size results. Class size and PTR are NOT the same; even Hanushek has stated that clearly and noted that historically researchers have had PTR data, not class-size data. Nationally PTR and class sizes are about n=10 different in elementary grades. (See Appendix A).

Gerald Bracey has tried to alert educators to false conclusions and ideological claims about education in a section of his web site called "Education Disinformation Detection and Reporting Agency (EDDRA)." [The information posted there is copyright ©]. One issue of EDDRA deals with class size: "Distortion and Disinformation about Class Size Reduction: It BORDERS ON THE CRIMINALLY IRRESPONSIBLE" (Bracey, 1999). Bracey offers a critical review of Hanushek's work—the work most often cited by EdAd folks (practitioners and professors) and by the media to refute small classes for little children (Impostorship!)

> Hanushek's principal crimes are 1) presenting an analysis of trends in pupil-teacher ratio and then using this data as if it pertained to class size (he interleaves the two phrases as if they were identical) 2) refusing to acknowledge results that contradict his own analyses.

> Thus, Hanushek begins one paper "There have been consistent and dramatic falls in pupil-teacher ratios over most of the 20th century. This decline is the result of steady drops in the pupil-teacher ratio at both the elementary and the secondary school level. The obvious conclusion from this is that, if there is a problem of class size today, there must have been larger problems in the past."
>
> Hanushek rolls down a slippery slope from "pupil-teacher ratio" to "class size." Although Hanushek often uses these phrases as synonyms the two are not interchangeable by any means. Pupil-teacher ratio includes not only regular classroom teachers, but also special education teachers, kindergarten teachers, and basically, anyone in the building who has a teacher's certificate, whether or not they have any classroom duties.
>
> It is not surprising, then, that while the pupil-teacher ratio is about 14/1, the average class size, as given by the *Digest of Education Statistics,* is 22 for elementary classes and 25 for high school classes. While pupil-teacher ratio has been declining, so has the proportion of school staff who are teachers: In 1950 over 70 percent of all staff were teachers, in 1995, only 52% (*Digest of Education Statistics 1997* Table 82, page 89). (http://www.america-tomorrow.com/bracey/EDDRA/EDDRA4.htm)

If it is not bad enough for "education impostors" to claim that class size does not work because they have carefully reviewed the studies and not yet made up their own minds, it is probably worse that they don't know long-standing education practice and theory to support why small classes might lead to improved student improvement.* First, there is substantial supporting research and evaluation (Head Start, Perry Pre-School Project, The Abecedarian Project). Next, there are at least 17 theories to support that small classes provide better education outcomes for small children; there may be more, but Table 2 provides a sampling of them. How many of these theories and now many class-size studies will it take before EdAd folks begin to question the obvious questionable claim that "class size doesn't make a difference?" If only from common sense and practice, they should

* We reject that they have done a serious and critical review on their own because they only cite the much-challenged Hanushek data that, one must presume, they take on face value.

question that class size doesn't make a difference. Note the following three rather direct questions.

- What is the research base for classes now in use?
- What education improvement requires larger rather than smaller classes?
- What parent seeks larger classes for his/her child?

Table 2. A Sampling of theories and Exemplary Teaching Practices to Support That Small Classes Change Student Outcomes Positively.

• Group Dynamics	• Classroom Environment: Air Quality, Materials, Space/Crowding
• Academic Individualization	• Opportunity for Peer Interaction
• Time on Task	• Engagement/Participation
• Personal Attention/Family	• Use of More Teaching Methods
• Immediate Reinforcement	• Teach to Mastery
• Task Induction	• Less Indiscipline
• Classroom Management	• Teacher Morale/Energy
• Increased Parent Interest	• Accountability/Responsibility
• Early Diagnosis Of Learning Difficulty	

But, should the fact that EdAd persons resort to examples of impostorship surprise anyone who thinks seriously about it? Probably not. The class-size data have been available at least since 1978 (Glass & Smith, etc.) and the EdAd folks have NOT generally moved to apply the class-size data in schools to benefit all children. A few gifted students get small classes. So do the handicapped and those at risk of failure. Note that school-improvement projects such as Reading Recovery, Success for All, etc. do use small class size for their benefits. Strange. There are many other examples of research-based knowledge that is supported by theory, exemplary practice, and experience that is not regularly used in education. Impostorship? It would be impostorship if they did not know the research. More

seriously, if educators know the research, do not use it, and the current practice is detrimental to students, is this malpractice?

The Future Wave

So, if impostorship won't sell, what is one to do? Remember and advance the basic purposes of schooling. A challenge for EdAd personnel is to improve schools and schooling outcomes. Consider using research and theory as guides.

A. Read, understand, and use good research.

B. When some "research" clearly violates "common sense" (which isn't so common!), read and analyze carefully that "research" (Above all, do no harm to the client, or student).

C. Weigh carefully competing claims, using as the PRIMARY criteria factors relating to student outcomes.

1. benefits, or potential benefits to young students
2. school-improvement potential
   a) Achievement increases (tests)
   b) Behavior/discipline improvements
   c) Citizenship and participation gains
   d) Development of pupils into productive, humane students/adults.

D. Seek research that allows you (EdAd) to do things that are administratively mutable (Don't waste resources on things that you can't change). What are some administratively mutable "things" in schooling?

- Time, schedules, options
- Building (or learning group) size
- Organization of facilities, classes, etc.
- Hiring of personnel, followed by assignment, monitoring, developing their potentials
- Incentives
- Safe, caring learning environments (IAQ, too).
- Class sizes
- Processes: Homework, retention options.

E. More?

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APPENDIX A

Issues in The Class Size and Pupil-Teacher Ratio (PTR) Confusion

In his guide on Educational Policy Systems, Iannaccone (1975) emphasized the issue at the forefront of this confusion: "Descriptive reference is the first and most essential sense in which a concept has meaning" (p. 13). This author explained that:

> . . . the clarity of the meaning of a concept turns on the precision of the relationship between the concept and its referent, the features of the world for which it is a label. One source of error in the scientific venture is lack of precision in the referent of the concepts. Lack of precision leads to lack of reliability in the concepts. (pp. 13-14).

Hanushek (1998), often cited as an "expert" on class size, made the same point as did Iannaccone. Hanushek stated that the "conceptual ideal behind any measurement" is important made two key points: 1) ". . . pupil-teacher ratios are not the same as class sizes," and 2) "The only data that are available over time reflect the pupil-teacher ratios" (p. 12). Incredibly, Hanushek then criticizes class size by using PTR data.

Data available in large databases are generally PTR data. Surveys usually obtain PTR data. Valid and reliable ways to get class-size data are 1) to count the students in a class and/or 2) to establish class sizes and to monitor them as in Tennessee's Student Teacher Achievement Ratio (STAR) study. Consider the confusion and questionable conclusions caused in the following examples by mixing two very different concepts. (From Hanushek, 1998; C. Finn, 1997; Emphasis added in each quotation).

> The findings of the general ineffectiveness of reducing class sizes tend to be controversial if for no other reason than they tend to defy common sense, conventional wisdom, and highly publicized accounts of the available scientific evidence. (Hanushek, 1998, p. 1).

> The discussion until now has focused on pupil-teacher ratios, but pupil-teacher ratios are not the same as class sizes. These data on pupil-teacher ratios reflect the total number of teachers and the total number of students at anytime, . . (Hanushek, p. 12).

> A policy decision to employ more teachers (such as by reducing pupil-teacher ratios, which have fallen from 27 to 1 to 17 to 1 over the past 40 years) is obviously different from a decision to hold class size constant . . . (C. Finn, 1997, pp. 48, 36).

The excerpts demonstrate problems inherent in basing class-size conclusions on PTR. Hanushek generalized about "ineffectiveness" of class size but picked and chose from PTR information. Where is his "Evidence" on class size? At best, his work offers some insights into PTR "evidence" and highlights differences between PTR and class size.

Akerhielm (1995), an economist, tried to explain the class size and PTR problems in conducting studies on class size and schooling outcomes. Her explanation, in part, is included here because it provides insights into the potential misdirection that can occur in class-size studies if there is not very careful specification of actual class sizes. (All material from p. 230).

> To the extent that an aggregate ratio differs from the class size that a student was actually exposed to, measurement error exists, biasing the coefficient of the class size variable toward zero.
>
> In addition, pupil-teacher ratios are defined as the number of students in the school divided by the number of full-time teachers for an entire school and may have nothing to do with actual class size. This ratio often includes guidance counselors, principals, and special education teachers in the count of teachers, and thus the lower the ratio, the higher the non-teaching staff, regardless of actual class size. Moreover, even if the ratio only includes actual teachers, schools with the same pupil-teacher ratio may have significantly different class sizes depending on the average number of hours of teaching required (Bowles and Levin, 1968).
>
> The second problem is that, as opposed to using experimental (or randomized) data collected as part of a specific class size evaluation, past studies have often relied on data that were part of a larger national survey implemented for other purposes. (Emphasis added). As a result, previous research has used data in which student allocation to different class sizes may not be a random process.
>
> If a school has a deliberate policy to assign difficult or less able students to smaller classes, then any positive effect of small class size on student performance may be disguised because such students may tend to score lower on tests.
>
> Experimental studies in Indiana and Tennessee, in which students were randomly assigned to different class sizes and followed over time, found significant, positive effects of small classes on elementary school student achievement (McGiverin et al., 1989; Word et al., 1990). By showing the importance of small classes when there exists a random allocation of students to different class sizes, the results from experimental studies suggest that a non-random allocation may mask the true relationship between class size and student achievement.

Payne and Biddle (1999) summarized some research on school effects and included critiques of the uncritical application of research and results from one discipline to another. The rather extensive quotes are from pages 5 and 6.

> . . . The Heritage Foundation, for example, has opined that:
>
> Virtually all studies of school performance, in fact, reveal that spending has little bearing on student achievement. . . . Research demonstrates that [concentrating on performance assessment] will be far more successful than [reforms] that concentrate on salary levels and class size. (1989, p. 5).

> Somehow at the time, almost nobody noticed that major errors had appeared in the "Coleman Report"—errors likely to have reduced its estimates for the size of school effects. . . . Among other things, the authors of the report had failed to use available scaling techniques to validate their procedures (p. 5).
>
> . . . and a number of them (economists) began to study relations between what they conceived as the "inputs" and "outputs" of public education. They have pursued several strategies for doing this, but most have involved deriving "production function models" for input-output relations within education, each stated as a complex, mathematical equation involving variables that represent aspects of students' backgrounds and school environments. These models have then been tested in empirical studies with small samples. (p. 5).
>
> Secondly, norms for publication in the field of economics stress the need for careful specification and derivation of structural models but give short shrift to the operational details of empirical studies. Thus, many studies in this literature provide few-to-no details about the sample used, the ways in which data were collected, the ways in which measuring scales were constructed, the reliability or validity of those scales, the distribution or range of values for variables in the analysis, or even the values of basic correlations among those variables.
>
> In other cases these studies have provided details, but those details have revealed serious problems. To illustrate, many studies have used samples that were too small to generate statistical significance even for substantial effects. In other cases, they have employed "convenience samples" that can only generate a distorted picture of the real world of American education. (Raymond [1968], for example, based his study on a sample of West Virginia University students who had graduated from high schools in that state. Such a sample ignores most students from poor and working-class homes. Worse, West Virginia has long had only a small range of disparities between well-funded and poorly-funded schools, so it would be "difficult—to say the least—to draw valid conclusions about the impact of school funding across America using a sample drawn from that state alone.)
>
> In summary then, because of the widespread prevalence of design flaws in this literature one *cannot* use the bulk of its studies to reach valid conclusions about the net effects of school funding in America. Previous reviewers have tried to reach such conclusions by aggregating results from the effort as a whole, but one cannot make a silk purse even out of *many* sows' ears, and unfortunately their efforts have implied, to the unwary, that one should take the corpus of this largely-flawed literature seriously.

Many (most) early discussions of class size, however, were based on available data, that is data about studies of PTR. Those studies formed the base for some "class-size" analyses. One concrete example from the STAR experiment may make the concept clear.

Widget Elementary School, grades K-5, has 529 students, with 261 in grades K-2 which are shown in detail (Table A-1). Kindergarten (K) has four STAR experimental classes with 86 students randomly assigned to 2 small (S), 1 regular (R), and 1 regular class with a full-time aide (RA) classes. If not in STAR, Widget would have 3 K classes for 86 students. Grades 3-6 with three classes per grade (as in grades 1 and 2) have 268 students and 9 teachers.

Ten other educators including administrator, counselor, media specialist, Title I, etc. also work at Widget. The 10 other educators and 19 regular classroom teachers give Widget a PTR of 529 divided by 29 positions, or 18.2. Only two of Widget's 19 classes—the two STAR (S) classes in K have fewer than 18.2 students. Other classes have 10-11 more students than the school's PTR of 18.2. The class-size range is 27-30 in non-STAR classes.

Table A-1 About HERE

In most STAR schools, the (R) classes that served as the control group in the experiment were smaller than the classes in the rest of the grades in the school. This occurred because one STAR guideline was that no student should have less of an education opportunity from participating in STAR than if STAR were not in that child's school. If STAR were not in Widget, the three kindergartens for 86 students would average about 29. By participating in STAR and even being in the (R) class, a student would be in a smaller class than if STAR were not at Widget.. In fact, if others in the school (e.g., aides, nurse, etc.) were counted in the PTR computation, the PTR could be 529 ÷ 32, or 16.5. This example shows clearly some problems with substituting class size for the PTR. The study by Miles (1995) in Boston and other studies of class size show that class size and PTR really are, in Hanushek's (1998) own words, "not the same" (p. 12). In fact, just numerically class size and PTR are about 10 students apart, but conceptually and operationally they are worlds apart. (See Table A-2)

Table A-2 About HERE

Boozer and Rouse (1995) found important differences in class size and PTR outcomes. They addressed the PTR and class-size confusion directly. In their study, Figures 1a and 1b relate to school size. These figures showed that typically the larger the school, the more variance and thus, the larger was the difference between PTR and class size: "Figures 1a and 1b illustrate that the pupil teacher ratio and the school's average class size, while correlated, may reflect different aspects of the school's teaching resources." (p. 5). They footnoted that discussion with, "The correlation between the pupil teacher ratio and the average class size is relatively low at 0.13 in the New Jersey Survey and 0.26 in the NELS" (p. 5, Footnote 8).

Boozer and Rouse's findings help explain why PTR changes do not have much influence on student outcomes. "Once again we find that the pupil teacher ratio does not

(statistically) increase in schools with a larger proportion of black students, but that the average class size does." (p. 8) and . . . "On the other hand, students in schools with larger average class sizes have significantly smaller test-score gains (p. 8). Boozer and Rouse (1995) find another important class-size difference from PTR. "Thus, using only the cross-school variation in class size we find that it satisfies two requirement for explaining the black-white gap in achievement: black students are in larger classes than are white students, and smaller classes are associated with larger test score gain." (p. 9). Left unsaid is that PTR change is most often influenced by remedial efforts and "projects" to help at-risk students, projects like Title I, the nation's largest "remedial education" effort. They concluded this discussion with "The fact the school average class size matters, but pupil teacher (ratio) does not . . . (p. 9) and then turn to problems inherent in some production-function work, work in which Hanushek most often translates PTR analyses into class-size conclusions.

> . . . If remedial and special education classes have smaller class sizes and generate lower test score gains for a given class size than do high achieving classes, then the fitted regression line that ignores these differences will estimate an upward sloping relationship between class size and test score gains. This presents a serious problem for estimating education production functions.
>
> Theoretically, if one has within-school class sizes, then a regression including school fixed effects and allowing different slopes for the remedial and high-achieving classes should recover the hypothesized negatively sloping relationship between test-score gains and class size. However, even within these classification, students are likely allocated to classes according to ability so that one must also account for the allocation mechanism. (p. 10. Emphasis Added).

Note here that in STAR, students were assigned to classes randomly within schools (accounting for the allocation mechanism), and then teachers were assigned randomly to classes within schools, accounting for school fixed effects. Thus, each of the 79 (only 76 at the conclusion) schools in STAR was essentially its own randomized, longitudinal class-size experiment, far exceeding Hanushek's 59 weak PTR "observations" (Krueger, 2000) and his 1998 and 1999 pronouncements about "class size" made by using PTR data. Hanushek never included STAR, even as one experiment, not to mention as the 79 (76) it really could have been using his criteria. The data were available before the 1997 and 1999 repetitions of earlier works. Amazing, both for the unabashed bias in what is claimed as research, and that educators, especially education leaders, did not admit their early dismissal of class-size evidence (e.g., Glass & Smith, 1978) and by 1990 or even 2000 begin to use the accumulating evidence from Prime Time and STAR.

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Table A-1. Example of Class-Size and Pupil-Teacher Ratio (PTR) Difference.

Grade and Classes	(n)
Kindergarten N=86 (STAR)	
Small	16
Small	16
Regular	27
Regular-Aide	27
Grade 1 N=88	
A	29
B	30
C	29
Grade 2 N=87	
A	29
B	29
C	29
Totals (K-2)	
Students	261
Teachers	10
Totals (3-5)	
Students	268
Teachers	9

Computation *	
Total Students N=529	
Other Educators	
Title	N
Principal	1
Counselor	1
Media Specialist	1
Special Education	2
Title I	3
Art	.5
Music	.5
Physical Education	.5
Gifted	.5
Total "Other"	10
Total Regular	19
Total Educators	29
PTR = 529÷29 or 18.2	

* This excludes aides (n=4), secretary (n=1) and nurse (n=.5) whose salaries could add the equivalent of 3 more professional positions, providing a PTR of 529 ÷ 32 or 16.5. Widget Elementary, a STAR School has 261 students in grades K-2, and 529 students, K-5. From Achilles, 1999, p

Table A-2. Some Major Differences Between Class Size (CS) or Class-size Reduction (CSR) and Pupil-Teacher Ratio (PTR).

VARIABLES of note in comparing PTR and CS	PUPIL-TEACHER RATIO (PTR)	CLASS SIZE (CS) or (CSR)
Definition	Students (n) at a site (building, district, class) divided by: teachers, educators, adults, (etc.) serving the site.	Students (n) in a teacher's room regularly.
Computation	DIVISION, with various divisors available depending upon the EXACT definition.	ADDITION. This cannot be accurately determined from large databases.
Concept	The teacher needs help; the student needs special services the teacher cannot provide.	A competent teacher can handle most education issues if given a reasonable case load.
Operation and Context	A project and "pull-out"-driven model full of commotion and "Band Aid" treatments. Loss of time on task. Difficulty in determining responsibility and accountability.	Teacher is responsible and accountable for the student's growth and development: Academics, Behavior, Citizenship, Development, (A, B, C, D) Small focused learning groups.
Outcomes	CONSISTENTLY MARGINAL. Note, for example, education "production function" analyses; Title I evaluations, Boozer and Rouse (1995), Borman and D'Agostino (1996) Wong and Meyer (1998), etc.	CONSISTENTLY POSITIVE on many variables (A, B, C, D). See data in Tables 1 & 2 of this paper. Much consensual validation, anecdotal evidence, and "common-sense" support.

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GENEVA, NY 14456
315-789-2399

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