2-22-2015

Dear Methacton Board Members,

Please do not close our beloved school Arrowhead. It is more than just a school, it is family, and it is community. We hope there can be other solutions that may not be the easiest solution, but a way to make it work without closing our treasured doors. I send this out as a plea on behalf of my children and our Arrowhead family. Thanks for reconsidering all viable options before closing the door on hopes and dreams of the students, staff, and parents that view Arrowhead as an integral part of the community.

The Roeger Family

2-22-2015

--Document generated from SchoolDigger.

Why would we consider closing a school that encompassed a track record such as the below? What kind of message would our school district be sending to all the parents, teachers, and children? If PEL has agreed to do a FREE reassessment in the Fall, what is the rush? Stats on population have not proven accurate in the past within the last decade for our district, we need to confirm before rushing into a decision that affects our whole community. We need to act as one to a common goal as best for everyone affected in this scenario. Please rethink all viable solutions that are based around a report that could have future false projections. Thanks for considering it all, The Roeger Family

Arrowhead

Year	Avg Math Score	Avg Reading Score	Statewide Rank	Total # Ranked Elementary Schools	PA State Percentile	SchoolDigger Rating
2003	81.8	82.8	144th	1465	90.2%	★★★★★
2004	82.1	80.6	252nd	1477	82.9%	★★★★
2005	93.0	80.0	434th	1601	72.9%	★★★★
2006	94.8	93.3	51st	1563	96.7%	★★★★★
2007	96.8	93.2	40th	1570	97.5%	★★★★★
2008	98.7	92.7	39th	1564	97.5%	★★★★★
2009	99.3	94.8	22nd	1565	98.6%	★★★★★
2010	98.5	91.3	77th	1599	95.2%	★★★★★
2011	95.6	91.5	151st	1607	90.6%	★★★★★
2012	96.3	91.4	120th	1606	92.5%	★★★★★
2013	92.5	93.0	59th	1469	96.0%	★★★★★
2014	93.0	91.5	78th	1415	94.5%	★★★★★

Denise Ketterer
Parent of Ethan and
Isabella Ketterer,
students at Arrowhead
Elementary School
Feb. 25th, 2015

Statement to the School Board of Directors of Methacton School District

My name is Denise Ketterer, I live at 700 Barrington Road, Collegeville, and I am the parent of two Arrowhead school students. I share the many concerns presented here tonight. I am particularly concerned about **class size in our elementary schools**, the **proposed class sizes of 25** (or more?) pupils per class, and the **academic impact to our students**, if even one of our schools were to close their doors.

Upon researching the subject of "class size", *I have found an abundance of research* from a multitude of academic journals and websites. Many research studies have been conducted, for the specific reason of determining the direct relation between *smaller class sizes and student academic performance.*

Tonight I will mention three, more publicized **large scale research studies that have scientifically documented findings** *that link reduced class size to increased student achievement in grades K thru 3rd such as:*

1. Tennessee's Project STAR (Student Teacher Achievement Ratio) which was a 4 year controlled study with a scientifically valid research design, involving 79 elementary schools, and approximately 11,500 students. This study used a "small class" size of 13-17 pupils, and a "regular" class size of 22-25 pupils per class.
2. Wisconsin State's program SAGE (Student Achievement Guarantee in Education) begun in 1996, phased in over 5 years, limited pupils to 15 per classroom.
3. California's CSR (Class Size Reduction) program, phased in over 4 years, utilized no more than 20 students per classroom.

These scientifically verified *research studies have shown without a doubt, that small class sizes of 20 or less pupils, ideally 17 or less for greatest benefit, show statistically significant results of increased academic student performance in the early primary grades of K-3rd*, as evidenced by improved SAT scores, and curriculum based tests in math and reading.

Furthermore, after these positive findings of Project STAR, Tennessee state authorized a long term study called their Lasting Benefits Study, which followed many of the students in the STAR study into grade 10 and beyond. The results were positive:

1. Students who had been in *the smaller test groups of 13-17*, had *maintained their high academic achievement* vs. the students in the larger class sizes of 22-26 pupils.
2. The students in the smaller classes were *found to expend more effort* in the classroom and were *more interested in learning* vs. students in the larger classroom sizes of 22-26 pupils.
3. The smaller group of students *displayed less disruptive and inattentive behavior* vs. the students in the larger class sizes.

On a Financial note, research studies have been done on the health and economic benefits of reduced class sizes, showing that lower class sizes lead to:

1. Increased rate of high school attendance and graduation
2. Increased rate of college attendance
3. Increased HUMAN CAPITAL of the United States
4. Increased health over one's lifetime, and a decrease in Medicare and Medicaid enrollment.

One study reports results that class size reductions would "generate a net cost savings of approximately 168,000$ and a net gain of 1.7 quality adjusted life years for each high school graduate produced by small class sizes" (Muenning, P., & Woolf, S. H., 2007).

QUESTION FOR DR. ZERBE AND THE BOARD:

In my opinion, I do not find the decision to close our schools educationally sound, and in fact would be a detriment to the present and futures of our children. I ask the Board to carefully consider this information when making their decision that will affect our children and our entire community.

With the available research discussed here, how do you justify the proposed class size increase to 25 pupils as an educational and financial benefit, if one or two of our elementary schools were to close?

Thank you for your time and consideration. Reference list included.

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The latest version is at http://www.ajph.org/cgi/doi/10.2105/AJPH.2006.105478

Health and Economic Benefits of Reducing the Number of Students per Classroom in US Primary Schools

Peter Muennig, MD, MPH, and Steven H. Woolf, MD, MPH

Objectives. We estimated the costs associated with reducing class sizes in kindergarten through grade 3 as well as the effects of small class sizes on selected outcomes such as quality-adjusted life-years and future earnings.

Methods. We used multiple data sets to predict changes in the outcomes assessed according to level of educational attainment. We then used a Markov model to estimate future costs and benefits incurred and quality-adjusted life-years gained per additional high school graduate produced over time.

Results. From a societal perspective (incorporating earnings and health outcomes), class-size reductions would generate a net cost savings of approximately $168 000 and a net gain of 1.7 quality-adjusted life-years for each high school graduate produced by small classes. When targeted to low-income students, the estimated savings would increase to $196 000 per additional graduate. From a governmental perspective (incorporating public expenditures and revenues), the results of reducing class sizes ranged from savings in costs to an additional cost of $15 000 per quality-adjusted life-year gained.

Conclusions. Reducing class sizes may be more cost-effective than most public health and medical interventions. (*Am J Public Health.* 2007;97:XXX–XXX. doi:10.2105/AJPH.2006.105478)

With health costs soaring and student performance falling, the United States is in jeopardy of losing its economic dominance. As low-skilled jobs are outsourced, the availability of highly skilled workers is increasingly a determinant of global competitiveness.[1,2] At the same time, government and corporate budgets are struggling under the weight of soaring health costs.[3,4] One partial solution to both problems resides in America's schools.

In recent years, the performance of students in the United States has been declining relative to the performance of students in competing countries; however, a variety of innovative school-based interventions and programs are beginning to show promise.[5–7] In the case of 1 intervention, implementation of small class sizes, long-term follow-up data are now available from a large, multischool randomized controlled trial.[7] This trial, Project STAR (Student Teacher Achievement Ratio), is the highest quality long-term experiment to date in the field of education. If Project STAR is proven to be reproducible on a national scale, it could markedly improve the human capital of the United States.[8,9]

Reducing class sizes may also represent an effective health intervention. Improvements in educational attainment have long been linked to increases in both health status and longevity. Potential mechanisms include improved cognitive abilities, higher earnings, and better job quality.[10] Improved cognition and knowledge enable people to make better lifestyle and health care choices, conferring a range of skills[11] allowing them to better survive in their environmental niche. Higher earnings and better job quality enhance access to health insurance coverage, reduce exposure to hazardous work conditions, and provide individuals and families with the necessary resources to move out of unfavorable neighborhood environments (where exposure to crime and pollution, and inadequate access to health care are heightened) and to purchase goods and services, ranging from healthful foods to prescription drugs and good housing, that contribute to improved health.[9,12]

Beyond the intuitive mechanisms just described, there is growing evidence that the overall link between educational achievement and health is causal in nature.[5,10,13–16] If so, it would be informative to explore whether the potential net economic benefits would offset the massive societal investment that would be required for widespread adoption of an effective educational intervention, such as reducing class sizes, on a national scale.

We estimated the health and economic effects of reducing class sizes from 22–25 students to 13–17 students in kindergarten through grade 3 nationwide, the intervention tested in Project STAR. We acknowledge that some uncertainty remains regarding whether the effect size observed in that trial is reproducible or will produce substantive health benefits. However, we used its findings as a starting point for constructing a model exploring how those uncertainties define the boundaries of the potential costs and benefits of educational interventions designed to improve high school graduation rates. Because we focused on a relatively expensive intervention (one that included limited estimates of future cost savings) and examined outcomes over a range of efficacy values, our results should provide a conservative framework for evaluating this and other interventions as long-term data on educational interventions become more plentiful.

METHODS

Study Design

We used data from Project STAR to conduct 2 separate analyses of (1) all students and (2) low-income students eligible for school free-lunch programs. In each analysis, we examined costs from a societal perspective (incorporating the individuals' earnings and health outcomes only) and from a governmental perspective (incorporating public expenditures and revenues only). We adhered to the standards recommended by the Panel on Cost-Effectiveness in Health and Medicine.[17] However, rather than adhering to the panel's recommendation that all costs be included in all calculations, we included crime

and various other sources of cost savings only in the sensitivity analysis to ensure that our estimates were as conservative as possible.

Project STAR

We used efficacy data from Project STAR to generate effectiveness estimates—i.e., a 12% increase in the high school graduation rate among the general population of students and an 18% increase in the high school graduation rate among free-lunch students—and tested these estimates in a broad sensitivity analysis.[7,8] Project STAR, a randomized trial of 12 000 students that began in 1985, was conducted in 329 classrooms across 46 school districts in Tennessee. Both students and teachers were randomly assigned to classes containing either 22 to 25 students or 13 to 17 students.

Some of the more than 100 studies of small class sizes conducted before Project STAR showed little or no effect on graduation rates of reducing class sizes; taken as a whole, however, these investigations indicated that small class sizes increase high school graduation rates, especially among low-income students.[18] Because none of these earlier studies had involved randomized designs, Project STAR helped solidify the conclusion that small class sizes are effective. Although a single randomized trial—albeit a large, multicenter trial—cannot guarantee reproducibility, Project STAR provides the best available estimate of the efficacy of small classes in producing additional high school graduates.

Project STAR provides high-quality data on differences in educational attainment according to class size, but information was not collected on relevant health or economic outcomes. We used regression analyses to estimate the extent to which educational level influences earnings, health, and longevity. There is good evidence from a variety of studies differing in design that regression analyses produce valid estimates of the effects of educational attainment on earnings.[9,19] There is also evidence that by using regression analyses, it is possible to conservatively predict causal effects of educational attainment on health status.[14,15] However, regression analyses may underestimate effect sizes for low-income populations and overestimate effect sizes for high-income populations.[20]

Medical Expenditure Panel Survey

We used data from the 2003 Medical Expenditure Panel Survey (MEPS), which focused on a nationally representative sample of 34 215 noninstitutionalized individuals, to quantify the effects of smaller class sizes on health-related quality of life, Medicare and Medicaid enrollment, and health care expenditures.[21] We eliminated respondents younger than 25 years-old and older than 65 years, foreign-born respondents, proxy respondents, and those with missing values, which resulted in a final sample size of 12 229.

MEPS participants completed the EuroQol-5D,[22] a health-related quality of life measure that captures data in the areas of mobility, self-care, typical activities, pain or discomfort, and anxiety or depression. Health-related quality of life scores were scaled from 0 to 1.0, with 0 representing death and 1.0 representing perfect health. Thus, 10 years lived at a health-related quality of life rating of 0.7 is equal to 7 (10×0.7) quality-adjusted life years. A quality-adjusted life-year is a year of perfect health. We used point-in-time data for Medicare and Medicaid enrollment rather than enrollment throughout the year.

Other Data Sources

We used combined data from the March 2003 and March 2004 versions of the Current Population Survey to generate earnings and welfare inputs.[23] We used the TAXSIM program version 5.1 (National Bureau of Economic Research, Cambridge, Mass) to calculate federal tax returns according to different levels of educational attainment. The welfare programs examined included Temporary Assistance for Needy Families, housing assistance, and food stamps. We obtained crime data from the Federal Bureau of Investigation's Uniform Crime Report.[24] Crime costs included costs associated with violent crime, property crime, and drug offenses. We excluded crime data from the primary analysis to ensure conservative estimates; however, we included the data in our sensitivity analyses.[5,13,16]

Statistical Analyses

Our model calculations focused on a hypothetical cohort of children aged 5 years who were exposed to small classes and who were then followed until the age of 65 years. To calculate quality-adjusted life-years gained when the hypothetical cohort members graduated from high school or college, we examined the effects of reducing class sizes on health-related quality of life scores and age-specific mortality.[25] We obtained data on risk of death according to different levels of educational attainment from an analysis of the National Longitudinal Mortality Survey; in that study, Backlund et al. examined educational attainment–specific mortality patterns among 400 000 persons aged 25 to 64 years.[26]

Individuals with a higher level of education are less likely than are those with lower levels to qualify either for Medicaid or for Medicare before the age of 65 years. To estimate enrollment rates in these programs according to highest degree completed, we constructed 2 logistic regression models, 1 with Medicaid enrollment as the dependent variable and 1 with Medicare enrollment as the dependent variable. We then multiplied these enrollment rates by the mean cost per enrollee to estimate per capita costs.

Because educational attainment influences an array of modifiable covariates, ranging from marriage rates to occupations, in our regression models, we controlled only for nonmodifiable covariates: age (25 to 65 years), gender, race (White, Black, Asian, American Indian, Hawaiian, or membership in more than 1 racial group), ethnicity (Hispanic or non-Hispanic), and highest level of education completed (no high school, high school or general equivalency diploma, or college).

Consistent with the income-specific variations in medical expenditures observed in a randomized trial focusing on health insurance coverage,[27] we found that educational attainment exerts little influence on health expenditures; thus, we did not include health expenditures in our societal analysis. Expenditure levels according to educational attainment (or its correlate, income) appear similar in part because less-educated people are less likely than are more highly educated people to be insured (and therefore consume care at lower rates when they are not ill) but are in worse health (and therefore more likely to need costly treatment).

Using the more complete National Health Accounts data,[10,28] we derived data on

Medicare and Medicaid per enrollee costs from the 2003 MEPS and adjusted these data for costs not included in the MEPS, such as disproportionate share hospital payments, which support hospitals in poor neighborhoods. We estimated that mean costs for adult Medicaid enrollees and Medicare beneficiaries (i.e., those aged 25–64 years) were $7695 and $11 894, respectively.

Using the methods of Levin and Belfield, we based mean national costs of classroom size reductions on data derived from the education literature and on general salary and school construction costs (at a 5% amortization rate over 30 years).[29,30] Construction and salary costs average $8076 per student in smaller (12–17 students) kindergarten through grade 3 classes. We then applied our discount rate of 3% over 12.5 years, because the benefits of these expenditures would not be realized until students graduate from high school. This procedure yielded an estimated cost of $13 555 per student in present terms.

We estimated that students in small classes would complete an average of 1.5 additional years of high school (dropouts complete less schooling and thus incur lower costs), at an average national cost of $14 394 (Table 1).[32] Also, we estimated that students who went on to college would incur additional expenses of $49 081 to the government and $65 860 to society as a whole[33] and that they would delay entering the labor force for 4 years. Thus, we calculated the total cost of small classes per each additional graduate as follows:

$$(1) \qquad C = c_p + c_h \times p_g + c_c \times p_c$$

where C is the overall per student cost of small classes, c_p is the per student cost of reducing class sizes (the cost of the program itself), p_g is the probability that small classes will produce an additional high school graduate, c_h is the cost of additional high school attended by students in small classes (as a result of fewer dropouts), c_c is the cost of additional college attended, and p_c is the probability of students attending college. The overall costs of producing an additional graduate are $79 211 from a societal perspective and $78 876 from a governmental perspective.

We used a Markov model to compare life expectancy, health-related quality of life scores, costs, and earnings over the lifetime

TABLE 1—Major Modeling Assumptions and Supporting Evidence Used to Justify the Assumptions

Assumption	Supporting Evidence
A higher level of education produces an increase in wages consistent with that predicted by linear regression	Data from randomized controlled trials, natural experiments, and instrumental variable analyses[9]
A higher level of education leads to better health outcomes and thus results in a reduction in Medicare enrollment and an increase in quality-adjusted life expectancy	Data from instrumental variable analyses and randomized educational trials[5,14,15]
A higher level of education produces improvements in health-related quality of life and mortality consistent with those predicted by linear regression	The literature suggests that regression analyses may underestimate the real-world differences in mortality associated with compulsory schooling[14]
Benefits will accrue only among those students who actually graduate from high school as a result of small class sizes	There is some evidence that nongraduates also benefit from early schooling interventions, but this is difficult to quantify and mostly takes the form of reduced social pathology (a cost excluded from the present analyses)[5]
A generic class size intervention modeled after Project STAR will produce increases in high school graduation rates similar to those observed in Project STAR[7,8]	Project STAR was a large multischool trial; this critical assumption was tested in a broad sensitivity analysis ranging from no additional graduates produced up to the number observed in Project STAR
Project STAR will increase college graduation rates by 4%	Although Project STAR did not examine college completion rates, it did report that students randomized to small class sizes were 4% more likely to take college entrance examinations[31]; most students probably enter via 2-year colleges that do not require entrance examinations
Students who graduate from high school rather than drop out will incur costs associated with 1.5 years of additional schooling	Students who do not drop out of high school as a result of exposure to smaller class sizes incur costs associated with 2 additional years of schooling, on average[23]; these costs may be offset by decreased demand for special education programs and reduced chances of being held back from advancing 1 grade while still in school (grade retention)
Medical expenditures are constant across levels of educational attainment, and thus medical expenditures should not be included in societal analyses	There is little difference in medical expenditures according to educational attainment or income[10,27]; whereas health status improves with increasing education, so too do rates of health insurance coverage and use of medical care
Approximately 11% of low-income high school graduates produced by smaller class sizes will go on to complete college	In Project STAR, roughly 22% of the additional low-income high school graduates produced by small class sizes took college preparatory examinations[31]
The governmental costs of violent crime and drug offenses should not be included in baseline analyses	This conservative assumption was made to simplify the overall analysis; these costs were included in the sensitivity analyses, however
Students who drop out of college or earn an associate degree experience no additional benefit beyond the health effects associated with earning a high school diploma	This assumption was made to simplify the overall analysis

TABLE 2—Selected Values Used in the Analyses, Along With High and Low Estimates of These Values Used in the Monte Carlo Simulation

Parameter	Overall Sample	High Value	Low Value
	High school graduates, %		
All students			
Full-sized classroom	76.3	78.0	74.0
Reduced-sized classroom	87.8	90.0	82.0
Free-lunch students			
Full-sized classroom	70.2	74.0	66.0
Reduced-sized classroom	88.2	92.0	84.0
	Increase in college attendance, %		
All students	3.7	5.0	2.0
Free-lunch students	4.0	5.0	2.0
	Health-related quality of life score[a]		
High school dropouts	0.74	0.75	0.74
High school graduates	0.78	0.79	0.78
College graduates	0.87	0.88	0.87
	Medicaid enrollment, %		
High school dropouts	24.8	25.4	24.8
High school graduates	8.2	8.8	8.2
College graduates	4.8	5.3	4.8
	Medicare enrollment, %		
High school dropouts	7.6	7.9	7.2
High school graduates	3.7	4.1	3.3
College graduates	3.4	3.8	3.0
	Earnings, $[b]		
High school dropouts	12349	12871	11827
High school graduates	23007	23427	22587
College graduates	33701	34105	33297
	Tax payments, $		
High school dropouts	1302	1360	1244
High school graduates	3085	3139	3031
College graduates	5954	6012	5896
	General costs, $<<AU: Okay?>>		
Per student cost of small class sizes	13555	16266	10844
Cost of additional time in high school[c]	14394	15834	12955
Cost of additional time in college[c]			
Public	49083	53991	44175
Private	65860	72446	59274
Total cost, Project STAR[d]			
Public	78876	…[e]	…[e]
Private	79211	…[e]	…[e]
Medicaid cost per enrollee	7695	8521	6869
Medicare cost per enrollee	11894	13842	9946

[a]Range = 0 to 1.0, with 0 representing death and 1.0 representing perfect health.
[b]Obtained from the March 2003 and 2004 versions of the Current Population Survey. Figures reflect the high and low estimates that are because of random error, which was used to generate confidence intervals in the Monte Carlo simulation. Effects were also tested using plausible ranges of nonrandom error in 1-way sensitivity analyses.
[c]Students exposed to small class sizes are less likely to drop out and more likely to complete additional schooling, which is associated with additional costs.
[d]Per additional high school graduate. Includes cost of high school and college attendance.
[e]High and low values used in the model varied according to (1) number of additional high school graduates produced, (2) number of additional college graduates produced, and (3) error in each cost input.

of our hypothetical cohort of high school dropouts, high school graduates, and college graduates. To obtain life expectancy for each education category, we multiplied mortality among high school dropouts[34] by educational attainment–specific risk ratios.[26] The model considered the costs associated with reducing class sizes for students aged 5 through 9 years, but it was assumed that benefits would not begin accruing until cohort members were aged 20 years. Calculations were discontinued after the age of 65 years, when all of the cohort members become eligible for Medicare and other retirement benefits irrespective of their educational attainment. Model inputs are listed in Table 2.

We conducted 1-way sensitivity analyses to isolate the most influential variables in our model. In addition, we used Monte Carlo simulations, based on the values shown in Table 2, to generate confidence intervals around the estimates derived.[17] We used DATApro 2006 (TreeAge Software, Morristown, Mass) in constructing the model.

RESULTS

Health Effects

Our regression analyses showed that students enrolled in small classes would achieve improved health status. The mean health-related quality of life scores were 0.74 for high school dropouts, 0.78 for high school graduates, and 0.87 for college graduates (Table 2). The health status of the average college graduate aged 45 years was comparable to that of the average high school dropout aged 25 years, with both having a health-related quality of life score of approximately 0.89.

Future Earnings and Tax Revenues

Results showed that the earnings of high school graduates would be almost twice those of high school dropouts ($23 000 and $12 000, respectively; Table 2). Because the tax curve is progressive, taxes paid by high school graduates would be approximately 2.5 times as great as those paid by high school dropouts ($3000 and $1300, respectively), and those graduating from college would pay about 4.5 times more in taxes than would high school dropouts ($6000).

TABLE 3—Cost-Effectiveness Values From Societal and Governmental Perspectives for All Students and for Students Receiving Free Lunches

Strategy	Total Lifetime Costs,[a] $	Incremental Cost,[a] $	Total Quality-Adjusted Life-Years[b] (SE)	Incremental Quality-Adjusted Life-Years[b] Gained	Incremental Cost-Effectiveness, $
All students					
Societal perspective[c]					
Small classes	−454 294	−168 431	19.7 (0.09)	1.7	
Regular classes	−285 863		18.0 (0.06)		…[d]
Governmental perspective[e]					
Small classes	60 038	25 685	19.7 (0.09)	1.7	15 415
Regular classes	34 353		18.0 (0.06)		
Free-lunch students					
Societal perspective[c]					
Small classes	−482 129	−196 266	19.7 (0.10)	1.5[f]	
Regular classes	−285 863		18.0 (0.06)		…[d]
Governmental perspective[e]					
Small classes	24 615	−9 738	19.7 (0.10)	1.5[f]	
Regular classes	34 353		18.0 (0.06)		…[d]

Note. Incremental values represent the cost or effectiveness of small class sizes minus the cost or effectiveness of regular-sized classes.

[a]Lifetime earnings of students are greater than costs of schooling; thus, societal values are negative.

[b]A quality-adjusted life-year is calculated from the health-related quality of life scores. These scores were scaled from 0 to 1.0, with 0 representing death and 1.0 representing perfect health. Ten years lived at a health-related quality of life rating of 0.7 is equal to 7 (10 × 0.7) quality-adjusted life years. A quality-adjusted life-year is a year of perfect health.

[c]The societal perspective incorporated individual income earnings and quality-adjusted life-years.

[d]Both more expensive and less effective than small classes.

[e]The governmental perspective incorporated public expenditures and revenues only.

[f]Differences here were because of rounding. Free-lunch students were assumed to have lower rates of college attendance, thus resulting in slightly lower predicted gains in quality-adjusted life-years.

Medicare and Medicaid Enrollment

Medicaid enrollments and costs among high school graduates would be about one third those of high school dropouts (8.2% and 24.8%, respectively). The effect of educational attainment on Medicare enrollment among individuals aged 25 to 65 years would not be as steep, with 3.4% of high school graduates enrolled in Medicare relative to 7.6% of high school dropouts.

Cost-Effectiveness

Class-size reductions are cost saving from a societal perspective (Table 3). According to our model, a student graduating from high school after attending smaller-sized classes gains an average of 1.7 quality-adjusted life-years and generates a net $168 431 in lifetime net revenue (increase in wages minus intervention cost) relative to a high school dropout who attended regular-sized classes. In addition, greater savings accrue when reductions in class sizes are targeted toward free-lunch students, among whom the lifetime net gain is $196 266 per additional graduate (again, after accounting for the cost of the intervention). The total gain in quality-adjusted life-years was slightly lower (1.5) in this group because fewer of these students were assumed to enter college.

From a governmental perspective, reducing class sizes for all students would generate an additional governmental cost of $25 686 over each student's lifetime but would add 1.7 quality-adjusted life-years to a given student's life expectancy, resulting in an incremental cost-effectiveness ratio of $15 415 per quality-adjusted life-year gained.

Small class sizes targeted toward all students became cost saving from a governmental perspective once the economic effects of smaller classes on other welfare programs and crime were included in the calculations. From a governmental perspective, small class sizes would save at least $2700 for each student by reducing demand for welfare programs, and $31 000 by lowering the costs of crime over the lifetime of the average high school graduate.

These additional savings render small classes cost saving for all students. However, when targeted toward free-lunch students, small classes result in cost savings whether or not crime and welfare costs are considered. Were the government to target this low-income group alone, it would save $9738 over each additional graduate's lifetime.

Sensitivity Analyses

The standard deviations for costs and quality-adjusted life-years gained are presented in Table 4. The Monte Carlo simulations were not affected by random and nonrandom error in the parameter estimate; all interventions remained cost saving with the exception of the analysis that focused on all students from a governmental perspective, which was associated with a confidence interval of $19 000 to $33 000 per quality-adjusted life-year gained.

The variable to which cost savings were most sensitive in 1-way sensitivity analyses was the efficacy of small classes in producing additional numbers of high school graduates. From a societal perspective, small classes must produce at least 5 additional graduates per 100 students to remain cost saving. When crime and welfare costs are considered, this number falls to 4 per 100.

The cost of reducing class sizes was another important variable. From a societal perspective, any educational intervention that produces 12 additional high school graduates per 100 must cost less than $49 000 per graduate produced in net present terms to remain cost-effective. Excluding the benefits associated with college attendance had little effect on outcomes, with total savings dropping to $141 000 and total quality-adjusted life-years to 1.3.

Removing discounting greatly increased the predicted benefits and rendered all 4 scenarios cost saving. From a societal perspective, small class sizes targeted toward either all students or free-lunch students would remain

TABLE 4—Standard Deviations of Values in Monte Carlo Simulation

	Incremental Cost-Effectiveness Ratio, $	Quality-Adjusted Life-Years[a] Gained
All students		
Societal perspective[b]		
Small classes	6898	0.09
Regular classes	6101	0.058
Incremental cost	8000	
Governmental perspective[c]		
Small classes	4923	0.09
Regular classes	555	0.058
Incremental ratio	3300	
Free-lunch students		
Societal perspective[b]		
Small classes	5685	0.10
Regular classes	6085	0.058
Incremental cost	11000	
Governmental perspective[c]		
Small classes	2347	0.10
Regular classes	551	0.058
Incremental cost	1700	

[a]A quality-adjusted life-year is calculated from the health-related quality of life scores. These scores were scaled from 0 to 1.0, with 0 representing death and 1.0 representing perfect health. Ten years lived at a health-related quality of life rating of 0.7 is equal to 7 (10 × 0.7) quality-adjusted life years. A quality-adjusted life-year is a year of perfect health.
[b]The societal perspective incorporated individual income earnings and quality-adjusted life-years only.
[c]The governmental perspective incorporated public expenditures and revenues only.

cost saving were the discount rate to increase to 5%. However, from a governmental perspective, small classes targeted toward all students and free-lunch students would be associated with incremental cost-effectiveness ratios of $43 000 per quality-adjusted life-year gained and $14 000 per quality-adjusted life-year gained, respectively.

DISCUSSION

We found that reducing class sizes would, in all likelihood, be cost saving from a societal perspective. Although educational interventions occur outside the ambit of medicine, our analysis suggests that class-size reductions would generate more quality-adjusted life-year gains per dollar invested than the majority of medical interventions[34] and would compare favorably with childhood vaccinations in terms of the quality of life years gained per dollar invested.[36,37]

Policy Implications

The national implications of these savings are considerable, given that approximately 600 000 to 800 000 American students do not complete high school by their 20th birthday.[38–40] Reducing class sizes would increase graduation rates, producing 72 000 to 140 000 additional graduates each year. These additional graduates would in turn produce a net savings totaling $14 to $24 billion and 111 000 to 240 000 quality-adjusted life-years over their lifetimes. Although these national estimates rely on data from a single trial (Project STAR) and similar results may not be achievable in all settings, our sensitivity analyses indicate that cost savings from a societal perspective will be realized even if small class sizes are half as effective as shown here.

Whether reducing class sizes is cost saving from a governmental perspective is less clear. Our sensitivity analysis showed that savings accrued by the government were contingent on reductions in crime or targeting reductions in class sizes toward low-income children. However, whether or not it is cost saving our estimate of the cost-effectiveness of reducing class sizes far exceeds the incremental cost-effectiveness ratio for most health care services currently funded by the government.[35,41]

Limitations

Even if educational attainment is causally linked to health,[5,14,15] we cannot be certain of the magnitude of the effect of educational attainment on health or earnings. Although the effect sizes in experimental studies examining the impact of education on health tend to be large and there is some evidence that simple correlations might underestimate the effects of educational attainment on mortality and earnings,[9,14] a variety of confounders could influence the accuracy of the health-related quality of life score, life expectancy, and future earnings effect sizes we predicted using linear regression.[42]

One such factor is innate intelligence: children who drop out of high school may be less genetically endowed, on average, than high school graduates. Other potential confounding variables include family structure, social support, and parenting skills; health habits (e.g., nutrition and physical activity); presence of infectious diseases; environmental exposures at home (e.g., exposure to lead and environmental tobacco smoke) and in the community (e.g., exposure to air pollution); exposure to stress, family dysfunction, substance abuse, violence, and abuse or neglect; and neighborhood conditions such as access to health care and opportunities to engage in physical activity.

Whereas not accounting for these genetic and environmental covariates could produce overestimates of the effects of class-size reductions, other factors could lead to underestimations. For example, the 12% to 18% of students who would otherwise have dropped out of high school but graduate as a result of their enrollment in small classes[7] are likely to be the healthiest, brightest, and least exposed to adverse environmental conditions unrelated to schooling among students at risk for dropping out. Because we considered only the marginal health gains in this advantaged subset of the dropout cohort, effect sizes predicted by our regression analyses (in which we controlled for race, gender, and ethnicity) may have been conservative. Moreover, the select few additional high school graduates produced by small class sizes are often from low-income families, and studies suggest that low-income students are at a considerably increased likelihood of being held back as a result of rectifiable environmental variables (e.g., school quality) as opposed to genetic factors.[20]

Our study involved other limitations as well. First and foremost, we based our effect-size estimates on a single trial. Although the sample size in Project STAR was large—12 000 students spread over 46 school districts—the project's findings may not be generalizable to other settings. Although the STAR findings are corroborated by many, but not all, earlier studies of small class sizes, these earlier studies involved weaker designs,[18] and a national program might not meet with similar success. For example, the intervention discussed here involved kindergarten through grade 3 classes only, and it would be ex-

pected to confer less benefit in communities overrepresented by children who are more likely to enter the school system at later ages or whose greatest setbacks occur after grade 3. Nonetheless, our sensitivity analysis demonstrated that a program roughly one third as effective as Project STAR would still lead to cost savings.

Interventions other than class-size reduction merit study because they could be less expensive and more effective than class-size reductions. Prekindergarten interventions, high school tutorial and college preparatory programs, and some charter school models are examples of educational interventions that may hold promise. We examined class-size reduction because this is the only intervention to have been evaluated in a multicenter randomized controlled trial.[5,13]

Second, we did not examine the feasibility of nationwide implementation of the class-size reduction tested in Project STAR. Determining whether the potential costs and benefits of an intervention are favorable, the focus of our study, is a necessary first step in determining whether the feasibility of an intervention deserves closer scrutiny. Third, our analysis excluded potentially relevant costs. For example, an expansion in teaching positions would probably foster competition among schools for qualified teachers, which in turn could increase teacher salaries.

Finally, our college progression rates were based on increases in rates of students taking college preparatory examinations rather than actual college attendance. However, incremental cost savings and quality-adjusted life-years gained would be little changed even if no students went on to college, with savings dropping from $168 000 to $141 000 and quality-adjusted life-years gained falling from 1.7 to 1.3.

Conclusions

Despite these limitations, our findings raise the intriguing question of whether investments in social determinants of health can be more cost-effective than investments in conventional medical care. More intriguing still, each dollar invested in education could potentially produce long-term returns. Further research is needed to refine models and produce more-precise estimates, but our findings point to the importance of looking more broadly at the options available for improving health outcomes—including those outside the boundaries of clinical medicine—and of the fallacy of assuming, without evidence, that investments in medical care contribute more to health than do investments elsewhere. In short, it is more appropriate to address underlying conditions than it is to treat the victims of social deprivation only to return them to the conditions that brought about their situation in the first place. ■

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Contributors

P. Muennig originated the study, conducted the data analyses, and contributed to development of the article. S.H. Woolf contributed to the origination of the study and to development of the article.

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Human Participant Protection

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Tennessee's Project STAR

Class size is not pupil/teacher ratio. One significant study (Boozer & Rouse, 1995) found that average class size–a more direct measure of classroom organization–was more important to academic achievement than the pupil/teacher ratio.

Tennessee's Project STAR. Project STAR, the only large-scale, controlled study of the effects of reduced class size, was conducted in 79 elementary schools in the state of Tennessee. Within each participating school, children entering kindergarten were assigned at random to one of three class types: small (S) with an enrollment range of 13 to 17 pupils; regular (R) with an enrollment range of 22 to 26 pupils; or regular with a full-time teacher aide (RA) with 22 to 26 pupils. Teachers also were assigned at random to the class groups. Teachers in the STAR classrooms received no special instructions of any sort, and the duties of teacher aides were not prescribed but were left to the teacher's discretion.

Classes remained the same type (S, R, or RA) for 4 years, until the pupils were in grade 3. A new teacher was assigned at random to the class each year. Standardized achievement tests (Stanford Achievement Tests, or SATs) were administered to all participating students at the end of each school year. Also, curriculum-based tests (Basic Skills First, or BSF) reflecting the state's instructional objectives in reading and mathematics were administered at the end of grades 1, 2, and 3. Finally, a measure of motivation and self-concept intended for young children also was administered to each pupil (Milchus, Farrah, & Reitz, 1968). In all, about 7,500 pupils in more than 300 classrooms participated in the 4-year longitudinal study.

The design of STAR, together with its magnitude and the follow-up research conducted after the 4-year period, led Harvard's Frederick Mosteller to term Project STAR "[a] controlled experiment which is one of the most important educational investigations ever carried out" (1995, p. 113).

The primary results: Differences among the three class types were highly statistically significant for all sets of achievement measures and for every measure individually.

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DOES CLASS SIZE MATTER?

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Does Class Size Matter?

By Diane Whitmore Schanzenbach, Northwestern University

Executive Summary

Public education has undergone major reforms in the last 30 years with the rise in high-stakes testing, accountability, and charter schools, as well as the current shift toward Common Core Standards. In the midst of these reforms, some policymakers have argued that class size does not matter. This opinion has a popular proponent in Malcolm Gladwell, who uses small class size as an example of a "thing we are convinced is such a big advantage [but] might not be such an advantage at all."

These critics are mistaken. Class size matters. Research supports the common-sense notion that children learn more and teachers are more effective in smaller classes.

This policy brief summarizes the academic literature on the impact of class size and finds that class size is an important determinant of a variety of student outcomes, ranging from test scores to broader life outcomes. Smaller classes are particularly effective at raising achievement levels of low-income and minority children.

Considering the body of research as a whole, the following policy recommendations emerge:

- Class size is an important determinant of student outcomes, and one that can be directly determined by policy. All else being equal, increasing class sizes will harm student outcomes.
- The evidence suggests that increasing class size will harm not only children's test scores in the short run, but also their long-run human capital formation. Money saved today by increasing class sizes will result in more substantial social and educational costs in the future.
- The payoff from class-size reduction is greater for low-income and minority children, while any increases in class size will likely be most harmful to these populations.
- Policymakers should carefully weigh the efficacy of class-size policy against other potential uses of funds. While lower class size has a demonstrable cost, it may prove the more cost-effective policy overall.

DOES CLASS SIZE MATTER?

Introduction

Public education has undergone major reforms in the last 30 years with the rise in high-stakes testing, accountability, and charter schools, as well as the current shift toward Common Core Standards. The availability of new datasets that follow large numbers of students into the workforce has allowed researchers to estimate the lifetime impact of being taught by teachers who increase students' standardized test scores.[1] In the midst of these new reforms and policy concerns, some have argued that class size does not matter. This opinion has a popular proponent in Malcolm Gladwell, who uses small class size as an example of a "thing we are convinced is such a big advantage [but] might not be such an advantage at all."

The critics are mistaken. Class size matters. Class size is one of the most-studied education policies, and an extremely rigorous body of research demonstrates the importance of class size in positively influencing student achievement. This policy brief first reviews the research on class size. Special attention is given to the literatures in economics and related fields that use designs aimed at disentangling causation from correlation. It then documents the recent rise in class size and considers how to compare the effects of class-size reduction with other commonly discussed policy alternatives.

Review of research

Research shows that students in the early grades perform better in small classes. This is especially the case for students who come from disadvantaged backgrounds, who experience even larger performance gains than average students when enrolled in smaller classes. Small class sizes enable teachers to be more effective, and research has shown that children who attend small classes in the early grades continue to benefit over their entire lifetime.[2]

The importance of research design

Isolating the causal impact of policies such as class-size reduction is critical, but challenging, for researchers. Sometimes people will argue based on less sophisticated analyses that class size does not matter. Simple correlational arguments may be misleading, though. Since variation in class size is driven by a host of influences, the simple correlation between class size and outcomes is confounded by other factors. Perhaps the most common misinterpretation is caused by low-achieving or special needs students being systematically assigned to smaller classes. In these cases, a simple correlation would find class size is *negatively* associated with achievement, but such a

finding could not be validly generalized to conclude that class size does not matter or that smaller classes are harmful. Instead, because class size itself is correlated with other variables that also have an impact on achievement, such as students' special needs status, the estimated relationship between class size and outcomes would be severely biased.

The academic research has many examples of poor-quality studies that fail to isolate the causal impact of class size, most of them written and published prior to the so-called "credibility revolution" in economics.[3] Eric Hanushek has surveyed much of the early research on class size, as well as other educational inputs such as per-pupil spending, in a

Importantly, small classes have been found to have positive impacts not only on test scores during the duration of the class-size reduction experiment, but also on life outcomes in the years after the experiment ended.

pair of older but influential articles from 1986 and 1997, which have been revived in Gladwell's popularized book.[4] Based on these surveys, he concluded at the time that "there is not a strong or consistent relationship between student performance and school resources" such as class size or spending. In a thorough re-analysis of Hanushek's literature summary, Krueger demonstrates that this conclusion relies on a faulty summary of the data. In particular, Hanushek's summary is based on 277 estimates drawn from 59 studies, but while more estimates are drawn from some studies than others, each estimate is weighted equally. As a result, Hanushek's literature summary places a disproportionate weight on studies that analyzed smaller subsets of data. Krueger argues that since studies, not individual estimates, are what are accepted for publication, weighting by study is more appropriate than weighting by the number of estimates. When Krueger re-analyzed the data giving each study equal weight, he found that there is indeed a systematic positive relationship between school resources and student performance in the literature surveyed by Hanushek.

More troubling, many of the studies included in the survey employed research designs that would not allow researchers to isolate causal effects. For example, one-third of the studies ignored the relationship between different measures of school inputs, and held constant per-pupil spending while studying the "impact" of class size. Because smaller classes cannot be had without increased spending on teachers, it is inappropriate to include spending as a control variable and effectively hold spending constant when investigating class size. The resulting estimate does not provide insight about the impact of reducing class size, but instead estimates a convoluted value that is something like the impact of reducing class size while simultaneously paying teachers less, which is unrealistic.[5] Such evidence does not reflect the impact of class size and should not be used to inform policy.[6] Nonetheless, in his 2013 book *David and Goliath*, Malcolm Gladwell uncritically cites the Hanushek literature summary and its argument that the class size literature is inconclusive.[7] As demonstrated below, well-designed studies generally—with a few notable exceptions—find strong class-size impacts.

The modern research paradigm strongly prefers the use of research designs that can credibly isolate the cause-and-effect relationship between inputs and outcomes. Scholars generally agree that true randomized experiments, such as the Project STAR class-size experiment described below, are the "gold standard" for isolating causal impacts. When an experiment is not available, researchers are sometimes able to employ other techniques that mimic experiments—termed "quasi-experiments" in the literature—that can better infer causality.

In implementing a quasi-experimental study, there must be some sort of variation in class size that is random or nearly random. Such variation is hard to come by, and in many cases there is no way for researchers to isolate the impact of class size. Thus, some of the older and better-designed studies inform the policy debate more accurately than newer studies that employ less sophisticated and simpler correlational designs.

Evidence from Tennessee's STAR randomized experiment

The best evidence on the impact of reducing class sizes comes from Tennessee's Student Teacher Achievement Ratio (STAR) experiment.[8] A randomized experiment is generally considered to be the gold standard of social science research. In STAR, over 11,500 students and 1,300 teachers in 79 Tennessee elementary schools were randomly assigned to small or regular-sized classes from 1985-89. The students were in the experiment from kindergarten through third grades. Because the STAR experiment employed random assignment, any differences in outcomes can be attributed with great confidence to being assigned to a smaller class. In other words, students were not more or less likely to be assigned to small classes based on achievement levels, socio-economic background, or more difficult-to-measure characteristics such as parental involvement.[9]

The results from STAR are unequivocal. Students' achievement on math and reading standardized tests improved by about 0.15 to 0.20 standard deviations (or 5 percentile rank points) from being assigned to a small class of 13-17 students instead of a regular-sized class of 22-25 students.[10] When the results were disaggregated by race, black students showed greater gains from being assigned to a small class, suggesting that reducing class size might be an effective strategy to reduce the black-white achievement gap.[11] Small-class benefits in STAR were also larger for students from low socio-economic-status families, as measured by eligibility for the free- or reduced-priced lunch program.

A follow-up study of the most effective teachers in STAR found that teachers used a variety of strategies to promote learning and that small classes allowed them to be more effective in employing these strategies. For example, they closely monitored the progress of student learning in their classes, were able to re-teach using alternative strategies when children did not learn a concept, had excellent organizational skills, and maintained superior personal interactions with their students.[12]

Importantly, small classes have been found to have positive impacts not only on test scores during the duration of the class-size reduction experiment, but also on life outcomes in the years after the experiment ended. Students who were originally assigned to small classes

did better than their school-mates who were assigned to regular-sized classes across a variety of outcomes, including juvenile criminal behavior, teen pregnancy, high school graduation, college enrollment and completion, quality of college attended, savings behavior, marriage rates, residential location and homeownership.[13]

Most other quasi-experimental evidence is consistent with STAR

True randomized experiments such as Tennessee's random assignment of students across an entire state to experimental and control groups are quite rare. Therefore, researchers must also look for quasi-experimental approaches that allow isolation of the causal impact of class-size reduction. Other high-quality studies that isolate the effect of small class size in elementary school on student outcomes generally show results similar to those found in STAR.

For example, a quasi-experimental approach was used to evaluate Wisconsin's targeted class-size reduction program. In the Student Achievement Guarantee in Education (SAGE) program, high-poverty school districts could apply to implement a pupil-teacher ratio of 15-to-1 in grades K-3.[14] While most participating schools reduced class sizes, some schools chose to attain the target pupil-teacher ratio by using two-teacher teams in classes of 30 students. Test scores of first-grade students in SAGE schools were higher in math, reading, and language arts compared with the scores of those in selected comparison schools in the same districts with average pupil-teacher ratios of 22.4 to 24.5. Attending small classes improved student achievement by approximately 0.2 standard deviations.[15]

The most famous quasi-experimental approach to studying class-size reduction comes from Angrist and Lavy's use of a strict maximum-class-size rule in Israel and a regression discontinuity (RD) approach.[16] In Israel, there is a strict maximum class size of 40 students. As a result, class size drops dramatically when enrollment in a grade in a school approaches the point when the rule requires the school to add a new classroom—i.e., when enrollment tips above a multiple of 40. For example, if a grade has 80 students, then a school could offer as few as 2 classrooms, with the maximum allowable class size of 40 students in each. If a grade has 81 students, however, the school is required to offer at least 3 classrooms, and consequently the maximum average class size falls to 27 students. In practice, some schools add an additional classroom prior to hitting the 40-student cap. Nonetheless the maximum-class-size rule is a good predictor of actual class sizes and can be used in an instrumental-variables research design to isolate the causal impact of class size on student achievement. Using the variation in narrow bands around enrollment sizes that are multiples of 40 students, Angrist and Lavy find strong improvements overall in both math and reading scores, of a magnitude nearly identical to that of Project STAR's experimental results. Consistent with the STAR results, they also find larger improvements among disadvantaged students.

Several subsequent papers have identified the impact of smaller class sizes using maximum class-size rules in other international settings.[17] (Note that quasi-experimental approaches tend to require large datasets and data spanning a large number of years. Such datasets are more likely to derive from settings outside the United States.) Most recently,

Fredriksson *et al.* evaluated the long-term impact of class size using data from students in Sweden between ages 10 and 13 who were facing a maximum-class-size rule of 30 students.[18] At age 13, students in smaller classes had higher cognitive and non-cognitive skills, such as effort, motivation and self-confidence. In adulthood (between ages 27 and 42), those who had been in smaller classes had higher levels of completed education, wages, and earnings. Urquiola used a similar regression discontinuity approach in Bolivia and found that a one standard-deviation reduction in class size (about 8 students in his data) improves test score performance by 0.2 to 0.3 standard deviations.[19] Browning and Heinesen derive similar results from data from Denmark, even though the average class size is much smaller in their study (20 pupils per classroom, compared with 31 students in Angrist and Lavy's Israeli data).[20]

A different quasi-experimental approach is to use variation in enrollment driven by small variations in cohort sizes across different years. Hoxby takes this approach using data from the state of Connecticut, finding no statistically significant positive effect of smaller class size.[21] One drawback of the Connecticut study is that test scores are only measured in the fall, so the impact of the prior year's class size may be somewhat mitigated by the time spent away from school in the summer. The discrepancy between Hoxby's Connecticut results and those of other studies that also use research designs capable of uncovering causal relationships is an unresolved puzzle. Despite the overwhelming pattern in the literature of positive class-size impacts, Malcolm Gladwell, intent on supporting his point about what he calls the "theory of desirable difficulty," described only the Hoxby results in his description of research on class size in his recent book.[22]

Results from statewide class-size-reduction policies

Based in part on the research evidence on the impact of class-size reduction, several U.S. states, including California, Texas and Florida, have implemented class-size caps. The most widely studied of these policies is the 1996 California law that gave strong monetary incentives to schools to reduce class size in grades K-3 to 20 or fewer students. Sometimes when a new policy is introduced it is phased in slowly across locations, which gives researchers the opportunity to compare outcomes in schools that have adopted the policy with those that have not yet done so. In California, however, the policy was nearly universally adopted within a short period of time, so there was very little opportunity to compare early implementers with later implementers. Furthermore, test scores are only available starting in grade 4, so any evaluation of the policy is forced to use test scores from later than the year in which the reduced class size was experienced. Although there were positive impacts on achievement due to class-size reductions on the order of 0.05 to 0.10 standard deviations, these impacts may have been offset because many inexperienced teachers had to be hired to staff the new classrooms, reducing average teacher quality.[23]

Why are small classes more effective?

The mechanisms at work linking small classes to higher achievement include a mixture of higher levels of student engagement, increased time on task, and the opportunity small

classes provide for high-quality teachers to better tailor their instruction to the students in the class. For example, observations of STAR classrooms found that in small classes students spent more time on task, and teachers spent more time on instruction and less on classroom management.[24] Similar results have been found in other settings.[25] However, qualitative research from the pupil-teacher ratio reduction in Wisconsin's SAGE program indicates that such beneficial adaptations in teachers' practices will not necessarily occur. It is important to provide professional-development support to instruct teachers on how to adapt their teaching practices to smaller classes.[26]

In addition, small classes may have a positive impact on student "engagement behaviors," which include the amount of effort put forth, initiative taken, and participation by a student. Not surprisingly, these characteristics have been shown to be important to classroom learning. Finn finds that students who were in small classes in STAR continued to have higher engagement ratings in subsequent grades.[27]

It is sometimes argued that class size only matters for inexperienced or low-quality teachers because more effective teachers are better able to adapt their teaching styles to accommodate larger classrooms. The evidence suggests that the opposite is true. In STAR, the positive impacts of small classes were found to be larger for experienced teachers.[28] Experienced teachers are better able to take advantage of smaller class sizes to make pedagogical changes.

What does the evidence say about how small is small enough?

The best evidence on class-size reduction is from the STAR experiment, which estimated substantial positive impacts from class-size reduction from an average of 22 to an average of 15. In fact, the class sizes targeted in STAR were informed by influential work by Glass and Smith that found strong impacts from class sizes below 20.[29] Based on this, some researchers conclude that the evidence supports better outcomes only if classes are below some threshold number such as 15 or 20. Sometimes the argument is extended to suggest that reducing class size is not effective unless classes are reduced to within this range. The broader pattern in the literature finds positive impacts from class-size reductions using variation across a wider range of class sizes, including class-size reductions mandated by maximum class-size rules set at 30 (Sweden) or 40 (Israel). In fact, the per-pupil impact is reasonably stable across class-size reductions of different sizes and from different baseline class sizes. For example, when scaled by a 7-student class-size reduction as in the Tennessee experiment, the Israeli results imply a 0.18 standard deviation increase in math scores, which is nearly identical to the Tennessee results.[30] The weight of the evidence suggests that class-size impacts might be more or less linear across the range of class sizes observed in the literature—that is, from roughly 15 to 40 students per class. It would be inappropriate to extrapolate outside of this range (as is done in the Gladwell book).

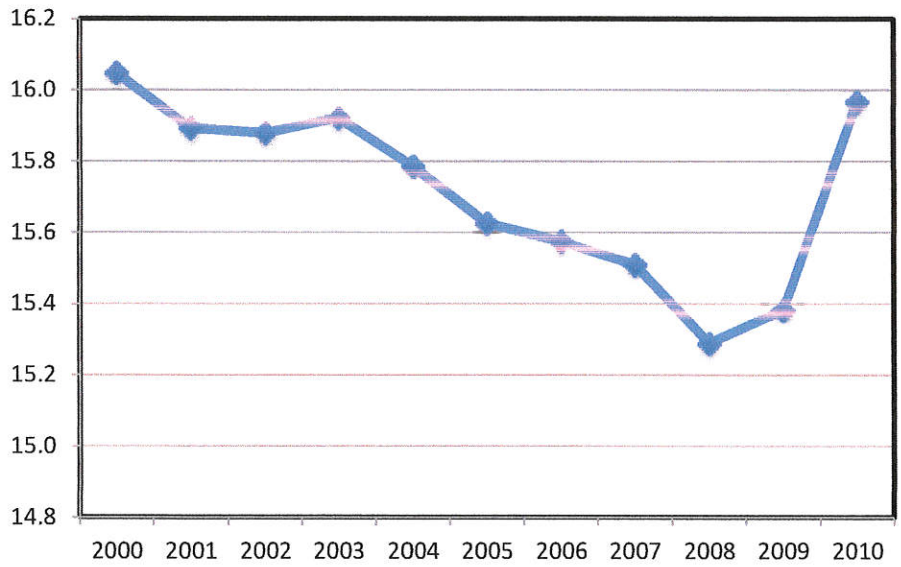
Do small classes matter in later grades?

Most of the high-quality evidence on class-size reduction is based on studies of the early grades. The available high-quality evidence on the impact of class size on outcomes in

older grades is more limited, and more research in this area is needed. A notable exception is Dee and West, who estimate class-size effects using variation in class sizes experienced by students across classes in different subjects, and by students taking classes from the same teachers in different class periods. The study finds that smaller class sizes in eighth grade have a positive impact on test scores and measures of student engagement, and finds some evidence that these impacts are larger in urban schools.[31]

Recent Developments

Student-teacher ratios in public schools fell steadily over the past 40 years until recently. Between 2008 and 2010, however, the student-teacher ratio increased by 5%, from 15.3 to 16.0 (see Figure 1). Note that actual class sizes are typically larger than student-teacher ratios, because these ratios include special teachers who are not included in class-



Source: Digest of Education Statistics (table 78, 2012; table 69, 2011)

Figure 1. Student/Teacher Ratios in Public Elementary and Secondary Schools

size counts, such as teachers for students with disabilities.[32] For example, imagine a grade level in a school that contains three "regular" classes with 24 students in each and one compensatory class with only 12. This school would have a pupil-teacher ratio of 21, even though most of the students in that grade (in fact, 85% of them) are in classes with 24 students. This is a reason why simple correlations between class size and student outcomes may be misleading. If some students are placed in smaller classes because they have low

performance levels, this biases the estimate of the positive effect of small classes downward.[33]

According to the Schools and Staffing Survey, in 2011-12 the average United States class size for public primary school teachers in self-contained classes was 21.6, up from 20.3 in 2007-08.[34] During this time frame, the recession forced California to abandon its class-size reduction policy, which had provided incentives for districts to adopt a 20-student cap in grades K through 3.[35] In response, the average K-3 class size increased from 23 students in 2008-09 to 26 students in 2012-13.

Table 1. Hypothetical Distribution of Students with Different Numbers of Teachers

		Allocation with 24 teachers		Allocation with 23 teachers	
Grade	Enrollment	Number of classes	Class size	Number of classes	Class size
K	100	4	25	4	25
1	100	4	25	4	25
2	100	4	25	4	25
3	100	4	25	4	25
4	100	4	25	4	25
5	100	4	25	3	33.3
Total	600	24		23	
Average class size			25		26.4
Average pupil-teacher ratio			25		26.1

Small increases in average class sizes can mask large class-size increases in some districts and schools. For example, sometimes policymakers will calculate the cost savings from increasing the average class size by a single student, arguing or implying that the impact on test scores from this "modest" one-student increase will be negligible.[36] This line of reasoning is misleading because actual classes and teachers are not easily divisible into fractions.[37] As illustrated in Table 1, imagine a K-5 school that has 100 students in each grade with four classrooms for each grade. Each of the 24 classes in the school has a class size of 25 students. If this school had to lay off one fifth-grade teacher, the aggregate numbers would not increase very much. The average pupil-teacher ratio would increase only slightly, from 25.0 to 26.1, while the average class size would increase from 25.0 to 26.4. These averages mask the sharp increase in class size experienced by the fifth-grade students, from 25 to 33.3. The negative impact of increasing class size by 8 students in

fifth grade would be expected to be sizeable, but it might not raise alarms to the average parent told that the pupil-teacher ratio increased by only 1 student.[38]

Discussion and Analysis

Recently some policymakers and education analysts have argued that manipulating other educational inputs would be more effective or more cost-effective than class-size reduction. By and large, though, these suggestions do not pit class-size reductions against some other policy alternative that has been implemented and evaluated. It is only appropriate to compare effectiveness across a variety of policy alternatives.

For example, recent studies have found that teachers with high value added on standardized test scores also have an impact on such subsequent outcomes for their students as wage earnings.[39] Based on these findings, some argue that giving students a high-test-score value-added teacher is more cost-effective than class-size policy. The problem with this suggestion is that there are few—if any—policies that have been designed, implemented and evaluated that increase the availability of teachers with high-test-score value added and result in higher student achievement. It's one thing to measure the impact of teachers on their students' standardized test scores, but it is a separate challenge to design a policy lever to bring more teachers into the classroom who can raise test scores. A recent report from the Institute of Education Sciences documents that disadvantaged students are taught by teachers with lower value added on tests.[40] At this point we know relatively little about how to increase teacher quality, much less how much it will cost to induce more high-quality teachers to work and stay in the schools that need them. Much more needs to be done in terms of pilot programs, policy design and evaluation before improving teacher quality can be considered a viable policy option.

Another proposal has been floated (e.g. by Bill Gates) to pay high-quality teachers bonus payments for taking on extra students.[41] It is certainly possible that such a reallocation of students could increase overall achievement, but it is also possible that it would backfire. For example, imagine a school with a grade containing two classes. One teacher is an excellent, experienced teacher, while the other is an untested, first-year "rookie" teacher. One option would be for both teachers to get classes with 25 students. Another option would be to pay the experienced teacher a bonus to take a class of 29 students, leaving the rookie teacher with a class of 21 students. All else equal, children in the experienced teacher's class would likely record lower test score gains if there were 29 students than if there were 25, but these gains would be enjoyed by more students. Perhaps the 21 students in the rookie teacher's classroom would be better off than if they would have been in a classroom of 25 students, though the research is less clear about whether the rookie teacher will be more effective in a small class. In this hypothetical case, it is possible that the aggregate test score gains could be larger when the classrooms have unequal sizes, especially if the experienced teacher is substantially more skilled at raising test scores than the rookie teacher. Whether it is an effective policy, however, hinges crucially on a variety of factors: how large the skill differential is between teachers, how large a bonus payment is required to induce the experienced teacher to accept a larger class, what the next best

use is for the funds used for the bonus payment, and whether the gains persist over time. While this is a potentially interesting area for policy development, much more pilot testing needs to be done before it could be considered a credibly policy alternative to class-size reduction.

Recommendations

The academic literature strongly supports the common-sense notion that class size is an important determinant of student outcomes. Class-size reduction has been shown to improve a variety of measures, ranging from contemporaneous test scores to later-life outcomes such as college completion.

Based on the research literature, I offer the following policy recommendations:

- Class size is an important determinant of student outcomes and one that can be directly influenced by policy. All else being equal, increasing class sizes will harm student outcomes.
- The evidence suggests that increasing class size will harm not only children's test scores in the short run but also their long-term human capital formation. Money saved today by increasing class sizes will be offset by more substantial social and educational costs in the future.
- The payoff from class-size reduction is larger for low-income and minority children, while any increases in class size will likely be most harmful to these populations.
- Policymakers should carefully weigh the efficacy of class-size-reduction policy against other potential uses of funds. While lower class size has a demonstrable cost, it may prove the more cost-effective policy overall.

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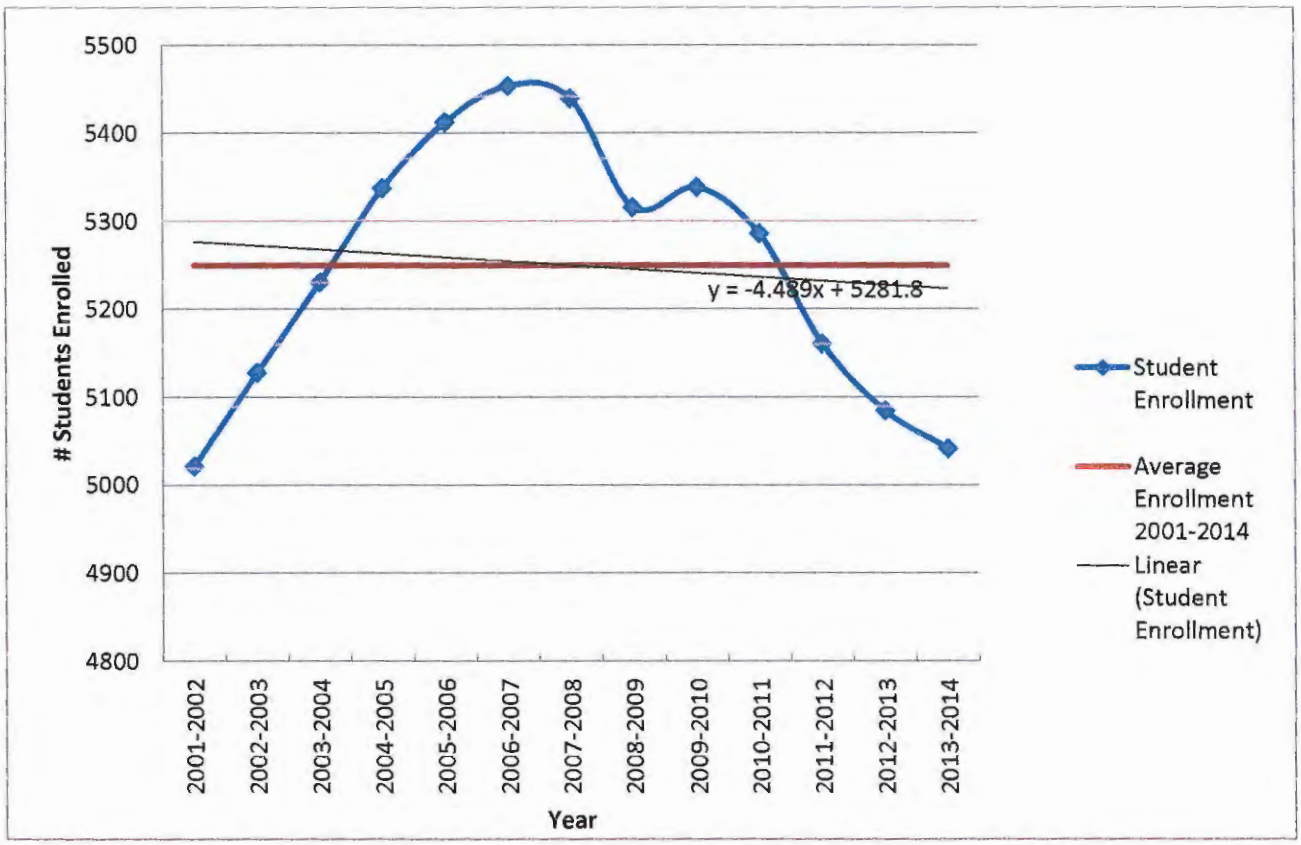
Methacton Enrollment with trend analysis 2001-2014
submitted by Elizabeth Drummond 2/23/15



Using MSD data of enrollment 2001-2014, I plotted a graph and looked at how the current trend in declining enrollment reflects the numbers of the past 13 years. I feel the board should consider that the district might be on the cusp of a rise of population once again and not the dramatic decline of population as projected by the study, as population trends are typically cyclical in nature.

"However, given the uncharacteristically large rise in the district's cohort survival rate in 2014-15 (the relationship between kindergarten entries and births in the district five years prior) and questions as to whether this level can be sustained, PEL—if requested—would revisit its projections in the fall of 2015 at no additional cost to the district in order to make any appropriate adjustments based on information available at that time." (Source: PEL Analysis of Demographics and Housing and Related Activity and Projections of Public School Enrollments in the Methacton School District, January 2015 p. 92)

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Is there a threshold effect in reducing class size?

There is a common misconception that a particular threshold must be reached in reducing class size -- that is, a class has to be decreased below a certain number of students to have a positive effect on student achievement.

This argument is often used in order to discourage class size reform efforts, since shrinking classes below a particular figure is viewed as either impractical or too expensive to contemplate. Yet the research shows that that there is no magic number that needs to be reached before a smaller class will result in more learning.

- Economist Alan Krueger of Princeton analyzed the Tennessee STAR data and found that even within the larger classes of 22-25, students did better the smaller their class size -- that is in classes of 22 or more. According to Krueger, Charles Achilles, and other class size researchers, the relationship between lower class size and higher student achievement is roughly linear, with no evidence of a threshold.[1] According to Achilles, the effect is approximately -.35 for every additional student added to a class.[2]

- Other analyses have found that class size benefits are roughly linear, and that each additional student added to a class results in a decrease in the class average for students in all academic scores. In the SAGE studies in Wisconsin, the test score decline in all academic areas was found for each student added to a classroom above 15 in the early grades; in OECD analyses in Europe, a decline in scores in reading, math and science was found for high school classes for each student added above 25. [3]

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[1] Alan B. Krueger, ***"Experimental Estimates of Education Production Functions,"*** The Quarterly Journal of Economics, Volume 114, Issue 2, May 1999. This paper is available at http://www.irs.princeton.edu/pubs/pdfs/379.pdf, see esp. pgs. 28-29. See also Jayne Boyd-Zaharias, et.al., "Quality Schools build on a Quality Start" in: *Creating The Quality School*, ed. Edward W. Chance April 1994, pp. 119-120, table 3, http://www.heros-inc.org/quality.pdf.

[2] See chart entitled "***Correlation between Individual class sizes and Stanford Achievement Test*** Scores in Reading and Math by Grade", from STAR secondary analyses.

[3] Molnar, A., Smith, P., Zahorik, J., Halbach, A., Ehrle, K., & Hoffman, L. M. (2001). ***2000-2001 evaluation results of the Student Achievement Guarantee in Education (SAGE) program.*** Milwaukee, WI: Center for Education Research, Analysis and Innovation, University of Wisconsin. pp. 141 - 142. See also OECD (2001).

- Three large scale studies have shown that the smaller the class, the better the results, as measured by student performance on NAEP exams, again with no evidence of a threshold effect. According to these studies, there is no particular level to which a class size must be lowered to in order to raise achievement. [4]

- In Texas, there has been substantial progress in student achievement, particularly in the early grades, and particularly among minority students since the state implemented a program to reduce class size to 22 students in kindergarten through 4th grade in 1984. Researchers at RAND have identified that these gains in national assessments known as the NAEPs, along with increased access to Pre-K, were due to the Texas statewide class size reduction program.[5]

- In an observational study of 49 randomly chosen schools in Great Britain, the researchers found significant benefits of smaller classes among student engagement and time on task, and no evidence of threshold effects. [6]

Prepared by Leonie Haimson, Class Size Matters, 12.09.09

Knowledge and skills for life. First results from PISA 2000. Paris, pp. 202 - 205. The Programme for International Student Assessment (PISA) study (2000) of reading, mathematical and scientific literacy of 15 year olds in 32 countries found that as the student-teaching ratio rises above 25, there is a continuous decline in school performance in all three areas of reading, math and science. The PISA study predicted that a student score which is ten points higher in one school than another is associated with an average of 3.3 fewer students per teacher.

[4] Donald McLaughlin and Gili Drori, ***School-Level Correlates of Academic Achievement: Student Assessment Scores in SASS Public Schools,*** U.S. Department of Education, 2000; http://nces.ed.gov/pubs2000/2000303.pdf. David Grissmer, et.al., ***Improving Student Achievement: What State NAEP Test Scores Tell Us***, Santa Monica, CA: RAND, 2000, www.rand.org/publications/MR/MR924/ See also Harold Wenglinsky, ***When Money Matters,*** Educational Testing Service, April 1997; http://www.ets.org/research/pic/wmm.pdf

[5] David Grissmer, et.al., **op.cit.**

[6] Peter Blatchford et.al, "Do low attaining and younger students benefit most from small classes? Results from a systematic observation study of class size effects on pupil classroom engagement and teacher pupil interaction", *presented to the American Educational Research Association* Annual Meeting 2008, posted at http://www.classsizeresearch.org.uk/aera%2008%20paper.pdf

Save Audubon

Dear Dr. Zerbi, the School Board, and citizens who value Audubon School much,

If you close Audubon School, you will soon be regretting what you had done. Audubon has sentimental value. Many generations of families have gone to Audubon! Don't close Audubon School!

My first reason is that if you close Audubon, families will have to move away. This would occur if the new school that the child (dren) have to go to is too far away from their home. Then, the family would consider moving away. You'd basically be driving people out of Audubon!

My second reason is that kids from other schools could come. How do you know? It's not like it is impossible that for other kids to come to Audubon Elementary. For example, I know ~~numerous~~ 8 people that are new to Audubon School. In my grade. [redacted] There are other new kids that have come to this school too! Also, if less kids were coming to Methacton District, there wouldn't be 5 kindergarten classes. Last year, there were only ~~two~~ 4! Plus, if you closed Audubon and Arrowhead, that's 800 kids get mashed into three schools.

My third reason is that Audubon has smart and great teachers! You may look at this as an opinion but read on and you will see why this is only part opinion. If the teachers here weren't good at teaching, I would be just sitting here thinking of what to write. And how to write what I chose to write, but no! I am sitting here typing away and as fast as I can without making any mistakes. Also, I am putting a lot of thought into what I am writing.

My fourth reason is that some parents want their children to go through the same thing their older children had gone through. Such as my parents, [redacted]

My fifth reason is that if you close Audubon that will be like taking a great part of history away from Audubon. Audubon School is what makes Audubon town so exciting to live in.

You should not close Audubon so families won't have to move away, kids will have an opportunity to come to Audubon, to provide smart teachers a job, parents will let kids go through the same things their older siblings did, and to keep a part of history of this town.

From, a fourth grade student.

Dear To whom concern,

Is it really necessary to lose such a valuable school? DON'T close Audubon.

My first reason that Audubon shouldn't be closed is that the other schools (Worcester, Eagleville, Woodlyn) would be too crowded with additional kids from Audubon. From my experience, if there are too many students in one class, it can be frustrating when the teacher doesn't call on you. Some of the students might never be noticed. As a result, the students might be discouraged from learning.

My second reason is that many students live far away from other schools. Parents would have to spend a lot of time on the road. If you were going on a bus, that would be even longer. I get bored on the bus even when it takes 30 minutes to get to school! Also students might not want to go to the school activities such as orchestra, band, or chorus, which are enjoyed by many students right now. If Audubon is closed, many students will not go just because the parents do not have time to drop them off.

My third reason is that I want my little sister to experience the same thing I did at Audubon. I want her to have the same amazing teachers I had at this amazing school. Many students at Audubon have little brothers and little sisters. I believe they're thinking the same thing.

My final reason is that the smart, brilliant, awesome and amazing teachers at Audubon would lose their job. Have you thought about how hard their lives would be after losing their jobs? Is it what they got for return after working so hard at Audubon for so many years? At Audubon, students care about their teachers very much, just like the teachers care about them. The students don't want see their teachers losing their jobs just because the board decided to close down the school not because they did not do good jobs. I've always wanted to visit my teachers when I get older. I would be really sad to find out that the school is closed when I decided to visit my teachers next year.

Don't close Audubon. If it is closed, other schools will be too crowded, many students live far away from the other schools, many great teachers will lose their jobs, and younger kids won't get to experience what the current students are doing at Audubon.

Sincerely,

[redacted] a 4th grade student currently at Audubon)

SAVE AUDUBON!

Dear Dr. Zerbi,

Wouldn't it be great for Audubon to stay years longer? Don't close Audubon!

My first reason why I think you should not close down Audubon is because this change could be hard for other schools in the district not just our school. The other schools could end up getting way too crowded. I do not think the parents would like their children to have switched schools more than once. Maybe then you will regret closing down Audubon.

My next reason that I think you should not close down Audubon is that a lot of teachers could lose their jobs. That would not be good for them because they will not be making money, and might have to find a new district to teach in, or even have to find a whole new job.

My third reason is why I think you should not close down Audubon is because it ~~come~~ can be hard for the bus drivers. I think that because they would have longer routs to drive that are farther away from the school. That could become hard because it would take longer for the buses to get to the school. The children could end up late. If you thought about just making the kids get up earlier NOT a good idea. Some kids that get up early get grumpy. They will not be in a good mood to learn, and there brain might not have gotten enough sleep so they might not be able to focus hard on schoolwork and tests.

My fourth reason is that it would be hard for the kids to switch schools. What if they barely know anybody? Maybe none of their best friends will go to the same school they are transferred to. On the first day of school they will have no clue where their classroom is. They could get lost.

My next reason is that I want my younger brother to have all the same great experiences I had. He is only in second grade, I want him to be able to stay until fourth grade. Do the other schools in the district (Arrowhead, Worcester, and Woodlyn) do all the same fun stuff Audubon does, like the fun fair, variety show, science fair, and walk- a- thon?

My final reason is what are you going to do with all the work books, desks, smart boards, and shelves that this school has spent money on? My biggest question is what are you going to do with Audubon? It would be sad driving by and seeing our school not being used, or not see it at all! I do not think this school needs to be repaired at all! I do not think this school needs to be repaired at all! If you do not repair Audubon no money will be used for that

circumstance. If you do close Audubon and do not use the computers, Smart boards, and workbooks that would be a waste of money.

Those are my reasons why I think you should not close down Audubon. I hope I change your opinion at least a little.

From: [redacted]

A 4th Grade Student

Community Sponsored Panel Applicants

February 25, 2015

Enrollment Projections and Capacity Analysis

Amber Anderson
AmberDNAnderson@gmail.com
215-432-1905

PhD in Statistics from The University of New Mexico. 15 years of experience as a statistician for Fortune 500 company. Methodologies include analysis of variance, mixed models, regression, multivariate analysis, predictive modeling.

Gary Landsberg, P.E.
Gary.landsberg@gmail.com
443-810-1782

Master of Science degree from **Massachusetts Institute of Technology** and MBA from the **Wharton School of the University of Pennsylvania**. Mr. Landsberg is currently a Global Practice Leader at Fortune 500 Consulting Firm. Experience includes advanced analytics and modeling, financial analysis, business strategy, advanced research and development in unmanned aircraft systems, and Systems of Systems design optimization.

Andrew Sandner
rasandner5@gmail.com
267-981-7004

Mr. Sandner is currently employed by the United States Department of Treasury as an Account Coordinator where he is responsible for the audits of America's largest corporations. Andrew's prior experience includes: • Public accounting with Arthur Andersen, LLP. • Senior Finance Manager for a company which expanded from a $12 million division of a public entity with 140 employees to a four unit $150 million private equity backed entity with over 900 employees. • Vice President/Owner commercial real estate development business. • Property and casualty insurance broker with The Graham Company. Andrew earned a B.S. in Accounting from the University of Delaware, and is currently a candidate for the Professional MBA degree at Drexel University. Andrew holds a Certified Public Accountant License (inactive) with the State of Pennsylvania and is a Certified Building Contractor with the State of Florida. He has also held licenses in numerous states as a property and casualty insurance producer.

Finance & Infrastructure

Luis Dario Gile, RA, NCARB
luisgile@gmail.com
347-922-4919

Bachelor of Architecture from the New Jersey Institute of Technology. Registered Architect in the Commonwealth of Pennsylvania, Certified by the National Council of Architecture Registration Boards. Mr. Gile directs procurement of design and construction services for Fortune 500 Clients at a leading global consulting firm. Mr. Gile has over 20 years of experience in design and construction. His experience includes K-12 and Higher Education sector projects including performing site assessments and building inspections to evaluate repair/renovation needs in existing facilities. He's an expert in design and construction contracting, procurement, and cost modeling.

Andre Goldstein
andregoldstein@yahoo.com
610-906-0866
Regional Director – Asia Pacific
Dale Carnegie & Associates, New York

Andre Goldstein serves as Director Operations - Asia Pacific for Dale Carnegie Training. He provides coaching, strategic support and development to Dale Carnegie offices throughout the Asia Pacific region and is committed to their success and has overall responsibility for a US$300 million territory.

Andre Goldstein brings over 15 years of experience in franchise operations, joining Dale Carnegie and Associates from MRI Network, one of the world's largest recruitment organizations.
Most recently he had global responsibility for strategic projects focused on revenue growth; value-added, client-facing solutions; operational efficiency; client satisfaction and continuous improvement, ensuring quality in all business processes. In a prior role as VP Operations, he was responsible for providing operational support to over 300 of MRI's largest offices.
During his tenure at MRI, he has held leadership roles in international operations, marketing, product development, field operations, strategic planning and technology. Andre has more than 20 years' business experience, including six years spent living and working in China as a consultant to multinational companies expanding in to the region and has successfully negotiated joint venture operations in China for a variety of U.S.-based companies.

Andre holds an MBA from the Weatherhead School of Management at Case Western Reserve University in Cleveland, Ohio. He also has a B.A. in Asian Studies from CWRU. He lives in Philadelphia, Pennsylvania, USA with his wife Jennifer and his two sons Owen and Henry.

Andrew Sandner
rasandner5@gmail.com
267-981-7004

Mr. Sandner is currently employed by the United States Department of Treasury as an Account Coordinator where he is responsible for the audits of America's largest corporations. Andrew's prior experience includes: • Public accounting with Arthur Andersen, LLP. • Senior Finance Manager for a company which expanded from a $12 million division of a public entity with 140 employees to a four unit $150 million private equity backed entity with over 900 employees. • Vice President/Owner commercial real estate development business. • Property and casualty insurance broker with The Graham Company. Andrew earned a B.S. in Accounting from the University of Delaware, and is currently a candidate for the Professional MBA degree at Drexel University. Andrew holds a Certified Public Accountant License (inactive) with the State of Pennsylvania and is a Certified Building Contractor with the State of Florida. He has also held licenses in numerous states as a property and casualty insurance producer.

Education

Katrin Blamey, Ph.D.
katrin.blamey@desales.edu
302-489-9305

Doctorate in Education from the University of Delaware, Master's degree from the College of William and Mary. Dr. Blamey is the Chair of the Early Childhood and Elementary Education program at DeSales University. She is responsible for teaching undergraduate and graduate courses in early childhood and elementary education, supervising student teachers, and conducting research studies on educational outcomes for young children.

Special Education

Jennifer Zavertnik, Ph.D., NCSP
Nationally Certified School Psychologist (Since 2004)
jenn.zavertnik@gmail.com
610-639-6537

Undergraduate Degree in Psychology and Sociology: University of Notre Dame

M.Ed. and Ph.D. in School Psychology from Temple University. Dr. Zavertnik is currently a self-employed school psychologist who administers comprehensive psychoeducational evaluations to Early Intervention preschoolers and school-aged children from kindergarten through twelfth grade. For two years, Dr. Zavertnik was an adjunct faculty member of the College of Graduate Studies at Immaculata University. Experience includes an in-depth knowledge of all aspects of psychoeducational evaluations (assessment, clinical interviews and classroom observations) and all aspects of the IEP process.

ANDRE T. GOLDSTEIN

1016 Brassington Drive | Collegeville, PA 19426 | 610-906-0866 | andregoldstein@yahoo.com

SENIOR OPERATIONS PROFESSIONAL

Experienced Senior Operations Professional with proven track record of delivering results in multi-unit operational management, optimizing organizational efficiencies, strategic planning, and executing strong client management skills. Capable of streamlining business practices, supporting new business opportunities, and developing and managing strategic projects. Demonstrated leader with abilities in talent acquisition and management, technology, and developing licensor and licensee relationships. Superior communication skills, with language proficiencies in Mandarin Chinese and Tibetan.

Areas of Expertise

Operations Management • Opportunity and Risk Assessments • Financial Analysis • Competitive Research and Analysis • Process Improvements • Strategic Planning • Implementation of Analytical Processes
Project Management • Resource Optimization • Cross-Functional Team Leadership • Business Development

PROFESSIONAL EXPERIENCE

DALE CARNEGIE AND ASSOCIATES, INC. Philadelphia, PA

A leading franchised global workplace learning and talent development organization with over 200 offices in more than 90 countries worldwide.

Regional Director – Asia Pacific 2014 – current

- Responsible for overall performance, support and development of the US$300 million Asia Pacific territory and have P&L accountability over US$40 million.
- Oversee a cross functional team based in the region that provides on-going support and consulting services to franchisees and their sales and training teams.

MANAGEMENT RECRUITERS INTERNATIONAL, INC. Philadelphia, PA

Franchised executive search/recruitment organization with $400M revenue & 700 offices in 35 countries worldwide.

Vice President, Client Service Excellence 1998 – 2013

- Focused on strategic projects, including revenue growth, value-added client facing solutions, operational efficiencies, optimization of technology, client satisfaction, and continuous improvements.
- Utilized total quality management techniques and six sigma methodologies to ensure quality in processes.
- Developed a web-based solution that allowed clients to search a centralized MRI database of candidates for a discounted fee generating as much as $6M in revenue during the first 18 months of implementation.
- Created an integrated metrics reporting dashboard, allowing offices to access data and significantly improve operational efficiencies, a measure of 40% over those not using the dashboard metrics.
- Promoted information-sharing among network members through a centralized best practices/knowledge base platform that collected, housed, and organized institutional knowledge.
- Standardized recruiting key performance indicators across MRI, allowing offices to easily track, analyze, and benchmark against network trends and organizational strategic goals.
- Developed internal and external measurement and assessment capabilities, including a customer satisfaction survey and exit interview programs.

Vice President, Operations and Technology

- Provided operational support to MRI's largest franchised offices through management of regional managers, representing over $350M in system-wide revenues. Oversaw P&L accountability over $15M.
- Spearheaded royalty revenue and contribution targets to plan each year; achieved 15%+ annual revenue growth over a five-year time period.
- Established a cross-functional consulting team and created office support model for continued expansion.
- Developed and launched a proprietary web application focused on collaborative sales among offices; establishment resulted in a five-fold activity increase and $18M in additional revenue.
- Led website rebuilding project that included an integrated custom job board, central directory application for profile management and authentication, and a hosting solution showing annual savings of $300,000.

PROFESSIONAL EXPERIENCE (CONTINUED)

Senior Director, Marketing & Global Product Development

- Ensured budget accountability for $1.5M annually; this encompassed the Product Development, Field Marketing, Media and Internal Communications components of the organization.
- Created, developed, and implemented new product lines, business practices, and marketing tools which allowed the global franchise network to successfully grow businesses and increase revenues.
- Provided expertise as part of the leadership team responsible for strategic re-branding initiative started in 2005 and implemented during 2006; included brand standards and operational compliance.
- Launched an email marketing platform targeted to offices that allowed for unique, personalized email communications; emphasized superior customer service and supported touch plans.
- Developed new revenue generating products, including Business Planning in a Box, Hiring in a Box, Global Accounts, and Succession Planning and Business Transfer.

MANAGEMENT RECRUITERS INTERNATIONAL, INC. Philadelphia, PA

Director, International Strategy & Business Development

- Developed the business model transformation strategy for international operations and managed the implementation. Negotiated new agreements in key markets, resulting in a 200% increase in revenue.
- Identified markets, program initiatives, entry strategies, and program implementation possibilities. Researched and analyzed new business lines and potential acquisition targets.
- Achieved profitable business relationships in Scandinavia, Benelux, Germany, Spain, and France, resulting in a 200% increase in revenue from the regions.
- Created an entry strategy for Japan and implemented the execution of the plan. Served as the leader for detailed negotiations with several potential Japanese business partners.
- Facilitated the sale of offices in Mexico and Central Europe; concluded affiliate partnerships in Canada.

Director, International Search

- Effectively managed and integrated all search activities among the U.S. based offices and the newly acquired 220-office overseas network; ensured seamless transition and compatibility within the network.
- Increased cross-border placement revenue from $600,000 to $4M in the first 18 months.
- Executed the post-acquisition integration of the overseas group into the North American business.

AUSTIN POWDER COMPANY Cleveland, OH

Privately held, multinational manufacturer of commercial explosives having annual sales of $250M operating 30 production facilities with 1,500 employees worldwide.

Director, Asian Operations 1994 – 1998

- Utilized international business knowledge to establish new partnerships and markets for investment projects throughout Asia, including China, Korea, and Vietnam.
- Collaborated and developed partnerships with government industry planners and ministry officials to establish manufacturing operations in Asia.
- Managed the company's China Department with budget responsibility of $750,000.
- Negotiated and coordinated all efforts to establishing a joint venture manufacturing facility in China.
- Aligned with a large Korean conglomerate and negotiated a technology licensing agreement.

YEN ENTERPRISES, INC. Cleveland, OH

Privately held, international trading company specializing in import/export transactions.

International Sales Manager 1992 – 1994

- Furthered joint venture interests in China and profitable sales activities in Japan and Korea.
- Functioned as manufacturer's representative for U.S. companies seeking to expand into the APAC region.

PAUL, WEISS, RIFKIND, WHARTON & GARRISON Beijing, China

New York legal practice operating 15 offices worldwide with practices in Beijing, Shanghai, and Hong Kong, China.

Legal Assistant 1987 – 1989

- Worked closely with industry planners and government ministry officials regarding the application of Chinese law and new legislation to specific client business transactions.
- Served as the permanent Beijing representative for Sun Orient Exploration Company (a Sunoco Co.).

EDUCATION

Master of Business Administration, *Strategic Marketing & Intl. Business*, Case Western Reserve University, Weatherhead School of Management.
Bachelor of Arts – Asian Studies, Minor – Chinese Language, Case Western Reserve University
Concentrated Study in Mandarin Chinese and Business Law, People's University of China – Beijing, China

INTERESTS

- Men's varsity basketball team – People's University of China – Beijing, China
- Semi-pro sponsored mountain bike racer for over 15 years; Competitive tennis player
- Founder of Great Lakes Racing, a 10-person competitive cycling team

Dr. Zerbe,

I would like to be afforded the opportunity to add immediate value to your Capacity and Enrollment Decision Committee which I believe needs to fully encompass the Methacton School District's mission, with its strong tradition of excellence, to challenge all students to achieve their greatest potential and create a vibrant community of learners who appreciate diversity and will lead and succeed in a dynamic global society.

I have been successful in a number of leadership roles and have a very strong knowledge of finance, construction and an understanding of the economic enterprise as a whole. I believe much of my success relates to creating strong interpersonal relationships as-well-as a genuine curiosity which has led to a lifetime of learning. I have managed in tough economic times and realize the importance of having a strong policy of continually understanding the returns being achieved on the investments being made.

A brief summary of my qualifications are as follows:

UNITED STATES DEPARTMENT OF TREASURY, IRS Large Business and International

- Responsible for managing a team of specialists examining the largest multinational entities in the United States. These entities have extraordinarily complex accounting systems, financial statements and tax positions. As the lead interface with taxpayer executives and their representatives, facilitate open and consistent communication utilizing all IRS resources to resolve issues reaching into the billions of dollars.

THE GRAHAM COMPANY

- As a licensed P&C insurance broker, utilized sound insurance knowledge to maintain over $3 million in annual revenue by serving the complex property and casualty insurance needs of demanding clients in the construction, manufacturing, distribution and healthcare industries. Provided all lines of coverage including commercial general liability, automobile, workers' compensation, property, inland marine, professional liability, pollution, and executive protection. During my tenure I achieved 100% customer retention in a challenging and competitive environment.

RTS DEVELPMENT, INC.

- Proven success financially and operationally managing customers, employees, subcontractors, government officials, timelines, money and materials as an executive/part owner of my Father-in-Law's commercial and residential real estate development business which develops multi-unit commercial properties and high-end custom homes from the acquisition of raw land to the certificate of occupancy. Budgets for these projects ranged from $300,000 to $3,000,000.

INFOR GLOBAL SOLUTIONS, INC. (GOLDEN GATE CAPITAL)

- Second-in-charge financially for a technology company which, during my tenure, expanded from a $12 million division of a public entity (NASDAQ: SCTC) with 140 employees to a four unit $150 million private equity funded entity with over 900 employees. Key member of the Mergers & Acquisitions team which integrated 3 international and numerous domestic entities. Assisted the CEO on the turnaround of two businesses that were cash flow negative to profitability and positive cash flow in less than one year. Assisted the sales organization by developing and implementing an ROI program to quantify compelling events for prospective executives via cash flow analysis. The program played an active role in closing over 50% of sales in its first two years of existence.

ASTRAZENECA, Inc.

- Planned and executed audits for a multibillion dollar publicly traded Life Sciences Company in order to evaluate operational efficiency, risk and compliance with financial standards.

ARTHUR ANDERSEN, LLP

- Maintained direct contact with clients to provide comprehensive tax consulting and valuation services for high net worth individuals and multinational conglomerates.

UNIVERSITY OF DELAWARE, Bachelor of Science, Accounting

DREXEL UNIVERSITY, Candidate for Master's in Business Administration

Certified Public Accountant, State of Pennsylvania (Inactive beginning in 2014)

Certified Building Contractor, State of Florida

CPE Instructor - Pennsylvania State University (Abington Campus) and The Graham Company