

The school class size debate: does size matter?

by Preston Davies

The issue of class size needs to be considered in the context of a much wider debate on school funding and who should make decisions on how education is delivered.

Introduction

Over the years, there has been much debate among educationalists and economists about the effect of class size on educational performance. This debate looks set to continue, and the issue remains topical in education reform discussions.

This *Briefing Paper* reviews the debate on class size, examines international and New Zealand evidence on these issues and seeks to draw some basic conclusions.

The issue of class size needs to be considered in the context of a much wider debate on school funding and who should make decisions on how education is delivered.

Should the Government do so on a centralised basis? How much discretion should schools have over how they deliver education? What role should parents have? While these higher-level questions are important, they are not addressed here.

Background

Basic staffing entitlements for delivering the curriculum in New Zealand schools are derived from a formula based on a maximum average class size at the different levels of schooling. Full time teacher equivalents¹ (FTTE) vary across the levels of schooling as follows:

- Years 1 – 3: 1 FTTE for every 23 pupils;
- Years 4 – 8: 1 FTTE for every 29 pupils;
- Years 9 – 10: 1 FTTE for every 25 pupils;
- Year 11: 1 FTTE for every 23 pupils;
- Year 12: 1 FTTE for every 18 pupils; and
- Year 13: 1 FTTE for every 17 pupils.

It should be borne in mind that average class sizes are conceptually different from pupil-teacher ratios. Factors such as the length of the school year and day, the number of classes teachers have, and the proportion of time teachers spend teaching (as opposed to other non-teaching activities) all contribute to the difference.

With this in mind though, OECD data show that, over the 1991-1999 period, the ratio of students to teaching staff in New Zealand was above the OECD average, at both the primary

Key facts

- Basic staffing entitlements in NZ schools are derived from a formula based on maximum average class size (MACS). The range is from one FTTE teacher for every 29 pupils at years 4-8 level, to one FTTE teacher to every 17 pupils at year 13 level.
- Schools have discretion about actual class sizes, despite being staffed according to MACS ratios.
- 89 percent of New Zealand secondary teachers hold a non-teaching tertiary qualification, with around 51 percent holding a bachelors qualification.

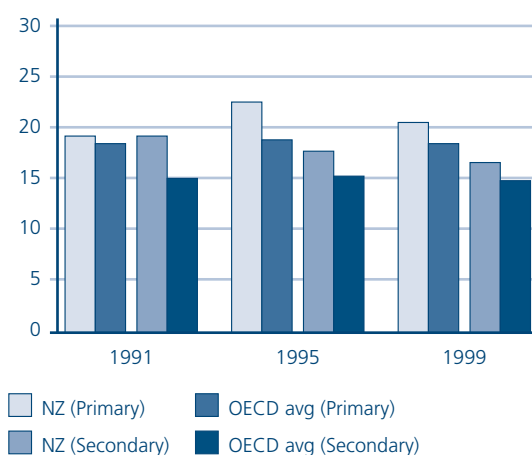
1 Note that schools can have more than one teacher making up an FTTE. For instance two part-time teachers each working 0.5 of a full-time teacher will generate 1 FTTE. FTTE is not defined in terms of time, except that it is full year. Due to the staffing entitlement including teachers other than class room teachers, actual average class sizes may not necessarily reflect the ratios implied by the funding formula.

On its own, class size seems to perform poorly in explaining academic achievement. Students in countries like Korea and Japan frequently appear at the top of international test score comparisons, yet class sizes there are consistently above OECD averages.

and secondary levels (Figure 1 below).

OECD data also show that the ratio of students to teaching staff fell only slightly over the 1988-1999 period, at both the primary and secondary levels. In New Zealand, the average student:teacher ratio for secondary education has dropped somewhat over this period, while that for primary education has stayed around roughly the same level.

Figure 1: Ratio of students to teaching staff, New Zealand and OECD, 1991-1999



The class size debate: key policy issues

Many people argue that smaller class sizes are both a necessary and sufficient means of achieving improved educational outcomes. Indeed, in the United States, former President Bill Clinton² has said of the issue:

"Smaller class size is one of the most important investments we can make in our children's future...children learn better in small classes...and kids who start out in smaller classes do better right through their high school graduation."

Those who argue in favour of smaller class sizes do so on the basis that smaller classes:

- allow students more one-to-one time with the teacher;
- enable better teaching methods to be adopted;
- ease the burden of handling non-productive or negative behaviour in the classroom; and
- increase the amount of classroom time spent on learning rather than classroom/student management.

Other commentators, however, believe that while class size is important, it is only one of a myriad of possible explanations for differing educational performance. On its own, class size seems to perform poorly in explaining academic achievement. Students in countries like Korea and Japan frequently appear at the top of international test score comparisons, yet class sizes there are consistently above OECD averages.

In considering the impact of class size on educational outcomes, a number of issues are relevant. These include:

- How important is class size as a determinant of educational outcomes and how successful are class size reductions relative to other interventions in terms of improving educational outcomes?
- Are the benefits, if any, from class size reductions linear? That is, would any benefits from a reduction in average class size by three pupils be three times that of a one-pupil reduction? Or would the benefits vary more (or less) than proportionately with the size of any reduction?
- Do the benefits of reducing class size vary, depending on the "starting point" (i.e. would a reduction from 30 to 20 pupils produce benefits of the same magnitude as a reduction from 35 to 25)?

2 Quoted in "The Class-Size Reduction Program – Boosting Achievement in Schools Across the Nation", US Department of Education, September 2000.

One of the basic messages from [Hanushek's] work is that there is no evidence of consistent improvements in educational achievement resulting from class size reductions and that smaller class sizes may not be cost-effective.

- Does the importance of class size vary across different groups of students? Across level or year of schooling? By the socio-economic status of students?
- Should the goal of policy be a blanket reduction in average class size, or a more targeted approach, and what are the implications?
- How successful are class size reductions relative to other interventions in terms of improving educational outcomes?

The class size debate: the evidence

Available evidence on the impact of class size on education outcomes is summarised below. There is a wide literature on other determinants of educational quality, which is covered here.

In comparing the evidence, it is difficult to draw firm conclusions, due to differences in methodology and definitions used. In addition, it is often difficult to disentangle the effects of class size reduction from the impacts of other reforms. Nonetheless, some general results do emerge from the literature on class size reduction.

The impact of class size

In the United States, University of Rochester economist Eric Hanushek has published a number of articles in which he argues there is no strong or consistent relationship between the level of school inputs and student performance, principally measured by student test scores.³ Hanushek's body of work is based on an analysis of over 377 statistical relationships estimated in many separate studies by various researchers. His series of literature reviews/summaries has been very influential, principally due to the breadth of

coverage (albeit within the United States).

One of the basic messages from this work is that there is no evidence of consistent improvements in educational achievement resulting from class size reductions and that smaller class sizes may not be cost-effective. Hanushek does not argue that school resources *never* have an impact. Rather, he argues that there is no reason to expect that added resources would have a consistent effect across typical schools currently being operated.

Hanushek's work was not explicitly designed to identify policy alternatives, and offers little in terms of underlying explanation of his findings. He sees the central issue in all policy discussions as not whether to provide more or less funding to schools, but rather how to get the most out of any additional expenditure. Stronger incentive structures for schools that promote student performance are one area he sees as useful, although he acknowledges that much work needs to be done on how best to achieve this.

There is, however, considerable debate over Hanushek's results. For example, Princeton University economist Alan Krueger (2000) reanalysed the data from which Hanushek made his observations and suggested that some qualifications were required to Hanushek's conclusions. In Krueger's view, there are substantial and significant returns to reducing class size in the early grades. He also argues that resources would be optimally allocated if targeted towards those who would benefit most from smaller classes – children and schools in high poverty districts. In other words, Krueger found that Hanushek's general result did not necessarily apply to targeted reductions in class size.

Hedges et al. (1994) also reexamined the

3 Inputs considered were teacher-pupil ratios, spending per pupil, as well as teacher education, experience and pay.

A study found that in classes of fewer than 20 pupils, teachers were more likely to describe pupils as aggressive (Blatchford et al, 1998). In larger classes, it was proposed that pupils interacted more with each other rather than the teacher, and so could develop greater independence.

studies analysed by Hanushek, using formal statistical procedures to combine the results of the studies included in Hanushek's survey. They found a systematic positive relation between resource inputs and school outcomes. They argue that resource inputs probably have a positive influence on school outcomes, and that Hanushek's methodology was not robust.

Card and Krueger (1996) argue that test scores are inappropriate as an outcome measure, as their explanatory power is very limited, and that test scores do not adequately reflect the value of school outputs. They suggest that the level of educational attainment and earnings be used as key outcome measures. Card and Krueger find a positive and statistically significant association between education resources (defined in this case as expenditures per pupil and the pupil-teacher ratio), and educational attainment and earnings.

While none of the commentators suggest that increasing class sizes will lead to improvements, some British evidence goes further than Hanushek, and suggests that reduced class size could have a negative effect on classroom dynamics and educational outcomes. A study found that in classes of fewer than 20 pupils, teachers were more likely to describe pupils as aggressive (Blatchford et al, 1998). In larger classes, it was proposed that pupils interacted more with each other rather than the teacher, and so could develop greater independence.

There is little evidence available for New Zealand. Boozer and Maloney (2001) used longitudinal data from the Christchurch Health and Development Study to look into the effects of class size on long run growth in reading abilities and early adult outcomes. This work follows on

from some earlier work conducted for the Treasury. Boozer and Maloney found:

*"...statistically and economically significant effects of children being assigned to persistently smaller classes on both childhood test score growth as well as on early adult outcomes such as completed education and unemployment experiences."*⁴

In other words, smaller class sizes were associated with better educational and employment outcomes. Their key conclusion was that only persistent class size policies have an effect they can detect. Unlike much of the US data, the longitudinal nature of the data used in the study allowed such conclusions to be drawn.

The 'optimal' class size is likely to depend on circumstances. In New Zealand, John Hattie of the University of Auckland, has suggested that class sizes of 15 pupils or fewer are required for the benefits of a reduction to accrue. In his view:

*"Reducing class sizes from the 30s to 20s is in the right direction, but there is little support for the claim that there are increases in student achievement or satisfaction, or teacher attitude and morale. Only when the class size reduces to 15 or below are there appreciable positive benefits."*⁵

Research in the United States has argued that positive educational outcomes are more likely for classes no greater than 17 pupils.⁶ In the UK, it has been suggested that primary school classes with fewer than 24 pupils had a positive impact on pupils' achievement. (Mortimore, 1998).

4 Boozer, Michael A and Tim Maloney (2001) *The Effects of Class Size on the Long-run Growth in Reading Abilities and Early Adult Outcomes in the Christchurch Health and Development Study*, Working Paper 01/14, The Treasury, Wellington.

5 Hattie, John (1999) *Influences on Student Learning, Inaugural Professorial Lecture*, University of Auckland, 2 August.

6 McRobbie J, Finn J and Harman P (1998) *Class Size Reduction: Lessons Learned from Experience*, WestEd Policy Brief 23, www.wested.org/cs/wew/view/rs/119.

A key issue is whether reducing average class sizes is a cost-effective strategy for improving educational outcomes relative to other policy options.

Class size is only one of a number of determinants of student performance. Others may include teacher quality, school management/governance, 'peer effects', socio-economic status and home environment.

Results from the literature on class size are mixed, but indicate that blanket class size reductions may be less effective overall than targeted policies. The research also suggests the impact of policies on class size depends on the level of education concerned, the persistence of class size reductions, and the absolute level of class sizes.

Class size reductions vs alternative measures

A key issue is whether reducing average class sizes is a cost-effective strategy for improving educational outcomes *relative to other policy options*.

Class size is only one of a number of determinants of student performance. Others may include teacher quality, school management/governance, 'peer effects', socio-economic status and home environment. Hence, a key question for policymakers is whether class size reductions are more or less cost-effective than alternative measures aimed at lifting educational performance.

While it is difficult to accurately estimate the total cost of class size reductions, the additional teacher salary costs of reducing the overall average ratio of state primary and secondary students to teaching staff by one pupil (to 18.4 and 14.5 respectively) are estimated at \$113 million per year.⁷ Total costs, including property and other costs, could be much greater than this.⁸

An increase in funding to support additional teachers need not be the default setting when considering reducing class sizes. For example, Odden and Archibald (2001) examined instances in the United States where schools were able to

reduce class sizes within existing funding through the use of innovations in time-tabling, as well as reallocation and reprioritisation of resources toward full-time classroom activities.

Class size reductions and teacher quality

There is a substantial literature on the impact of teacher quality per se. A number of studies have found teacher quality has a positive impact on student achievement (eg. Hedges, Laine, and Greenwald (1994) and Darling-Hammond (1998)).

An important factor for policymakers to consider is that a reduction in class sizes can have an adverse effect on teacher quality. This could occur because the increased demand for teachers could result in poorly or under-qualified and inexperienced teachers being employed, with consequent negative effects on educational outcomes – at least in the short-term.

The net effect of a drop in teacher quality is that students may be worse off than if they had larger classes, but better quality teachers. This is particularly true in disadvantaged areas that find it harder to attract good teachers. Edward Lazear of Stanford University summed up the potential trade-off between class size and teacher quality as follows:

*"It is more effective to have a good teacher in a large class than a poor teacher in a small one."*⁹

California's experience suggests that the teacher quality issue is potentially important. Following the introduction of a class-size reduction programme in 1996, many school districts in California had to hire new teachers or those with emergency credentials. As a result, the proportion

7 Based on Ministry of Education average salary and ratio figures for 2000. Excludes property and overhead costs.

8 It is also possible that costs could be lower than this figure, as some class sizes might already be below the proposed size.

9 Lazear, Edward (1999) 'Smaller Class Size no Magic Bullet', *Los Angeles Times*, 2 September.

The quality of teachers is an important factor to consider in class size reductions.

A thorough assessment of the issues around teacher quality (including any adverse impact on teacher quality from class size reductions) should precede any move to reduce class sizes.

of teachers without full credentials rose from 1.8 percent to 12.5 percent in the year after implementation. It has remained high (14 percent in 2002), with most of these teachers concentrated in the neediest schools.¹⁰

Conclusion

While the debate continues to rage, it is possible to draw some general conclusions from the research to date on the impact of class size:

- Resources (through changes to class size) clearly matter for educational performance, but are not the only determinant. There is no consensus in the literature that resources are even a major factor. Class size reductions are clearly not a panacea.
- While some studies point to benefits from reductions in class size, the weight of research suggests that, in practice, general reductions in class size from current levels may be of little or no benefit.
- The evidence suggests that class size reductions should be targeted to areas where the biggest gains can be made (low achieving pupils, and those in the first few years of schooling).
- Class size reductions should be assessed against and alongside alternatives. Even if class size reductions deliver benefits, they may come at a much higher cost than alternative initiatives.
- The quality of teachers is an important factor to consider in class size reductions. A thorough assessment of the issues around teacher quality (including any adverse impact on teacher quality from class size reductions) should precede any move to reduce class sizes.

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Additional Resources

- Further (and more recent) articles by Hanushek are cited in the Krueger article referred to above. Additional information is available at the University of Rochester home page of Eric Hanushek: www.econ.rochester.edu/Faculty/Hanushek.html
- The original work by Barker and Maloney for the Treasury is available at www.treasury.govt.nz/workingpapers/2000/00-6.asp
- Further articles and links on this and related topics are contained at www.edweek.org

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