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Author(s)	Soh Kay Cheng
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CLASS SIZE, TEACHING METHOD, AND WHAT ELSE?

DR SOH KAY CHENG

Class Size — Small or Large?

Schools the world over teach children in classes of various sizes for the obvious reasons of economy and teacher availability. Commonsense would suggest that the smaller the class the better the effects of teaching. The opposite view was, however, expressed by the well-known educator of the seventeenth century Comenius,

> It is not only possible for one teacher to teach several hundred scholars at once, but that is also essential... The larger the number of pupils that he sees before him the greater the interest the teacher will take in his work...To the scholars, in the same way, the presence of a number of companions will be productive not only of utility but also of enjoyment.

As commonsense and personal conviction are not science, what then, has research to say about the effects of class size?

Trends in Developed and Developing Nations

Based on OECD information, Porwoll in 1978 reported a decrease in pupil-teacher ratios from an average of 30 in 1960 to 25 in 1970 in primary schools in nine developed nations. More recently, using UNESCO 1978-79 information, Glass reported in 1985 class sizes varying from as low as 10 pupils/teacher in Denmark and Norway to as many as 55 pupils/teacher in Bangladesh. It is interesting to note that pupil-teacher ratios of Asian nations tended to be higher compared with those of Western nations. For instance, according to UNESCO (1971, 1991), the pupil-teacher ratios of five Asian nations for the years 1965 and 1988, respectively, are Singapore 30 and 26, Hong Kong 30 and 27, Taiwan 42 and 31, South Korea 62 and 36, and Japan 28 and 22.

In contrast, the corresponding figures for Belgium are 21 and 17 (estimated), Netherlands 31 and 17, United Kingdom 25 and 20, and United States 28 and 18. Thus, in the international context, Singapore compares favourably at the primary level. While the pupil-teacher ratios varied very little around 30 from 1969 to 1983, there is a gradual decline to around 26 from 1984 to 1990. As an aside, pupil-teacher ratio indicates the **national average** of the number of pupils sharing the instruction and care of one teacher, and hence it is not strictly equivalent to class size which is the pupil-teacher ratio at the **classroom** level; however, a substantial correlation between the two indices can be expected across nations. Thus, pupil-teacher ratio can be reasonably used in lieu of class size. It is not known on what grounds class sizes have been decided upon, although class sizes have declined over the years in many nations. Several conditions might have contributed to the decreasing pupil-teacher ratios. First, the economic health of the nations might have made it possible to lower pupil-teacher ratios. Secondly, lower birth rates might have brought about lower pupil-teacher ratios by default, since teachers already in service have to be retained for tenure and other related reasons. As a matter of fact, for the nine developed nations considered by Porwoll, the present writer found a correlation of 0.491 between decrease in pupil-teacher ratios and decrease in crude birth rates. Thirdly, the belief especially among teachers that smaller class size is conducive to teaching and learning might have exerted pressure to reduce the ratios. It is obvious that the first two plausible reasons for decreased pupil-teacher ratios are non-educational while the last is educational and hence deserves serious and objective evaluation. Operationally, this means asking the question, "What evidence is there that smaller class size has brought about better pupil achievement and behaviour?" It should, of course, be noted that 'pupil-teacher ratio' is conceptually different from 'class size' but since the two can be expected to be highly correlated, inferences on 'pupil-teacher ratio' could be taken as on 'class size' as well.

Research Findings from Western Nations

In 1960, a conclusion in the *Encyclopedia of Educational Research* reads, "Studies of the relation of class size to student attainment, discipline, self-reliance, attitudes, and work habits failed to establish research basis for decisions on class size." In the late sixties, several national and international research reports appeared: the Coleman Report (1966), the Plowden Report (1967) and the IEA International Mathematics Study (Hussen, 1967). These large-scale studies included class size as one of a whole host of factors related to pupil achievement. They have come to the conclusion, as summed up in *The International Encyclopedia of Education* (1985), that "When pupil achievement was correlated with 'school resources', including class size, the relationships observed were generally small and unimportant."

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In 1978, Glass & Smith's meta-analysis shows that within the range of 20 to 40 pupils/teacher, class size makes little difference in pupil achievement and that the major benefit from reduced class size is obtained only when class size is reduced below 20 pupils/teacher. In 1980, Robinson & Forsyth doubted Glass & Smith's conclusion on methodological grounds such as the small number (14) of studies included in the meta-analysis and the unrealistic class size of one-to-one arrangement and classes of 2-5 pupils in some of the studies cited.

It has to be realized that relating class size and pupil achievement without considering **moderating** and **confounding** factors of classroom reality is an over-simplification and can therefore be misleading. In 1986, Robinson & Wittebols reviewed comprehensively American studies on class size effects which appeared in the 35 years between 1950 and 1985. They concluded that the most promising effects of small class size on pupil achievement are the early grades K-3, especially classes having 15-22 pupils. The strength of the relationship between class size and achievement declined substantially with grade level. However, pupils in smaller classes were found to show more positive behaviour and attitudes and teachers of smaller classes tended to use more variety of techniques and pay more individual attention, although there was no guarantee that this would be the case. Robinson & Wittebols further pointed out that smaller class size benefitted pupils of lower academic ability and minority pupils more and the effects varied with the subjects studied. These authors concluded that efficient class sizes are the product of a host of variables, including grade level, subject area, nature of pupils in classroom, nature of learning objectives, availability of materials and facilities, methods and staff, and budgetary constraints. This conclusion corroborates with Finn & Achilles' 1990 study of more than six thousand kindergarten pupils from more than seventy elementary schools in USA.

So much about research findings of the Western nations, especially USA. What, then, of Singapore?

The Henry Park Study

Where published reports are concerned, no in-depth research study seems to have been done locally. This tacitly makes the **Henry Park Study** carried out in 1992 and summarized here the first of its kind in Singapore.[1] This study is exploratory in nature and **quasi-experimental** in design, as the 'natural experiment' has already taken place when the data were made available for statistical analysis.

The school is highly popular in terms of parental preference to enrol their children there. Some pupils in the school did well in many subjects but Chinese. To help these children, the school organized smaller classes for them after their Primary Three examination. Moreover, an innovative method of teaching Chinese, with emphasis on pupils' active participation during lessons, was adopted for some of the classes. Different combinations of smaller class size and innovative teaching method were applied and continued for some classes.

Four Primary Five classes not only had different sizes but also taught by using either the conventional or innovative method. These classes thus afforded the comparison of class size and teaching method effects, both separately considered and in combination. They were compared on the mid-year examination results for Chinese. And, as the classes started with different performance level in Chinese at the beginning of their Primary Four year, such initial differences which can be expected to affect their subsequent performance was statistically controlled.

The results (see table below) show that the larger class taught by using the innovative method did best and the larger class taught by using the usual, conventional method was the poorest among the four classes. The two classes with smaller class size came in between these. Statistical analysis shows that class size alone made no difference in performance; likewise, teaching method did not. It is only when these two factors were taken together that a difference was found, contrary to commonsense expectation, in favour of the larger class.

Average Mid-Year Chinese Marks of the Four Classes

Class size	Teaching method	Adjusted means
Larger (38)	Innovative	80.50*
Smaller (25)	Conventional	78.05
Smaller (14)	Innovative	75.95
Larger (36)	Conventional	73.82*

* *A statistically significant difference exists between these two groups.*

Where Do We Go from Here?

As the common belief goes, smaller class size would enhance pupil achievement and so would innovative method. The corollary is that larger class size and conventional method would have an adverse effect on pupil achievement and, furthermore, the benefits would be even greater when smaller class size and innovative method are combined. The Henry Park Study, limited in scope though, does not lend support to this contention. It appears that re-educating the teachers through in-service training and supporting them with new instructional material are more likely to improve pupil performance than reducing class size. Moreover, the economic and manpower implications of reducing class size deserve careful consideration.

The research findings of the Western nations and the Henry Park Study indicate that the seemingly simple question of class size effect is much more complex and other conditions such

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as teaching methods, class levels, subjects, pupils' home background, etc., need be given due consideration.

Note:

1. The report will be published by the Centre for Applied Research in Education titled *Class Size And Teaching Method Effects: A School-Based Exploratory Study.*

Enhancing pupil performance does not depend solely on the class size.

REFERENCES

Coleman, J. S. (1966). *Equality of Educational Opportunity.* Washington, DC.: United States Government Printing Office.

Ebel, L., Ed. (1969). *Encyclopedia of Educational Research.* New York: Macmillan.

Finn, D. J. & Achilles, C. M. (1990). Answers and questions about class size: a state-wide experiment. *American Educational Research Journal, 27(3),* 557-577.

Glass, G. V. (1985). Class size. In Husen T. & Postlethwaite, T. N.(eds.). *The International Encyclopedia of Education: Research and Studies, Vol. 2 C.* Oxford: Pergamon Press.

Glass G. V. & Smith, N. L. (1978). *Meta-Analysis of Research on Class Size and Achievement.* San Francisco, California: Far West laboratory for Education Research and Development.

Hussen, T. ,Ed. (1967). *Internal Study of Achievement in Mathematics: A Comparison of Twelve Countries.* Stockholm: Almqvist and Wiksell.

Hussen, T. & Postlethwaite, T. N., Eds. (1985). *The International Encyclopedia of Education.* Oxford: Pergamon Press.

Plowden Report (1967) *Children and Their Primary Schools: A Report of the Central Advisory Council for Education.* London: Her Majesty's Stationery Office.

Porwoll, P. J. (1978). *Class Size: A Summary of Research.* Arlington, Virginia: Educational Research Service, Inc.

Robinson, G. E. & Forsyth, J. M. (1980). *Class Size Research: A Critique of Recent Meta-Analyses.* Arlington, Virginia: Educational Research Service, Inc.

Robinson, G. E. & Wittebols, J. H. (1986). *Class Size Research: A Related Cluster Analysis for Decision Making.* Arlington, Virginia: Educational Research Service, Inc.

UNESCO. *Statistical Yearbooks 1971, 1991.*

APPOINTMENT OF HEADS OF DIVISIONS

The following have been appointed Heads of Divisions for two years with effect from 1 March 1993:

Dr Chen Ai Yen	–	Instructional Science
Assoc Prof Goh Kim Chuan	–	Geography
Dr Goh Ngoh Khang	–	Chemistry
Assoc Prof S Gopinathan*	–	Policy & Management Studies
Dr Grace Loh	–	History
Dr Quah May Ling	–	Specialised Education
Dr Esther Tan	–	Psychological Studies

* In the absence of Assoc Prof Gopinathan on academic/holiday leave from 1 Apr 93 to 21 Dec 93, Dr Chong Keng Choy has been appointed Acting Head.