DOCUMENT RESUME

ED 058 640 EA 003 953

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TITLE Pupil-Teacher Ratios and the Use of Research Findings in Educational Policy-Making.
PUB DATE [71]
NOTE 15p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Board of Education Policy; Boards of Education; *Class Size; *Educational Research; *Policy Formation; *Research Utilization; Resource Allocations; *Student Teacher Ratio; Teachers

ABSTRACT

This report examines the issue of student teacher ratios as a focus for a discussion on the utilization of social science research findings by policymakers. The author notes that such findings on the issue of student teacher ratios are in agreement on the fact that minor changes in the ratio are insignificant. Notwithstanding, educational policymakers seldom acknowledge these findings; and teachers' spokesmen press for reductions in class size. The paper concludes with a review of recent findings of research on student teacher ratios and suggests some conclusions and implications for policymakers. (Author)

ED058640 Pub

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# PUPIL-TEACHER RATIOS AND THE USE OF RESEARCH FINDINGS IN EDUCATIONAL POLICY-MAKING

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EA 003 953

Discussions of pupil-teacher ratios are common in educational literature and in everyday conversation. One of the most interesting questions about educational policy-making is brought into prominence by this issue, that is the question of in what circumstances policy-makers in education do or should make use of the findings of social science researchers. The research findings on this issue, some of which will be reviewed subsequently, are virtually unanimous in finding that minor changes in the ratio are insignificant. Yet policy-makers in education do not seem to acknowledge these findings, and teachers' official spokesmen continue to press for reductions in class size. This brief paper will examine the issue in general terms, and then discuss questions about the utilization of scientific knowledge raised by this issue; finally the paper will review recent findings of research on the pupil-teacher ratio, and suggest some conclusions and implications for policy-makers.

## The Nature of the Issue

In general, teachers have maintained on the basis of experience and intuition that even quite small variations in the ratio of students to teacher, for example from 35 to 32:1, have a significant effect on their ability to teach, and consequently on the learning which takes place. As a consequence of this it has been the policy of

many teachers' associations to seek reductions in this ratio, for the purpose of improving instruction. The last phrase is very important; few people would deny that having lower pupil-teacher ratios improves the working conditions of the teachers and makes their lives more pleasant. From this point of view, the policy is eminently sensible and quite unchallengeable. What is controversial is the effect that the lower pupil-teacher ratio has on the students.

It takes two to make a controversy: the other side of this issue is argued by governments and by school boards, largely on financial grounds. The reason is not hard to find. In Manitoba, for example, at the present time the ratio is approximately 20.5:1 in unitary divisions. (MAST, 1971) If this could be moved upward, to 21.5:1, potential savings would be about $4.08 millions, in the unitary divisions. This is based on 1970 figures and computed thus: costs of instructional services in unitary divisions x 20/21. This would represent a saving of 3.3% of the 1970 operating costs. Thus when costs of education are a major issue, the pupil-teacher ratio automatically becomes extremely important. The key question can be posed this way in the kind of terms made familiar by cost-benefit analyses. Since the additional cost of lowering the ratio from 21 to 20 is approximately $4 million, what is the benefit, and can it be considered equal to or greater than the cost?

Some comparative figures will demonstrate that Manitoba is not remarkable in its pupil-teacher ratio. (Discrepancies between the ratio here and that already given derive from consideration of the province as a whole here).

PUPIL-TEACHER RATIOS

| | 1969-1970 | 1970-1971 | 1971-1972 | 1972-1973 |
|---|---|---|---|---|
| Ontario | 22.09 | -21.74 | -21.19 | -20.93 |
| Manitoba | 21.93 | -21.89 | -21.79 | -21.70 |
| Saskatchewan | 21.60 | +22.74 | -22.49 | 22.49 |
| Alberta | 20.80 | +20.81 | -20.73 | 20.73 |
| British Columbia | 24.16 | -24.01 | -23.70 | -23.49 |
| Canada | 22.25 | -22.18 | -21.83 | -21.65 |

(Derived from DBS, 1971. The + and - symbols indicate trend since previous year).

These figures suggest that despite current concern about the costs of education, the pupil-teacher ratio is still dropping, and is likely to continue to do so. The prediction for Manitoba is of only a small change, but a change in the wrong direction from the point of view of controlling costs.

## The Utilization of Scientific Knowledge

Research in science is generally conceived as cumulative. (Walker, 1963 One major reason for this view is one of the fundamental tests of good research, the reproducibility criterion. Describing scientific procedures, Berelson and Steiner point out that science must meet certain standards, one of which is that "the findings must be

replicable: Because of the openness of the inquiry another scholar can test the finding by seeking to reproduce it". (1968: 16,17)

Scientists particularly concerned with the utilization of knowledge, and more specifically applied social scientists, share the general commitment to reproducibility, although differing from pure-science-oriented workers in, for instance, adopting some lay values such as

> "Improvement of the efficiency or effectiveness with which diverse lay goals are pursued, as exemplified in the work of some industrial sociologists or applied anthropologists". (Gouldner, 1957: 92)

Such values are not always purely lay values; Durkheim, one of the most theoretical of social scientists, commented that "social science can provide us with rules of action for the future". (Gouldner, 1957)

Similarly, it may be pointed out that reproducibility is not purely a scientific value either. It is important to the lay user of scientific findings, since it seems to promise some generality in the findings, which in its turn suggests the applicability of the findings to a wide range of problems, including the ones faced by the layman. It seems probably that a good deal of the skepticism with which laymen treat the findings of science is based on the concern for reproducibility

For instance, school boards and their superintendents, in the face of social science and educational research findings, are frequently highly reluctant to base policy on these findings, for

reasons which go beyond mere conservatism or inertia. However, there is a point at which reliance on intuition and unanalyzed and unquantified personal impressions and experience becomes unwise and extravagant, from the point of view of both professional reputation, and costs. In essence, this point is probably the one at which a reputable social scientist can say in essence "a survey of the available research shows that the following is true, in the following circumstances", and not be severely criticized by his peers for doing so.

This would seem an elementary point, yet both on the positive and on the negative side significant examples of failure to base policy on such a simple generalization can be suggested. On the negative side, a major recent social science study, the Coleman Report on Equality of Educational Opportunity (1966) arrived at certain findings which on the one hand were clearly contrary to other significant research projects, and on the other hand were generally unsupported by any other major study. Yet the latter findings, and specifically the finding that equality of educational opportunity was significantly related to a mix of pupils of various levels of achievement and social background in a school, have been made the basis of one of the most extensive educational policy programs ever implemented, both in terms of its effect on students and its cost to the taxpayers, the busing now in operation in virtually every state. Yet this is in essence an isolated finding, which might or might not be supported by the work of other researchers.

On the other hand, other findings of Coleman's study showed in some instances significant support for well-known findings of previous studies; particularly of interest here is the finding that minor variations in pupil-teacher ratio have no significant effect on student achievement. The conclusion drawn in the Report on this issue was quite clear, and supports virtually all previous research on the issue. Nystrand and Bertolaet, in a recent review of research, point out that the Report

> "corroborated the observations of many researchers who have investigated the effects of class size on a much smaller scale. They observed that pupil-teacher ratios in instruction showed a consistent lack of relation to achievement among all groups under all conditions. (1967: 453)

However, none of this research has had much influence on policy, as another reviewer of the Coleman study points out.

> "Coleman's findings on the apparent unimportance of pupil-teacher ratio on classroom instruction are matched by similar findings of research going back four decades, none of which have had any apparent influence on educational policy. (Moynihan, 1968: 26)

To restate the main theme of this section: Research is an appropriate guide to policy when it is cumulative and roughly uni-directional. It is inappropriate as a guide to policy when it is inconsistent and confused.

Before commenting further on the findings of the Coleman Report, it is perhaps necessary to establish some context. The Coleman Report was certainly a major piece of social science research:

> "The study, Equality of Educational Opportunity, was hardly an everyday affair. Commissioned under the Civil Rights Act of 1964, one of the great bills of the twentieth-century, sponsored by the United States Office of Education in a period of its most vigorous leadership, and conducted by leading social scientists at just the moment when incomparably powerful methods of analysis have been developed, the study was perhaps the second largest in the history of social science. (Moynihan, 1968: 24)

The study can be described very briefly. Using regression analyses, Coleman and his colleagues attempted to find out the extent to which a list of factors usually considered to be related to the achievement of students were in fact significantly related. A great many factors were considered, but from the point of view of this paper it is only necessary to say that one of the characteristics considered was pupil-teacher ratio.

Coleman's general finding was that the school factors had little relation to pupil achievement but that differences in student achievement "appeared to arise not principally from factors that the school system controlled, but from factors outside the school". (Coleman, 1966: 312) This leads Coleman into general observations about the inadequacy of varying characteristics of the schools, from the point of view of equalizing educational opportunity. For instance, Coleman maintains that changes in staffing and quality of staffing will probably not be effective. Describing the results of his study, he comments "that variations in teachers (and a number of other resource measures) had little relationship to student achievement". (1967: 7)

Few of his peers would support these general findings. The most important reason for this is probably that they are in conflict with the findings of similarly-conducted studies, and as has already been pointed out, such conflicts are extremely important in scientific research. One of Coleman's critics, Dyer, in assessing the significance and validity of the Coleman findings, adopts precisely this approach. He cites previous major studies which conflict, and attempts to explain the conflict in findings. He identified three major studies and suggests that there are a significant number of school characteristics which do in fact correlate with student achievement. However, these studies agree with the Coleman study in their dismissal of the pupil-teacher ratio as a significant factor in student achievement. (Dyer, 1968)

Other approaches to the problem set by the divergence of the Coleman findings from the findings in previous major studies have been to criticize the Coleman methodology, and to re-sort the Coleman data on somewhat different bases. This has led to some interesting results. For instance, Dyer, in the study already cited, finds that the 45 school characteristics examined by Coleman can be sorted into correlates and non-correlates of pupil achievement by asserting a somewhat loose definition of correlation: "a correlate is loosely defined as any school characteristic that correlates 0.2 or better with any one or more of the three achievement measures...in any one of the eight ethnic groups at either grade 6 or grade 9". (1968: 50) However, even this

minimal definition of relationship does not grant any significance to the pupil-teacher ratio. Another similar re-working of the Coleman data by Mayeske suggested that teacher and expenditure characteristics were the most likely ones to affect achievement. (1968: 55)

Another similar reassessment of the Coleman data yields, with somewhat different statistical treatment, a quite similar conclusion about teacher quality and its possible effect. Bowles finds that

> "the evidence of the Coleman study itself...indicates that teacher quality is a major determinant of scholastic achievement among Negro students and that feasible changes in the level of quality of the teachers of Negro students would bring about significant changes in the achievement levels of these students. (1968: 94)

The Coleman Report has raised at least two main issues: first, the relation between research findings and policies; second, the question of the effects on student achievement of selected characteristics of educational systems. On the first issue it seems clear that the simple rule of thumb proposed above, that policy be based on research findings when these are relatively clear and consistent, is not generally adopted. If it were, pupil-teacher ratios in Canada would presumably be going up, not down, in a period of financial restriction. On the second, it would seem desirable for boards to allocate resources where they are most likely to affect outcomes; yet all the work done in this area has not yet yielded clear and consistent guidelines.

## Conclusions and Implications

One main conclusion is that research findings are relatively clear and consistent on the fact that the benefits to students of minor changes in the pupil-teacher ratio are non-existent, or at best so small as to be non-measurable. It has already been pointed out that there are significant benefits to teachers, however. The issue remains a controversial one then, but one in which the appropriate policies of school boards and departments of education are fairly clear in a time of fiscal belt-tightening. Naturally, teachers will and should oppose such policies, in their own interests. But it is clear, from the evidence cited above, that this opposition cannot rationally be based on the quality of education, or the consequences for student achievement implicit in student-teacher ratios.

Specific ways open to the responsible authorities in Manitoba of raising the pupil-teacher ratios are relatively limited. For the provincial government, a modification in the finance formula, under which grants are made to school boards, might be effective particularly if such a modification allowed more discretion in the use of funds allocated than the present grant system. For school boards employing teacher-over-grant at present, a careful assessment of the pupil-teacher ratio is probably in order. This process is unlikely to be pleasant or painless, but controlling the costs of education is very unlikely to be

achieved without some distress. An examination of alternative ways of using professional staff is one feasible technique for school boards, given the desire to raise the pupil-teacher ratio, and hence cut costs, and a re-examination of allocations of personnel to administrative and other non-teaching duties is another possibility.

In any attempt to assess the significance of and justification for specific classes of expenditures, comparative data is of the utmost importance. The most suitable approach for school boards attempting to assess areas of possible economy might be to compare their expenditures to provincial averages, as computed in the recent finance study by the Association, in order to identify areas in which the division exceeds provincial averages by significant amounts. It is probable that the careful examination of such areas will give some indications of ways of economizing. Naturally, if the divisions which exceed provincial averages reduce expenditures significantly, overall provincial averages will also drop, and in this way the costs of education in the province can be reduced overall.

One important proviso should be added. Too great a reliance on averages is certainly unwise, since clearly different areas have different needs. But expenditures running significantly above provincial averages can be examined to assess the justification; thus the comparisons should be merely guidelines and not determinants of policy.

One final point can be made: decisions about resource allocation in education becomes increasingly important as the supply of resources becomes more limited. For many boards, reductions in annual expenditures may be difficult or impossible. But the reassessment of certain kinds of expenditures, to see whether they represent the most rational allocation of scarce resources, is certainly possible. Clear guidelines are provided by research findings in some areas, and where they exist it would seem to be highly desirable to base policy on them. One such area is the pupil-teacher ratio.

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