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Textbooks in the Philippines: Evaluation of the Pedagogical Impact of a Nationwide Investment

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The contribution of learning to economic growth has long been recognized, although precise measurement of its effect is still subject to debate. Parental demand for educational opportunity, coupled with the economic and political incentives for authorities to supply it, account for the recent expansion of formal schooling to unprecedented levels. Universal primary school enrollment has now been achieved in 35 of the richer developing countries since World War II, including Argentina, Gabon, Malaysia, and Trinidad and Tobago. In the 36 poorest countries (whose per capita gross national product [GNP] was US$265 a year or less in 1975), average enrollment in primary education increased from 48% of the school-age population in 1960 to 70% in 1977. There are, moreover, about 50% more children enrolled in grade 1 than in grade 4, so this 70% enrollment figure significantly understates the proportion of children who begin school.

Despite the significant advances made in providing "places," primary schools in the developing countries generally have poor resources and therefore are ineffective in passing on the complex cognitive skills required of school leavers. Inadequate teaching environments result in part from the fact that about 95% of the funds available for primary education is allocated to salaries. Paying a teacher to copy a wornout textbook onto a blackboard and to supervise its memorization by 50 students is an ineffective use of, in relative terms, expensive talent. (This is now widely referred to as the "copy-copy" situation.) The question is, What level of classroom resources should teachers have available to complement their time input? In industrial countries today, 14% of primary school recurrent costs are allocated to classroom resources (books, maps, visual aids, furniture, etc.) and 86% is spent on salaries. The average in Asia is 9% and 91% for salaries, and in Africa 4% and

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96% for salaries.[1] One policy dilemma that developing countries are now confronting with regularity is determining what is the minimum standard of resources a primary school should have before new teachers are taken on. Experience has suggested that, at a minimum, expenditures on teaching tools should account for approximately 10% of public recurrent expenditures. But the question remains: Given sharp limitations on the availability of the requisite capital, what are the most efficacious approaches to improving school quality?

The Demand for Investments in School Quality

The international demand for investments in school quality has risen markedly over the last decade. For example, not one of the 31 education projects appraised by the World Bank between 1963 and 1969 contained support specifically for classroom materials. Since 1976, however, the provision of classroom materials (electronic or print) has become a major component in 2 out of 10 projects; inservice training has become a major component in 1 out of 10 projects; and preservice training in 1 out of 2 projects. The demand has been particularly pronounced with respect to primary education. The portion of World Bank education lending devoted to primary education was only 5% between FY70-74. It rose to 14% between FY74-78 and is projected to be 24% between FY79-83. This represents an investment increase of from US$8 million per year between FY70 and FY74 to US$144 million per year between FY79-83. The source of this demand, furthermore, is not at all confined to the lowest income borrowers. Major investments in primary school construction and/or quality are being made in Columbia, Paraguay, the Philippines, Thailand, Brazil, and Indonesia as well as Malawi, Sierra Leone, Papua New Guinea, Bangladesh, and Pakistan. The one conclusion we are able to draw from this experience is that high rates of school attendance are only the first among many steps toward providing a sufficient human capital base; as long as there are substantial differences across countries in the quality of school classrooms there will be a need (and demand) for improvements in school quality (Heyneman, 1983).

Research on School Quality Investments

School quality research in developing countries has been handicapped in three ways. Reviews of the literature have had to be limited to the research findings currently available, which are unacceptably scarce and often of low quality. A careful search for studies that used correlations, regressions, or differences in means (i.e., those that had potential for comparison), located fewer than 30 published sources on the cognitive impact of teacher training in low and middle income countries over the last 20 years. This stands in comparison with almost 400 such studies published in the United States in 1 year alone. Similar imbalances exist with respect to textbooks, duplicating machines, visual aids, radio, television—in fact, with respect to all school resources. Second, what data have been available have been almost without exception cross sectional. Conclusions have to be based on differences within static samples. Recommendations for investment have to be based on assumed changes in achievement and/or earning that could occur rather than on changes observed as a result of actual investment. Third, where there has been experimentation and useful analysis of gain scores as a result of an intervention, for reasons of cost and logistics the experiments have been confined to relatively small samples (Heyneman, Farrell, & Sepulveda-Stuardo, 1978; Heyneman & Jamison, 1980).[2] This leaves open the question of whether this effectiveness could be replicated on a national scale even

[1] A comparison of percentages does not reflect real differences in the level of investment per student. For example, before the Third Education Project was appraised, the average pupil:book ratio in the Philippines was 10:1. According to the National Center for Educational Statistics a similar figure for the United States at the same grade level was about 1:14; that is, 14 library books (this is in addition to textbooks and reference books) for each pupil. Thus the typical pupil in the United States had, at a minimum, 140 times the reading material available in school.

within the same country where experimentation occurred. Our purpose in this paper is to report the results of an evaluation of a large-scale investment in school quality improvement: the Philippines Textbook Project. The results illuminate not only the strong positive impact of the project, but also the possibility of assessing quantitatively the impact of a major educational intervention.

The Philippine Textbook Project

The Philippine government, with the assistance of the World Bank, launched the $US37 million Textbook Project to alleviate the lack of textbooks in the nation's public schools. Prior to this investment, there was an average of 10 pupils for every book available in a given subject. During the first year of implementation, the Textbook Project produced approximately 20 million first and second grade textbooks in science, mathematics, and Pilipino. These were distributed nationwide in the 1977–78 school year at a ratio of two pupils per book. In the course of its 5-year duration, the Textbook Project would produce 97 million books covering all subject areas from first grade through high school and would distribute enough so that there would be only two students per book at each grade level in each subject. Books cost an average of US$.55 each (for an average length of 180 pages); the overall program increased per student costs by about 1% (Orivel, 1979). Teacher training in the use of the books was part of the project. These and other aspects of implementation are described in detail by Aprieto (1983).

Textbook content was geared closely to the national curriculum and tightly screened for clarity of presentation. Photo layouts and colors were used judiciously. Because books were expected to be in use for up to 5 years, binding and stitching were of high quality. Distribution was made first to regional warehouses, then to municipalities, then to schools. Arrival time and textbook condition in the nation's 100,000 schools were monitored by computer in the capital. The success of the project was due not to simply having new textbooks, but rather to having new textbooks of high quality, reasonably on time, well understood, and well used by teachers.

The Evaluation Section of the Textbook Project was formed primarily to investigate the effects of this sizable investment on student achievement. One year before the first sets of textbooks were distributed, an evaluation plan was designed, and instruments were developed to measure these effects. The plan was implemented during the first year of textbook distribution and has been a continuing component of the Textbook Project. The results presented here were obtained from the first-year evaluation data, otherwise known as Phase I. The effects of textbooks on achievement in conjunction with pupil, home, school, and environmental variables were examined, the primary concern being the increment in the achievement of pupils, given the use of the project textbooks, while other influencing factors were controlled.

Methodology

Treatment and Comparison Conditions

The design for the evaluation of the Textbook Project called for a comparison of two groups: those with textbooks and those without. Simultaneous nationwide distribution of books in each subject at each grade precluded assignment of students to contemporaneous experimental and control groups. The closest control available was the previous year's students. A random sample of grade 1 and grade 2 students selected one school year before textbook distribution served as a control group, referred to as the *nonproject group*. Another sample of grade 1 and grade 2 students was selected during the school year of textbook distribution, referred to as the *project group*. The academic achievement of sample project group pupils in science, mathematics, and

[2] In a study related to the one reported here (Jamison, Searle, Galda, & Heyneman, 1981) a small group of Nicaraguan primary schools was randomly assigned to receive textbooks, to receive radio instruction, or to serve as controls. The subject was mathematics. Random assignment and careful monitoring of interventions allowed a particularly tight evaluation. What remains is to see if similar gains can be acquired through the implementation of a project in a large and geographically diverse national setting.

Pilipino at the end of the project year was compared with the achievement of sample nonproject group pupils the year before that. Thus, the project group is the treatment group, and the nonproject group is the comparison group.

There were two treatment conditions for both grade levels of the project group. The first followed the general distribution of a 2:1 pupil textbook ratio; the second derived from a randomly selected subsample of project schools provided with books on a 1:1 pupil/textbook ratio so that student performance on the two treatment conditions could be compared.

Sampling

A two-stage procedure was used to obtain the sample for both project and nonproject groups. Specifically, two school divisions were randomly selected from each of the 12 geographical regions in the Philippines (excluding metropolitan Manila). Within divisions, schools were stratified according to central and barrio categories, and random samples of 30% and 70% were then obtained. The number of schools selected from each region was determined in proportion to the size of the region. The clustering of the sample within two divisions per region resulted from a concern for logistics and management. (Definitions for all variables, such as central and barrio schools, can be found in Appendix 1.)

A random sample of 32 pupils was selected from all sections (homerooms) in grades 1 and 2 in the sample schools. This reduced bias introduced by homogeneous homeroom groupings. Where schools had only one section in the grade level, the entire class was administered the instruments. In small sample schools an entire class may have had less than 32 students. In the first grade sample 1,547 project group pupils from 52 schools and 1,652 nonproject group pupils from the same number of schools were tested. Of the grade 1 project group only 1,204 pupils were administered the Pilipino test because there were 11 sample schools that did not receive Pilipino textbooks in time. There were 1,191 project group pupils from 46 schools and 1,634 nonproject group pupils from 52 schools in the grade 2 sample. The school sample for the project at the grade 2 level was reduced by 12% due to problems in textbook distribution. Nevertheless, we are confident that the nonproject sample roughly represents the typical grade 1 and grade 2 child in the Philippines prior to the massive governmental investment in textbooks, and that the project group roughly represents the typical grade 1 and grade 2 child 1 school year after that investment.

Instruments

In both grades, achievement tests were administered in science, mathematics, and Pilipino. The grade 1 test consisted of 25 items, and the grade 2 test consisted of 30 items. The curriculum objectives of the Ministry of Education and Culture are uniform throughout the Philippines, and these tests were developed to encompass these objectives. (For a more detailed description of test development, see Textbook Board Secretariat, 1978.) In addition to the achievement tests, a questionnaire was designed to gather pupil-specific information, but because pupils were too young to answer questions on their own, other arrangements had to be made. Questionnaires were first translated into nine local languages. Classroom teachers sent the forms home with the children, whose parents or guardians were asked to respond. In some instances teachers supplied the required information from school records. Teachers also were asked for information separately. Occupations of the father and mother were divided into 16 categories; parents' educational level was obtained by requesting the highest school grade completed. Family income was categorized into nine levels, ranging from below 250 pesos per month to above 2,000 pesos per month. Information on the language spoken in the pupil's home also was gathered.

Appendix 1 contains definitions of the variables included in the regression analyses presented here. The variables describing treatment condition, region, and language are all indicator variables that for each student take on the value 1 if the student is in the indicated treatment condition (region, language group) and take on the value 0 otherwise. Means and standard deviations are shown in Appendixes 2 and 3 (grades 1 and 2, respec-

tively). The percentages for various subsamples may not add up to the total sample because of missing data. Table I displays the regression results for science achievement using two specifications. Model 1 includes the project group in comparison with the nonproject group,[3] along with other pupil and region/language indicator variables. Model 2 breaks the project group into two categories, one that had textbooks at a 2:1 pupil/textbook ratio (project group 2), and one with a 1:1 pupil/textbook ratio (project group 1).

Results

Our analysis addressed two questions. The first was the degree to which student achievement was altered as a result of exposure to new textbooks, a level of exposure that reduced the ratio of pupils per book per subject from an average of 10:1 to 2:1. In addition to the effects of the standard intervention, we discuss the differential effects of a 2:1 student-to-textbook ratio compared to the 1:1 ratio.

Our second interest was the question of *who* benefits most from the introduction of new textbooks. Do new textbooks have the most pronounced cognitive impact on those students whose homes are more advantaged and who are more familiar with the use of educational materials; or do they have the most pronounced effect on students from homes of relative poverty and who have had the least previous experience with reading materials?

General Intervention Effects

All achievement test scores in science, mathematics and Pilipino were strongly influenced by membership in the Textbook Project. For all six of the project to nonproject comparisons (three subjects and two grade levels), the regression coefficients comparing project to nonproject group were statistically significant at the .001 level. Table I presents the full multiple regression results for science, and Table II presents the overall pattern of results. Table II demonstrates how many standard deviations better on the posttest a student could be expected to perform if he or she were in the Textbook Project. (Table II shows the coefficient of project effectiveness. This is the ratio of the change in the number of problems answered correctly for being in the project group to the standard deviation in the posttest score.)

In sum, the overall effect of the first year investment in textbooks was to raise the national level of academic achievement by one-third of a standard deviation in grade 1 Pilipino, by a similar magnitude in grades 1 and 2 mathematics, and by almost one-half of a standard deviation in grades 1 and 2 science. This is a sizeable impact. The .51 change in standard deviation in first grade science, for example, implies that the mean score achieved by 50% of the population was achieved by 69% of the population a year later. In second grade mathematics, the .32 change in standard deviation implies that what was achieved by 50% of the population without the new textbooks was achieved by 63% of the population a year later. These learning gains represent some of the highest we have observed; moreover, they reflect not a few experimental classrooms, but gains achieved by 8 million students in the nation's schools. Measured in units of standard deviation, the alteration in science achievement in the Philippines is twice the impact of what Glass and Smith (1979) conclude would be the result of reducing the size of the average class in North America from 40 students to 10.

Further improvements were not observed when the 1:1 pupil-textbook ratio and the 2:1 treatment condition were compared. In science, the 2:1 condition regression coefficients were slightly higher than the 1:1 condition at both grades. In mathematics, the reverse was true at the first grade, although the difference was small (1.58 and 1.13). In second grade mathematics, slightly higher regression coefficients (1.646 vs. 1.365) were ob-

[3] In the initial analysis the project group sample was subdivided into sample students (25%) who had access to the books for only half a school year (21 weeks or fewer) and those who were able to use the books for longer than 21 weeks. The differences in length of exposure to the textbooks was an unforeseen event caused by problems in textbook distribution. When length of textbook use was included in the regressions, the effects of this variable turned out to add little to the analysis, and was thus excluded from further consideration.

tained for the 2:1 condition. In Pilipino, both first and second grade pupils in the 2:1 condition did better than those in the 1:1 condition. In fact, the regression coefficient for the 1:1 condition in grade 2 Pilipino was not statistically significant. Whatever the cause, the results provide no indication that the 1:1 ratio of pupils to books added any significant impact over the 2:1 ratio in the first and second grades, despite the near doubling of costs that the 1:1 ratio would entail.

The strongest overall effects were seen in science at both the grades. The weakest project effects were seen in grade 2 Pilipino. Several hypotheses may be advanced to explain the better response of pupils to new textbooks in science: (a) The science books were better; (b) the absence of science books may have been more detrimental to learning than the absence of mathematics or Pilipino books; and (c) there was better use of science books by teachers, that is, teachers may have been better trained or motivated in the use of the science books.

There is some evidence, at least in the case of Pilipino, that the pupils may have had difficulty in the use of the new books, which could have hindered their performance. A small survey of 64 randomly selected grade 2 teachers was conducted with the purpose of getting their assessment of the new books after having used them. Comments were largely positive, but more teachers gave unfavorable com-

TABLE I

Multiple Regression Results: Unstandardized Regression Coefficients for Science Achievement in Grades 1 and 2

	Grade 1		Grade 2	
Variable	Model 1 (N = 2,246)	Model 2 (N = 2,141)	Model 1 (N = 2,158)	Model 2 (N = 2,098)
Project group	2.39***	—	2.46***	—
	(13.57)		(11.10)	
Project group 1	—	2.33***	—	2.14***
		(8.51)		(6.40)
Project group 2	—	2.39***	—	2.74***
		(11.45)		(10.68)
Pupil sex	−.12	−.17	.37	.25
	(.74)	(1.03)	(1.864)	(1.29)
Pupil age	.10	.13	−.13	−.49
	(1.12)	.(1.34)	(1.307)	.51
Parent education	.24***	.24***	.25***	.24***
	(8.83)	(8.46)	(7.463)	(7.49)
Regions[a]				
1 (constant)	—	—	—	—
2	2.18***	2.16***	.71	.50
	(4.85)	(4.82)	(1.329)	.94
3	4.90***	4.88***	3.14***	2.98***
	(9.69)	(9.68)	(5.251)	(5.02)
4	1.53**	1.57**	−.65	−.14
	(2.78)	(2.89)	(.095)	(.17)
5	6.32***	7.27***	−.65	−.83
	(3.97)	(4.29)	(.390)	(.51)
6	−1.43*	−1.01	−1.13	−1.32
	(2.15)	(1.53)	(1.378)	(1.62)
7	−1.90**	−1.58**	−1.35	−1.48
	(2.65)	(2.15)	(1.488)	(1.64)
8	2.15*	2.36*	−4.83***	−4.94***
	(2.25)	(2.45)	(3.774)	(3.93)
9	4.27***	4.28***	.95	.79
	(6.85)	(6.93)	(1.184)	(1.00)

ments regarding the Pilipino than the mathematics or science books (36% for Pilipino, 2% for mathematics, and 10% for science). The teachers reported that the Pilipino books were too difficult (24%), had long stories that confused the students (9%), or were inappropriate for the grade level (Textbook Board Secretariat, 1978).

Effects on Children with Different Social Backgrounds

The most recent and perhaps most comprehensive survey of student achievement in the Philippines at the time of the Textbook Project Evaluation Study was the Survey of the Outcomes of Philippine Education (SOUTELE, 1974–1977). From this national assessment of students emerged the fact that parental income and education and student achievement were positively and highly intercorrelated.

The SOUTELE Survey, of course, is not the only source to suggest that a child's socioeconomic status affects learning. The fact is that socioeconomic status is perhaps the single best predictor of achievement in Europe and North America, and is close to becoming an expected tendency in the social sciences. Recently, however, it has been noticed that the strength of the relationship seems to diminish in parallel fashion with national per capita income. It ranges from being strong and consistently positive in high income countries to being null or even slightly

TABLE 1 (*Continued*)

	Grade 1		Grade 2	
Variable	Model 1 (N = 2,246)	Model 2 (N = 2,141)	Model 1 (N = 2,158)	Model 2 (N = 2,098)
10	37	.63	3.22***	3.00***
	(.55)	(.93)	(3.747)	(3.49)
11	1.88***	1.86*	−.16	−.24
	(2.73)	(2.57)	(.184)	(.27)
12	4.08***	1.66	3.04**	2.72*
	(5.26)	(1.78)	(2.910)	(2.61)
Languages[a]				
9 (constant)	—	—	—	—
1	−4.90**	−5.95***	1.84	1.82
	(3.18)	(3.60)	(1.174)	(1.19)
2	.83	.42	−.63	−.59
	(1.47)	(.71)	(.910)	(.88)
3	.17	−.12	.41	.39
	(.03)	(.00)	(.616)	(.61)
4	.59	.51	−.98	−.93
	(1.24)	(1.05)	(1.810)	(1.75)
5	−2.45***	−2.43***	−3.51***	−3.65***
	(3.66)	(3.67)	(4.686)	(4.96)
6	−1.63	−1.81	—	—
	(1.83)	(2.02)		
7	−1.28	1.85	5.05***	5.03***
	(1.16)	(1.02)	(4.591)	(4.68)
8	−1.67	−.82	−3.02*	−2.95*
	(1.69)	(.75)	(2.518)	(2.43)
10	−1.73**	−1.70**	−.44	−.45
	(4.66)	(4.71)	(.978)	(1.01)

Note. t values are in parentheses.

[a] All regions and languages have been assigned random numbers.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

TABLE II

Summary of the Impact of the Textbook Project

Subject	Grade level	
	1	2
Science	.51	.46
Mathematics	.30	.32
Pilipino	.32	.18

Note. Entries in the table show the number of standard deviations improvement in posttest score expected to result from a student's being in the Textbook Project rather than not.

negative in low income countries (Heyneman, 1976a, 1976b, 1980; Heyneman & Loxley, 1982, 1983).

From these Textbook Evaluation data it appears that mother's education, father's education, and family income do emerge with positive zero-order relationships with pupil (posttest) scores in mathematics, science, and Pilipino. Zero-order correlations range from $r = .14$ to $.24$ ($p < .001$). These relationships are stronger than what one might expect to find in Africa or India; weaker than similar relationships in Western Europe, and approximately the same to what is found in Indonesia or Thailand.

The question is whether the intervention has more effect on children of privileged social backgrounds or more effect on children of impoverished social backgrounds. There are hypotheses to support either. Children from privileged backgrounds might take advantage of the intervention more efficiently because they might be more familiar with books and how to use them. Alternatively, children from impoverished backgrounds might take advantage of the intervention more efficiently because they are more deprived and because educational materials are more scarce in their lives, and consequently they may appreciate more the privilege of having them.

The evidence suggests that the intervention was more effective on children whose backgrounds were impoverished. First, the strength of intercorrelations between achievement and social background is significantly weaker for children in the project group. This is particularly evident in mathematics and science and less so with respect to Pilipino. Among nonproject students, the correlation between family income and science achievement is .16. Among project students, the correlation drops to .05. In mathematics it drops from .14 to .08, and in Pilipino from .19 to .09. The size of the drop is not uniform across subjects or measures of social status. It is least uniform with respect to changes in Pilipino performance and parental education. Parental education appears to be equally associated with Pilipino performance in both project and nonproject groups. The drop is most noticeable and most consistent across different measures of social status in the case of science achievement. Textbooks appear to have had their most pronounced effect on science scores of low status children.

Second, there are substantial differences in the predictive power of socioeconomic status depending on whether the dependent variable is cross sectional academic performance or a gain in academic performance.[4] A gain in performance, it must be noted, was due to more than the textbook intervention. Gains are due to

[4] Only grade 2 data were included because only the grade 2 students had a subsample in the project group that was pretested, thus making gain scores available on the same individuals. At the same time, there did not seem to be any dramatic difference between the grade 1 and grade 2 groups in terms of the influence of pupil, home, school, and other variables on academic achievement. Definitions for pre- and posttest scores used to calculate gains in achievement can be found in Appendix 1.

good teaching, to exposure to radio, in some cases television, and in all cases to a change in physical and mental maturity between the beginning and end of the school year. Nevertheless, the influence of a child's socioeconomic status, although a powerful predictor of cross sectional performance, appears to be minimal, at best, in the prediction of gain scores of students within the project group. The only significant influence of parental education on gain scores, controlling for other influences, is that on science and there the coefficient is slightly negative (beta = $-.10$, $p < .01$), that is, higher parental education is slightly indicative of lower science gain scores.[5] This anomoly is substantiated by cross tabulations between gain scores in science and father's education. Children from homes where the father never finished primary school gained twice as much in science (4.0 points) as did children whose fathers finished college (1.97 points).[6]

Summary

Ambiguity can be found in North America as to whether an improvement in physical resources can affect significantly the quality of educational output. Such ambiguity should not pertain to developing countries. There, where schooling itself is scarce, where classrooms are impoverished, where the motivation for education is high from both privileged and underprivileged families, a physical alteration in the quality of a school classroom can have sizeable effects. This appears to be true in the Philippines. Moreover, there the effect of a school quality intervention appears to be the most pronounced among the children who are most impoverished and whose home backgrounds are the most underprivileged.

[5] Parental education (measured as the sum of both parents' level of education) was made the measure of socioeconomic status because it correlated highly with family income and other home variables. Initial regression runs have shown that when entered into the equation before other SES variables, parental education accounted for most of the SES variance in the dependent variables.

[6] Are these results subject to "ceiling effects"? That is, are they a result of pupils who begin with high scores and who cannot markedly improve because of their original standings? If this were the case, pupils who scored low on pretests should then only equal those who scored high on the pretests. But low pretest-scoring pupils surpassed many high pretest-scoring pupils on the posttest. Furthermore, of the 30 items employed, the highest school mean scores only went to 23, still below the maximum, though there were pupils who did obtain a score of 30. This suggests that the substantial effort that went into pretesting ultimately insured that an appropriate range of difficult levels was contained in the tests.

APPENDIX 1

Definitions of Variables

Achievement test scores	
Grade 1 science	Scores on 25-item science test
Grade 1 mathematics	Scores on 25-item mathematics test
Grade 1 Pilipino	Scores on 25-item Pilipino test
Grade 2 science	Scores on 30-item science test
Grade 2 mathematics	Scores on 30-item mathematics test
Grade 2 Pilipino	Scores on 30-item Pilipino test
Treatment conditions	
Nonproject group	Grades 1 and 2 pupil sample during the school year immediately preceding textbook distribution
Project group	Grades 1 and 2 pupil sample during the school year of textbook distribution
Project group 1	Project group pupils provided books on a 1:1 pupil to textbook ratio
Project group 2	Project group pupils provided textbooks on a 2:1 pupil to textbook ratio
Regional and language indicators	
All regions and languages have been assigned random numbers.	
Other variables	
School location	
0 = Central	Main school in a town
1 = Barrio	School outside a town, usually in an outlying area or in barrio

APPENDIX 1 (*Continued*)

Pupil sex	1 = Male, 0 = Female
Pupil age	Measured in years
Parental Education	Average number of years of combined father's and mother's education (range = 1 to 17)
Grade 2 pretest	Achievement tests administered to a subsample of grade 2 students in the project group at the beginning of the school year.
Grade 2 posttest	Achievement tests administered to the full sample of grade 2 students in the project group at the end of the school year.
Grade 1 posttest	Achievement tests administered to the full sample of grade 1 students in the project group at the end of the school year.

APPENDIX 2

Variable Means and Standard Deviations for Grade 1

	Total sample		Project group		Nonproject group		Project group 2:1		Project group 1:1	
Variable	*X*	*SD*	*X*	*SD*	*X*	*SD*	*X*	*SD*	*X*	*SD*
Science score	13.11	4.70	14.10	5.06	12.18	4.13	13.93	5.08	13.21	3.90
Math score	12.33	4.64	12.82	4.81	11.87	4.43	12.21	4.75	12.24	4.04
Pilipino score	13.49	5.31	14.57	5.59	12.72	5.08	14.09	6.76	14.33	4.97
Project membership (Project group = 1 Nonproject group = 0	.40									
Project group 1:1 = 1 Other = 0	.13									
Project group 2 2:1 = 1 Other = 0	.23									
Pupil sex (0 = female) (1 = Male)	.49		.52		.47		.53		.50	
Pupil age (in years)	8.18	1.0	8.17	.98	8.19	1.01	8.22	.96	8.19	.98
School location (0 = central) (1 = barrio)	.36		.38		.35		.31		.48	
Average parental education (1 to 17 years)	6.85	3.28	6.97	3.3	6.75	3.24	6.70	3.02	7.16	3.50

APPENDIX 3

Variable Means and Standard Deviations for Grade 2

	Total sample		Project group		Nonproject group		Project group 2:1		Project group 1:1	
Variable	*X*	*SD*	*X*	*SD*	*X*	*SD*	*X*	*SD*	*X*	*SD*
Science score	16.89	5.39	18.28	6.23	15.88	4.42	17.39	5.38	19.82	6.35
Math score	14.03		5.77		14.21		7.07		13.88	
4.46 13.80	6.12		14.35		7.88					

APPENDIX 3 (*Continued*)

Variable	Total sample		Project group		Nonproject group		Project group 2:1		Project group 1:1	
	X	*SD*	*X*	*SD*	*X*	*SD*	*X*	*SD*	*X*	*SD*
Pilipino score	15.07		6.22		14.87		7.26		15.23	
5.25 14.96	6.46		14.73		8.09					
Project membership	.38									
Project group = 1										
Nonproject group = 0										
Project group	.13									
1:1 = 1										
Other = 0										
Project group 2	.24									
2:1 = 1										
Other = 0										
Pupil sex (0 = female)										
(1 = male)	.51				.51				.50	
.50			.50							
Pupil age	9.01		1.15		8.67		.98		9.25	
1.20 8.62	1.04		8.65		.89					
(in years)										
School location										
(0 = central)										
(1 = barrio)	.32				.30				.34	
.38			.28							
Average parental										
Education (1 to 17	6.78		3.21		6.92		3.31		6.67	
years)	3.14		7.36		3.51		6.74		3.13	

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