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The Empty Opportunity

Local Control of Secondary Schools and Student Achievement in the Philippines

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Decentralization alone does not produce local control of schools. Schools must also be given resources, motivated students, educated and experienced teachers, and control over teachers and school management.

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This paper — a product of the Education and Employment Division, Population and Human Resources Department — is part of a larger effort in the Department to understand the education sector, with particular reference to improving school effectiveness. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Danielle Eugene, room S6-224, extension 33678 (37 pages). January 1992.

Lockheed and Zhao use a multilevel model to examine:

- Differences in achievement and attitudes among grade 9 mathematics and science students in 213 national government, private, and local schools in the Philippines.

- Differences among these types of schools in social composition, available resources, classroom orderliness, academic emphasis, and school decisionmaking.

- Possible reasons for differences in achievement.

They found that — holding constant for age, gender, and socioeconomic status — students attending the three types of schools differed significantly.

Students in local schools scored lower in achievement (1.25 points lower in science and 1.61 points lower in mathematics) and had less positive attitudes than students in government schools. Students in private schools outperformed students in government schools (0.88 points higher in mathematics). These differences were attributable largely to the effects of student selection.

Lockheed and Zhao found that policies for centrally planned decentralization do not necessarily change what goes on in schools. Local schools were not managed as private schools. Local schools were given an empty opportunity: there was nothing for local control to control. Local schools had few resources — fewer of them had laboratories and their teachers were less educated and experienced than those in private schools.

By contrast, managers of private schools had significant resources over which to exercise control. Teachers were better educated and experienced, and planned their instruction. Students were motivated and completed their homework and assignments. And managers of private schools exercised significant control over teaching and school management.

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INTRODUCTION

1. Decentralization policies are at the heart of education reform efforts in many countries internationally. Two important types of policies are those that: (a) remove barriers to private education and (b) devolve authority and responsibility for schools from central level administrations to intermediate level organizations and ultimately to schools, relying more on local communities for school financing, with an overall goal of improving school effectiveness. While both types of policies are largely uninformed by empirical evidence regarding their impact on such education outcomes as student learning, in developing countries the evidence regarding the effects of local control is much weaker than that regarding private schools. This paper extends the literature on the impact of private education on achievement, while providing the first evidence on the impact of local control on achievement in a developing county. It analyzes data from 214 secondary schools in the Philippines to answer questions regarding (a) the relative effectiveness of local, government and private secondary schools, and (b) the factors that account for observed differences.

Secondary Schooling in the Philippines

2. Only about 40 percent of secondary school age youth are enrolled in secondary schools in developing countries. The vast majority of these students attend schools operated by national authorities (World Bank 1990). In the Philippines, secondary education covers 65 percent of the age cohort and is provided by three types of schools: private, national government public and local public, including village or baranguay, schools (Tan and Mingat 1989). Private schools are schools financed and managed non-governmentally; national government schools are publicly financed and managed schools identified as "national", "provincial" or "city" schools; local schools are baranguay or municipal schools. Laya (1987) reports that, in 1985, private, national government and local schools accounted for 42, 21, and 37 percent of all secondary enrollments, respectively. In the early 1980s, baranguay schools were more common in rural regions than in urban ones; Tan (1991) notes that they accounted for fewer than 4 percent of all secondary schools in the Metro Manila region, but over one half of all secondary schools in the Southern Tagalog. Baranguay schools were originally set up as community self-help schools maintained by villages through community contributions in money and kind. The result was that the cost per student was significantly lower in all types of local schools (400 pesos in 1985) than in government schools (1570 pesos); per student costs in baranguay schools were lower than the average for local schools (Laya 1987). As these resources proved inadequate, baranguay schools have been recently nationalized.

Comparative Effectiveness of Government and Private Schools

3. Expanding the provision of secondary education to a larger proportion of

youth without lowering school quality or significantly increasing national education budgets present a serious challenge to developing countries. Policy alternatives to nationally funded secondary schools may be necessary; two such alternatives are (a) relying on private schools to deliver secondary education and (b) devolving responsibility for education finance to local communities. Devolution of financial responsibility often carries with it an implicit expectation that educational responsibilities will also be devolved. Locally controlled schools should mirror private schools in their finance, management and educational effectiveness.

4. Private school effectiveness. Research on private education in both developed and developing countries indicates that, on average private schools are more effective and efficient than public schools. In North America, both private sectorian (Catholic) and elite non-sectarian private schools are more effective than public (government) schools in raising student achievement (Chubb and Moe 1989; Coleman, Hoffer and Kilgore 1982; Coleman and Hoffer 1987; Cookson and Percell 1985; Lee and Bryk 1989). Catholic private schools are also effective in enhancing equality, by reducing the gap in achievement between white and black students (Lee and Bryk 1989). Similar achievement effects have been reported for private schools in other developed countries (for Australia, Williams and Carpenter 1991; for the Netherlands, vanLaarhoven et al. 1987)

5. In developing countries, less research on the comparative effectiveness of public (government) and private schools has been conducted, but the few available studies indicate that private schools are more effective than public schools in the third world as well (Jimenez, Lockheed and Paqueo 1991). For example,

Jimenez, Lockheed and Wattanawaha (1987) found that, after controlling for previous achievemen , socioeconomic background and systematic selection by school type, students who were enrolled in private schools in Thailand significantly outperformed those enrolled in public schools; the difference amounted to 1.5 standard deviations. In the Dominican Republic, the advantage of private education was observed even for non-elite private schools (Jiminez et al. 1991). In Chile, students enrolled in private schools that were not subsidized by the government performed nearly twice as well on tests of reading and mathematics as did students in public schools (Rodriguez 1986).

6. Local school effectiveness. Two types of public schools are common in developing countries: national government schools and local community schools. Despite repeated calls for decentralization, little research on the comparative effectiveness of local versus national public schools has been carried out in developing countries. Yet in many countries, expansion of secondary education has depended upon such local schools. Examples include harambee schools in Kenya, local "district council" schools in Zimbabwe, and baranguay schools in the Philippines. These schools have expanded in numbers dramatically. In Kenya, communities were encouraged to build secondary schools on a "self-help" (harambee) basis; the demand for secondary education was so great that the number of harambee secondary schools increased from 557 in 1975 to nearly 1500 in 1985 (Eshiwani undated).

7. A similar expansion of secondary education was observed in Zimbabwe following independence; the number of secondary schools increased from 197 in 1980 to 1502 in 1989 (Ministry of Education, Zimbabwe 1990). Of these, 87

percent were non-government schools and two thirds were local district council schools. District council schools, which typically enroll students who were unable to obtain a place in a national secondary school, are managed by a local authority, rather than by a national authority. The building site and construction of "district council" schools is contributed by the local community, but teacher salaries and some recurrent costs are financed nationally.

8. Characteristics of these local schools are similar to those of private schools: in comparison with public schools, the schools are often smaller, the teachers are less well trained and paid, and the parents are more highly motivated to support the school through local contributions or school fees. Unlike elite private schools, however, which are highly selective and enroll students from comparatively advantaged backgrounds, local public schools are not selective and they often are found in disadvantaged areas. Recent research suggests that achievement gain for students in local district council schools is not dissimilar to that of students in other types of secondary schools in Zimbabwe, although their initial level of achievement is lower (Riddell and Nyagura 1991). Local financing was also found to be related to increased efficiency for schools in the Philippines (Jimenez, Paqueo and de Vera 1988).

What Accounts for the Greater Effectiveness of Private Schools?

9. Explanations for the observed difference in achievement between public and private schools are of two types: (a) those that have implications for improving (local) public secondary schools, and (b) those that do not.[1] Three

[1]Although there is still considerable methodological debate about whether private schools are indeed more effective than public schools (Murnane 1984), this debate has not affected the proliferation of explanations for the differences.

explanations for private schools' apparent superiority that hold little promise for improving local public schools are: selectivity on the part of schools and parents in choosing the students and schools, peer effects associated with this selectivity, and an historical stock of material and nonmaterial resources that are too expensive to replicate in local schools. Three explanations for the apparent superiority of private schools that may have implications for improving public education are: their emphasis on academic achievement, their more orderly environment, and their school-level control over decision making. This section reviews all six explanations.

10. Selectivity. The most important explanation for differences between the comparative effectiveness of public and private schools (and, parenthetically, between local and national government schools) is the difference in the composition of their student bodies. Generally speaking, students in private schools come from more advantaged backgrounds than do students in public schools, although there are some countries in which national public schools "cream" the better students (e.g. Tanzania, Cox and Jimenez 1990). It is therefore difficult to attribute differences in students' achievements to school characteristics alone, because a variety of nonschool factors also affect achievement. These factors include students' socioeconomic background, innate ability and individual motivation. Thus, unless nonschool factors are controlled appropriately, estimates of school effects will be contaminated by selectivity bias. Recent research has sought to control for selection effects through the use of modern statistical techniques; such studies with specific controls for selectivity have continued to show an advantage to private education, although peer effects have been pronounced (Jimenez, Lockheed and Paqueo 1991).

11. Peer effects. Peer effects have been widely recognized as contributing to differences in levels of achievement between public and private schools. The average social class background of students in the school has been found to affect the average achievement of students in public and private schools in the United States (Lee and Bryk 1989), Thailand (Jimenez, Lockheed and Wattanawaha 1988) and the Dominican Republic (Jimenez et al. 1991).

12. Material and non-material resources. Material and non-material inputs are positively and significantly related to student achievement in developing countries (Heyneman and Loxley 1979; Fuller 1987; Lockheed and Verspoor 1991). Of particular importance are the availability and use of textbooks, the quantity of instructional time, formal educational attainment of teachers, and -- in some cases -- teachers' experience. Expenditures per student, which are unrelated to student achievement in developed countries (Hanushek, 1986), are also important.

13. Available research on differences between public and private schools does not show consistent greater resource availability for private schools, however. First, unit costs for students in private schools are substantially lower than those in public schools (Jimenez, Lockheed and Paqueo 1991). Second, even specific inputs do not necessarily favor private schools. For example, in Thailand, although private school teachers were more experienced and twice as likely to have received some type of inservice training than public school teachers, fewer private school teachers were formally certified to teach mathematics (Jimenez, Lockheed and Wattanawaha 1988). In the Dominican Republic, although more than twice as many students in both types of private schools had textbooks in comparison with students in public schools, teachers in non-elite

private schools were less educated and experienced than teachers in public schools (Jimenez et al. 1991). Because of their apparent greater effectiveness, working with fewer resources, some analysts have concluded that private schools are more efficient than public ones (Jimenez, Lockheed and Paqueo, 1991; Chubb and Moe, 1989).

14. Emphasis on academic achievement. One explanation for the higher achievement in Catholic private schools versus public schools in the United States is that they place greater emphasis on engagement in academic activities, including higher rates of enrollment in academic courses. This, in turn, translates into such differences in student behavior as spending more time on homework (Coleman, Hoffer and Kilgore 1982). In developing countries, curricula are typically set nationally, and students have little choice over course selection. However, differences in the emphasis placed on academic achievement may vary between schools, and this may translate into differences between public and private schools in the level of effort spent by students on academic activities.

15. Orderly environment. The effective schools literature notes repeatedly that schools with orderly environments have higher achievement (Purkey and Smith 1983). Schools in developing countries seldom suffer from the types of discipline problems that characterize many poor performing schools in developed countries They do suffer from teachers whose lessons are unplanned and who do not monitor or evaluate their students' progress. Private schools in developing countries appear to provide a more orderly environment for learning than do public schools. For example, in Thailand, private school teachers reported

spending more time maintaining order in their classrooms and more time testing their students than did teachers in public schools (Jimenez, Lockheed and Wattanawaha 1988)

16. Local control. Public and private schools differ significantly in terms of their management organization. In developing countries, seventy percent of secondary education is publicly provided, with schools financed and managed by the central government. Teachers are hired and deployed by a central agency, curriculum is set nationally, and admission to secondary school is often controlled by national examinations with students placed in schools through central agencies. As a result, neither the local community nor the school principal exercises much control over key decisions, and inefficiencies are observed. Unlike centrally controlled public schools, private schools in both developed and developing countries exercise managerial control over a wide range of decisions. For example, research has found that in U.S. Catholic private schools, principals, teachers and parents have significantly greater control over decisions about the curriculum, instructional methods, allocating funds, hiring teachers, dismissing teachers, and discipline policies than do their counterparts in public schools (Hannaway 1991). Hannaway concludes that "there is something about public educational institutions that restricts their adaptation to local conditions" (Hannaway 1991, p. 122).

17. If locally controlled schools could adopt the management practices of private schools, they might be able to provide secondary education to students in developing countries with greater effectiveness and efficiency than is presently the case. At present, however, there is no available research that

addresses the three questions posed in this paper: (a) how does the achievement of students in local secondary schools compare with that of students in either government or private secondary schools, and (b) how do these types of schools compare in terms of inputs and management, and (c) what characteristics of the schools account for any observed differences in achievement?

18. This paper contributes to the literature in three ways: (a) by exploring a larger variety of school types (national government public, local public and private schools) than previously examined in either developed or developing countries, (b) by extending the range of outcome variables examined (achievement and attitudes), and (c) by using an appropriate multi-level model for examining school effects. It uses a hierarchical linear model (HLM) to estimate the effects of private, local public and national government public schools on student science achievement in the Philippines (see Raudenbush and Willms, 1990, for discussion of multi-level modelling).

METHOD

Background

19. Although school effects research requires the use of multi-level methods (see Aitken and Longford, 1986; Raudenbush, 1988 for reviews), most previous research on private school effects has been conducted with single level models (e.g. Coleman, Hoffer and Kilgore 1982; Willms 1985; Alexander and Pallas 1985). Even efforts that have used sophisticated statistical techniques to adjust for selectivity have employed single-level models (e.g. Jimenez, Lockheed and Wattanawaha 1988; Jimenez et al. 1991). The situation, however, is changing.

20. Recently, Lee and Bryk (1989) employed a multilevel model to estimate effects of Catholic schools on average secondary school achievement in the United States, and found significant sector effects for both average achievement and the achievement gap between black and white students. Lockheed and Bruns (1990) also employed a multi-level model to estimate school type effects on achievement in secondary schools in Brazil; private schools were more effective than other types of schools with respect to mathematics achievement. In Zimbabwe, Riddell and Nyagura (1991) examined school type effects on secondary achievement gain (from Form 2 to Form 4) and found significant positive effects for private schools. No research has examined differences in effectiveness of local versus national public schools, however.

21. The analysis in this paper seeks to determine the extent of differences in achievement and attitudes between students in government, private and local (largely baranguay) schools in the Philippines, and the possible causes of these differences. To do this, a multi-level modelling package, HLM, is used (Bryk, Raudenbush, Seltzer and Congdon, 1988). One advantage of the HLM procedure over ordinary least squares (OLS) is that it correctly estimates the standard errors for the school-level coefficients, so that the statistical significance of school-level variables is correctly estimated. A second advantage of multi-level modelling is that it models within-school relationships, such as within school correlations between social class and student achievement. It is therefore possible to examine the extent to which school characteristics aggravate or diminish within-school social class differences, should they exist.

Models

22. We model two elements of achievement within schools: student outcomes and socio-economic status (SES) differentiation. The grade 9 student outcomes considered in these analyses are science and mathematics test scores, positive and negative attitudes toward science, and positive and negative attitudes toward school. For each of these outcomes, we examine its within-school correlation with SES.

23. The within-school model holds constant sex and age, and regresses science and mathematics achievement for student i within school j as a function of socio-economic status:

$$(1) \quad ACH_{ij} = \beta_{j0} + \beta_{j1} SES + e_{ij}$$

$$(2) \quad ATT_{ij} = \beta_{j0} + \beta_{j1} SES + e_{ij}$$

where ACH refers to science and mathematics achievement, and ATT refers to positive and negative attitudes towards science and school.

24. The achievement (attitudes) in each school is characterized in terms of two parameters: an intercept and one regression slope. Achievement (attitude) scores are continuous variables centered around their school means. The two parameters may be interpreted as follows:

β_{j0} = Mean achievement (attitudes) for students in school $_j$.

β_{j1} = The degree to which SES differences among students relate to subsequent achievement (attitudes).

25. Effective schools would be characterized as simultaneously having a high average level of achievement, β_{j0} and a weak differentiation effect with regard to SES (i.e., a small value for β_{j1}). These effects are hypothesized to vary across schools as a function of sector (national public, local public and private) and school-level differences in social composition, material and non-material resources, emphasis on academic achievement (student motivation and effort), orderly environment and local control.

Sample and Data

26. The data come from the IEA Second International Science Study, conducted in the Philippines in 1983. A two-stage stratified sampling design was used. Stratification was based on thirteen geographical regions of the Philippines[2]. Within each region, schools were classified into public (government-supported) and private (supported by private funds) schools. Within the public sector, the schools were classified into two further strata: Barangay/Municipal High Schools (referred to in this paper as "local schools") and National, Provincial and City High Schools (referred to in this paper as "government schools"). This gave a total of 39 strata. At the first stage, schools were selected with probability proportional to the number of classes; at the second stage, one intact grade 9 class was chosen by simple random sampling. A total of 269 schools and approximately 10,000 students participated in the study. After cleaning,

[2]Ilocos Region, Cagayan Valley, Central Luzon, Southern Tagalog, Bicol, Western Visayas, Central Visayas, Eastern Visayas, Western Mindanao, Southern Mindanao, Southwestern Mindanao, Manila

acceptable data for analysis were obtained from 214 schools and 8736 students.[3]

Student Variables

27. Dependent Variables. This study examines school effects on two student achievement and four student attitude outcome variables. The achievement variables are the science and mathematics core test scores, unadjusted for guessing, from the IEA Second International Science Study. The attitude scales were constructed from factor analyses of the student attitude survey from the same study. For this study, attitude items were recoded (1 = agree, 0 = uncertain, and -1 = disagree) and factor scores were constructed from these recoded items using data from the total student sample. The minimum number of cases for the attitude factors was 10,222 students; for this sample all factor scores have a mean of 0 and a standard deviation of 1. **Positive attitude toward science** includes eight items of the type "Science is an enjoyable school subject". **Negative attitude toward science** is comprised of four items of the type "Scientific discoveries do more harm than good." **Positive attitude toward school** is comprised of four items of the type "I enjoy everything about school", and **negative attitude toward school** is comprised of four items of the type "School is not very enjoyable."

28. Student-level predictors. In this paper, we analyze three student-level variables: gender, age and socio-economic background (SES). **SES** is a factor score with a mean of 0 and a standard deviation of 1 and is based on father's

[3]The original school data file contained 269 records for which data from the teacher questionnaire, the school questionnaire and mean values from student records could be matched. Thirty-four schools were deleted due to missing data on five or more variables; 17 schools were deleted for lack of within school variation; and four schools were deleted for other miscellaneous reasons.

occupation, mother's occupation, father's education and mother's education. Additional individual-level variables -- family size, home language, availability of reading materials in the home -- were too highly correlated with SES to be analyzed, although we report summary statistics on these variables as well.

School Variables

29. Given the available data, measures were developed to indicate features of the school that have been found to be related to average achievement and within-school achievement differentiation. The variables have been grouped into five categories: the social composition of the school, material and non-material inputs, academic emphasis, orderly environment and local control.

30. School social composition. Six social composition variables were created. **Average family size** (the percentage of families in the school with more than 5 children), **dialect as home language** (percentage of students from dialect-speaking family), **English as home language** (percentage of students from English-speaking family), **average age** (mean age of the class), **average availability of reading materials in home** (mean number of books in the home), and **average SES**.

31. Material and non-material inputs. The IEA data set includes a wealth of teacher and teaching variables, but relative few variables that measure actual inputs. Variables selected for analysis in this paper represent only a few of those available. They are: **teacher education** (whether or not the teacher has studied post-secondary science), **teacher experience** (number of years teaching experience), **class size** (number of students in science class), **student time on "experiments or field work"** (whether or not students spend more than half their

time in science on these activities), **laboratory use**, (whether or not students are taught science in a laboratory more than 60% of the time), **frequent use of textbooks** (whether or not teacher uses textbooks frequently), and **use of small groups for instruction** (whether or not teacher uses small groups).

32. Orderly environment. Two indicators of an orderly environment for teaching are analyzed: **frequent testing** (whether or not teacher uses teacher made tests frequently) and **instructional planning** (mean factor score of student report of teachers teaching style which emphasizes advance organizers, summaries and demonstrations).

33. Academic emphasis. Variables indicating an academic emphasis in the school are derived from student reports regarding their level of effort and autonomous study. **Student motivation** is a factor score derived from responses to four items about frequency of checking homework, trying hard on assignments, doing homework and handing it in on time. For this scale only, a high score represents less effort. **Student active learning** is a factor score derived from responses to five items about the extent to which students choose topics for study, make up problems, consult reference materials, and influence the topic of lessons.

34. School decision making. Three variables related to school-level decision-making were constructed; for each, a higher score indicates greater localization and less centralization of decision making. Areas covered include **local control over teaching**, factor score indicating degree of local control over curriculum and instruction (range and type of subjects taught, course content choice of textbooks); **local control over management**, a factor score indicating degree of

local control over expenditures and teacher selection' and **local control over students**, a factor score indicating degree of local control over selection and management of students (selecting students, determining fees, making rules for students).

Table 1: Description of Variables used in HLM Analysis, Philippines 1983

Student-level Dependent Variables

Science test score: Science achievement score (range = 0 - 30)
Mathematics test score: Mathematics achievement score (range = 0 - 20)
Positive science attitude: Factor score based on 8 positive statements about science
Negative science attitude: Factor score based on 4 negative statements about science
Positive school attitude: Factor score based on 4 positive statements about school
Negative school attitude: Factor score based on 4 negative statements about school

Student-level Predictors

Male: A dummy variable (1 = male; 0 = female)
Age: Age in months
SES: Factor score based on father's occupation, mother's occupation, father's education and mother's education
English: A dummy variable (1 = English spoken at home; 0 = other)
Pilipino: A dummy variable (1 = Pilipino spoken at home; 0 = other)
Dialect: A dummy variable (1 = dialect spoken at home; 0 = other)
Books: Number of books in home (1 =
Large family: Number of children in family (1 = 5 + children in family; 0 = other)

School-level Predictors

1. School social composition
Large families: % families with 5 or more children
Dialect average: % students from dialect-speaking family
English average: % students from English-speaking family
Average age: Average age of the class
Average books: Average number of books in the home
Average SES: Average SES of the class

2. Material and non-material inputs
Teacher post-secondary science: A dummy variable (1 = teacher studied post-secondary science)
Teacher experience: Average number of years teachers have taught
Class size: Number of students in class
Student practice : A dummy variable (1 = students spend > 50% of time on experiments or fieldwork; 0 = other)
Laboratories: A dummy variable (1 = teacher teaches > 60% of time in laboratory; 0 = other)
Textbooks: A dummy variable (1 = teacher uses textbook; 0 = other)
Groups: A dummy variable (1 = teacher uses small groups for instruction; 0 = other)

3. Orderly environment
Frequent tests: A dummy variable (1 = teacher makes test; 0 = other)
Instructional Planning: Average factor score of student report of teachers teaching style

4. Academic emphasis
Student motivation: Average factor score of students' responsibility regarding homework and assignments (reverse)
Student active learning: Average factor score of students' active learning

5. School decision-making
Local teaching: A factor score indicating degree of local control over curriculum and instruction
Local management: A factor score indicating degree of local control over school management
Local student control: A factor score indicating degree of local control over selection and management of students

RESULTS

35. In this section we discuss, first, the observed achievement differences between private, government and local secondary schools. Second, we discuss the observed differences between the three types of schools in terms of their available resources and social context. Then we present the results of the HLM analyses, which explore reasons for the achievement differences.

Achievement Differences Between Schools

36. Private, government and local secondary schools in the Philippines differ in terms of their average science and mathematics achievement and in terms of the average attitudes of their students.

37. Achievement. Average science achievement in the Philippines was the lowest of all countries that participated in the IEA study, with an average for all students of 11.5 points on the 30-point core test (IEA 1988). The science scores of students in both government public and private schools in this analysis are slightly higher than the national average reported in the IEA report. However, science achievement in local public schools is 1.5 points lower than the national average, and nearly two points -- approximately one-half standard deviation -- lower than in private and government schools. The differential in mathematics achievement is even greater, with students in local schools scoring nearly a full standard deviation below those in private schools.

38. Attitudes. Student attitudes towards science and school are also less

positive in local schools, and these differences range from one-fourth to one-half of a standard deviation. The direction of the signs of the average attitude factor scores is important. For all four attitudes, students in local public schools hold fewer positive attitudes and more negative attitudes, while the reverse is the case for students in government public and private schools.

Other Differences Between Schools

39. Government, local and private schools also differ in the types of students who attend them and their available resources and social context. In general, students in local secondary schools are disadvantaged in comparison with students who attend private or government secondary schools (See Table 2).

40. Student characteristics. Students in local schools are more likely to come from more disadvantaged backgrounds than students in either private or government schools. In terms of socio-economic status, the SES background of local school students is more than three-quarters of a standard deviation lower than that of students in private schools and two-thirds lower than that of students in government schools. Their homes have fewer resources that are supportive of school. Students in local schools are less likely to speak English (the language of instruction and in which they were tested) at home and more likely to speak a local dialect. They report having fewer books in their homes; they report having more sibs; they are four to six months older, on average, than those in either private or government schools, which can be the consequence of either starting school late or of repeating a grade. Approximately 40% of all students in all schools are boys.

Table 2: Means and standard deviations of student-level variables used in HLM analysis for private, government and local schools in the Philippines, 1983

Variables	Private (N = 2960)		Government (N = 3470)		Local (N = 2306)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Student-level Dependent Variables						
Science test score	11.86	4.30	11.88	4.80	10.11	4.10
Mathematics test score	11.37	3.66	10.55	3.39	8.65	3.58
Positive science attitude	0.12	0.91	0.07	0.97	-0.30	1.10
Negative science attitude	-0.12	0.89	-0.13	0.92	0.33	1.14
Positive school attitude	0.07	0.94	0.04	0.97	-0.15	1.08
Negative school attitude	-0.13	0.96	-0.02	1.01	0.14	0.99
Student-level Predictors						
Male (%)	41.96	49.36	40.49	49.09	41.07	49.21
Age in months	188.91	23.11	190.60	22.56	195.18	34.11
SES factor score	0.20	1.00	0.07	0.98	-0.58	0.70
English spoken at home (%)	0.41	6.36	0.35	5.87	0.22	4.65
Philipino spoken at home (%)	36.01	48.01	30.55	46.07	21.34	40.98
Dialect spoken at home (%)	38.61	48.69	44.12	49.66	54.03	49.85
Books in the home	2.71	1.29	2.51	1.23	1.99	1.12
Large family	63.16	48.25	67.41	46.88	73.45	44.17

41. Social Composition. As a result of these family background differences, the social composition of private, government and local schools also differ from one another (Table 3). Local schools have a higher proportion of students that come from large families and that speak a local dialect; they have a lower proportion of students that speak English and have more than two books in the home. More of their classmates come from lower SES backgrounds.

42. Inputs. The three types of schools differ in a number of other respects as well, with local schools consistently disadvantaged. Teachers in local schools have fewer years of post-secondary science education and teaching experience; they teach less in laboratories and less frequently use small groups for instruction; their students report that their teachers are less likely to use a teaching style that emphasizes advance organizers, summaries and demonstrations.

However, students spend more of their science class on practice, have smaller science classes and use textbooks more frequently.

43. Possibly as a consequence of differences in family background and school resources, student motivation[4] is much lower in local schools than in private and government schools, and students in local schools are less responsible about completing their homework. However, students in local schools report being more actively engaged in their learning than are students in private or government schools.

44. With respect to school decision-making, both local and government schools report less local control over the curriculum and school management than do private schools. Local schools exercise slightly more control over the selection and management of students than do public or government schools, however.

Explaining Differences Between Schools

45. In this section, we address four questions: (a) how much of the observed differences in student achievement and attitudes is attributable to student background and how much to characteristics of their schools? (b) do the average differences between the three types of schools remain after taking into account the family background differences of the students that attend them? (c) do they remain after taking into account peer effects (the contextual effects model), and (d) what other school characteristics may account for average differences in achievement?

[4] A high score represents less effort

Table 3: Means and standard deviations of school-level variables used in HLM analysis, for private, government and local schools in the Philippines, 1983

Variables	Private (N = 70)		Government (N = 83)		Local (N = 61)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. School social composition						
Large families	0.64	0.16	0.68	0.12	0.74	0.11
Dialect average	0.40	0.36	0.45	0.34	0.55	0.32
English average	0.11	0.11	0.10	0.09	0.05	0.08
Average age	189.64	4.91	191.22	5.42	197.05	7.00
Average books	2.68	0.63	2.47	0.48	1.97	0.32
Average SES	0.18	0.53	0.02	0.51	-0.61	0.32
2. Material and non-material inputs						
Teacher post-secondary science	0.73	0.45	0.73	0.44	0.49	0.50
Teaching experience	10.60	6.86	10.84	5.97	8.26	4.88
Class size	42.03	8.93	41.49	7.89	37.25	8.75
Student practice	0.61	0.49	0.66	0.48	0.69	0.47
Laboratories	0.70	0.46	0.63	0.49	0.48	0.50
Textbooks	0.31	0.47	0.22	0.41	0.43	0.50
Groups	0.33	0.47	0.37	0.49	0.16	0.37
3. Orderly environment						
Frequent testing	0.77	0.42	0.77	0.42	0.74	0.44
Instructional planning	0.03	0.44	0.04	0.39	-0.11	0.54
4. Academic emphasis						
Student motivation (reverse)	-0.08	0.23	-0.07	0.27	0.25	0.42
Student active learning	-0.13	0.43	-0.02	0.37	0.29	0.33
5. School decision-making						
Teaching control	0.51	0.98	-0.38	0.80	-0.16	0.94
Management control	0.24	0.84	-0.03	1.00	-0.19	1.05
Students control	-0.11	0.93	-0.14	0.84	0.00	0.97

46. The Unconditional Model. The first step in the HLM estimation process involves fitting an unconditional, or random regression model. We do this in two stages. In the first stage, we partition the variance in the achievement and attitude scores into their between unit (school) and within unit (individual) components. The results are presented in Table 4; they show that school level factors account for approximately half of the variance in both science and mathematics achievement, but very little -- only 10-20 percent -- of the variance in attitudes.

Table 4: Results of HLM variance component analysis: Philippines secondary, 1983 (percent of total variance accounted for)

Score	School	Individual
Science test score	43	57
Mathematics test score	52	48
Positive attitude toward science	21	79
Negative attitude toward science	17	83
Positive attitude toward school	10	90
Negative attitude toward school	11	89

47. In the second stage, for each of the six outcome measures, we fit an unconditional model that includes one random student level variable (SES) and two fixed student level characteristics (sex and age)[5]. Table 5 summarizes the results from the six models. All three student-level characteristics were significant predictors of science and mathematics achievement; male students scored significantly higher on both tests than did female students, although the male advantage in science was only about 15% of a standard deviation and in mathematics only about 10% of a standard deviation, neither of which is considered meaningful (Cohen 1969). Male students also held less positive attitudes toward both science and school than did female students. Students from higher SES backgrounds had higher achievement and more positive attitudes than did students from lower SES backgrounds, ceteris paribus. Although the residual variance of SES was allowed to vary among schools, the SES differentiation estimates were not reliable (reliabilities range from .01 to .12). Therefore, in the remaining analyses, SES is treated as a fixed variable (residual variance set at zero). Significant school-level random effects exist even after controlling for individual level student characteristics, and the achievement and attitude estimates are quite reliable (.62 to .94). These differences between

[5]The other student background characteristics were too highly correlated with SES to be included as independent variables.

schools indicate that we can proceed to the second step in the HLM analysis (the Chi-square chart indicates that all estimated parameter variances are significantly different from zero; see Annex A).

Table 5: Parameter estimates from six HLM unconditional models, Philippines secondary, 1983 (t-statistics in parentheses)

Independent variable	Science test score	Mathematics test score	Positive attitude toward science	Negative attitude toward science	Positive attitude toward school	Negative attitude toward school
Individual level effect						
Male (fixed)	0.79	0.34***	-0.10	0.23***	-0.18	0.24***
	(10.95)	(5.89)	(5.26)	(11.96)	(8.53)	(11.65)
Age (fixed)	-0.01***	-0.01***	-0.00	0.00***	-0.00	0.00
	(4.51)	(5.43)	(0.33)	(3.68)	(0.26)	(1.69)
SES (random)	0.54***	0.26***	0.12***	-0.06***	0.07***	-0.00
	(10.63)	(6.78)	(9.67)	(4.96)	(5.52)	(0.10)
School level effects						
Mean	12.82***	11.78***	0.06	-0.47***	0.09	0.29**
	(29.19)	(33.23)	(0.52)	(4.46)	(0.83)	(2.65)
Percent between-school variance explained	9.75	8.02	20.0	12.5	10.0	0.0

*** $p < .001$; ** $p < .01$

48. School Type Effects Model. In the second step, we address the major purpose of this study: to explore differences in the achievement and attitudes of students attending different types of secondary schools. Comparisons were made, therefore, between the achievement and attitudes of those attending national public, local public and private schools. Two variables, "Local public schools" and "Private Schools", were added to each of the two between-school equations for both achievement and attitudes; national public schools are the omitted category. Table 6 summarizes the results of these analyses.

Table 6: Parameter estimates from six HLM school type effects models Philippines secondary, 1983 (t-statistics in parentheses)

Independent variable	Science test score	Mathematics test score	Positive toward science	Negative toward science	Positive toward school	Negative toward school
Individual level fixed effects						
Male	0.79***	.34***	-0.10***	0.23***	-0.18***	0.24***
	(10.91)	(5.85)	(5.18)	(11.95)	(8.51)	(11.67)
Age	-0.01***	-0.01***	-0.00	0.00***	-0.00	0.00
	(4.38)	(5.36)	(0.34)	(3.55)	(0.14)	(1.53)
SES	0.55***	0.26***	0.11***	-0.05***	0.06***	0.01
	(12.23)	(7.17)	(9.08)	(3.95)	(4.94)	(0.48)
School level effects						
Mean	13.15***	11.93***	0.11	-0.56***	0.11	-0.27*
	(26.03)	(29.52.	(1.01)	(5.12)	(0.95)	(2.34)
Local public	-1.25*	-1.61***	-0 29***	0.40***	-0.16**	0.13*
	(2.48)	(3.92)	(4.04)	(3.30)	(2.74)	(2.12)
Private	-0.26	0.88*	0.04	0.01	0.04	-0.13*
	(0.06)	(2.22)	(0.60)	(0.10)	(0.72)	(2.37)
Percent between-school variance explained	11.7	20.3	20.0	25.0	10.0	9.0

*** p < .001; ** p < .01; *p < .05

49. The signs of the effects for school type on average achievement and attitudes are generally in the expected direction. In local public schools, average science and mathematics achievement scores are lower than in national public schools, ceteris paribus. With student background held constant, students in local public schools score 1.25 points (about 25 percent of a standard deviation) lower in science and 1.61 points (about 50 percent of a standard deviation) lower in mathematics than students in national public schools. Effects of these magnitudes are both statistically significant and meaningful, according to Cohen (1969). Student attitudes are less positive in local schools as well. Students in local schools report less favorable attitudes towards both science and school in general than students in national public schools; the effects are statistically significant for all four attitudes.

50. With background effects held constant, students in private and national

public schools perform comparably in science, but private school students outperform students in national public schools by .88 points in mathematics (about 25 percent of a standard deviation). Students in private schools also have somewhat more favorable attitudes towards science and school, but these effects are statistically significant only for one variable, negative attitudes towards school.

51. Contextual-Effects Model. According to Lee and Bryk (1989), a contextual effect in HLM is represented by including the school aggregate of a student-level variable in the between-school model; in this case, we include the class average SES score in the between-school models for average achievement and average attitudes. This represents the composition of students in each school with respect to their SES and approximates possible initial differences in achievement and selection effects. The results of these analyses are summarized in Table 7.

Table 7: Parameter estimates from six HLM contextual effects models, Philippines secondary, 1983 (t-statistics in parentheses)

Independent variable	Science test score	Mathematics test score	Positive attitude toward science	Negative attitude toward science	Positive attitude toward school	Negative attitude toward school
Individual level fixed effects						
Male	0.79***	0.34***	-0.10***	0.23***	-0.18***	0.24***
	(10.92)	(5.87)	(5.15)	(11.93)	(8.50)	(11.68)
Age	-0.01***	-0.01***	-0.00	0.00**	-0.00	0.00
	(4.31)	(5.28)	(0.19)	(3.41)	(0.08)	(1.54)
SES	0.54***	0.24***	0.10***	-0.04**	0.06***	0.01
	(11.79)	(6.66)	(8.04)	(3.01)	(4.48)	(0.41)
School level effects						
Mean	13.09***	11.87***	0.90	-0.54***	0.10	-0.27*
	(26.31)	(30.18)	(0.82)	(4.96)	(0.88)	(2.35)
Local public	-0.13	-0.43	-0.09	0.25***	-0.12	0.13*
	(0.23)	(0.98)	(1.24)	(3.70)	(1.80)	(1.97)
Private	-0.28	0.61	0.00	0.04	0.03	-0.13*
	(0.60)	(1.63)	(0.05)	(0.66)	0.55)	(2.37)
Average SES	1.81***	1.90***	0.32***	-0.24***	0.07	0.01
	(4.23)	(5.62)	(5.33)	(4.42)	(1.35)	(0.22)
Percent between-school variance explained	18.5	30.7	30.0	31.3	10.0	9.0

***p < .001; **p <.01; *p <.05

52. Peer effects are powerful predictors of achievement in the Philippines. Average SES scores are significantly related to both mathematics and science test scores, and the observed differences in achievement among local, government and private schools are nearly entirely accountable to differences in the average SES of students in these schools. That is, the size and statistical significance of coefficients for "Local public school" and "Private School" disappear with the inclusion of "Average SES" in the between-school model.

53. Average SES scores are also significantly related to attitudes towards science, but they have no relationship to attitudes toward school in general. The difference in average SES between schools, however, does not account for the more negative attitudes towards science and schools held by students in local

schools, and the more positive attitudes toward schools held by students in private schools.

54. Other explanations for achievement differences. Even though the school type effect was nearly entirely explained by the social composition of the school, there remains significant between-school variance in achievement to be explained. Some of the differences in achievement may be due to other measured differences among the schools. The last step in our analysis involves exploring how differences among schools with respect to material and non-material inputs, orderly environment, academic emphasis, and school-level decision-making affect the average achievement and attitudes of students.

55. For this, we employ a feature of the HLM package called "exploratory analysis", which estimates slopes and standard errors of variables, presently not included in a model, as if they were included. We do this for each variable separately, and we report in Table 8 all variables for which the estimated t-statistic is greater than 1.65 (2-tailed $p < .10$). The model onto which these variables were added is the "contextual effects" model.

Table 8: Estimated slopes (gamma) and their standard errors obtained by regressing estimated Bayes residuals from contextual effects model on between-unit variables

Variables	Gamma	Standard Error	Gamma	Standard Error
1. Related to achievement.		Science		Mathematics
Teacher post-secondary science	0.86	0.40	n.s.	n.s.
Laboratories	0.73	0.39	0.90	0.30
Instructional planning	1.27	0.41	1.27	0.32
Student motivation (reverse)	-1.57	0.55	-1.30	0.43
Student active learning	-1.15	0.46	-1.11	0.36
Local student control	-0.44	0.21	-0.41	0.16
2. Related to positive attitudes		Science		School
Teacher post-secondary science	n.s.	n.s.	-0.07	0.04
Laboratories	0.10	0.05	n.s.	n.s.
Student practice	n.s.	n.s.	0.08	0.04
Instructional planning	0.35	0.05	0.29	0.03
Student motivation (reverse)	-0.24	0.07	-0.20	0.05
Textbooks	0.12	0.05	0.07	0.04
Groups	0.14	0.05	0.14	0.04
3. Related to negative attitudes		Science		School
Instructional planning	-0.25	0.04	-0.22	0.04
Student motivation (reverse)	0.35	0.06	0.15	0.06
Student active learning	0.17	0.05	n.s.	n.s.
Groups	-0.13	0.04	-0.11	0.04

n.s. = not significant

56. The exploratory analyses yield both anticipated and unanticipated results. A few material and non-material inputs were important in boosting achievement. Science achievement was higher in schools with more scientifically educated teachers (students whose teachers studied post-secondary science scored nearly one point higher on the science test than students whose teachers lacked post-secondary science training), and both science and mathematics achievement were higher in schools where teachers had access to science laboratories (also, nearly one point higher). However, most of these variables -- class size, the teacher's experience, use of textbooks, use of small groups, student time on experiments -

- were unrelated to student achievement in either subject. One measure of an **orderly environment** -- the students' report that the teacher plans his or her instruction (teacher explains work at the outset, summarizes work at the end, does demonstrations and explains relevance of work to students) was significantly related to achievement in both science and mathematics; each standard deviation of instructional planning was associated with a 1.27 point gain on both the science and the mathematics test. Achievement was also higher in schools with greater **academic emphasis**, in which students were more motivated and reported expending more effort on homework and in-class assignments; here, each standard deviation of student motivation was associated with a 1.57 point gain on the science test and a 1.30 point gain on the mathematics test. Unexpectedly, achievement was unrelated to greater **local control over decision-making** over teaching and school management and was negatively related to local control over student admission and regulation and to more **active student learning**.

57. Attitudes towards science were more positive for students whose teachers planned their instruction, used textbooks, taught in laboratories and placed students in small groups for work. With the exception of use of laboratories, these same teacher practices also affected students' attitudes towards school in general. Surprisingly, student attitudes were more negative about science when students were involved in more active learning and more negative about school when there was more local control over student admission and regulation. Variables unrelated to residu.l variance in student attitudes were: teacher experience, class size, teacher testing, student active learning and all other variables related to the local control of schools.

SUMMARY AND CONCLUSION

58. This paper has examined the relative effectiveness of 214 national public (government) schools, local public schools and private schools on secondary science achievement and attitudes in the Philippines. Significant differences were found among these three types of schools in terms of student achievement and available resources; peer effects and the context for learning were examined for their mediating effects on school type differences.

59. First, with SES, age and gender held constant, significant differences were observed in the achievement and attitudes of students in the three types of schools:

- Students in local schools had lower achievement (1.25 points lower in science and 1.61 points lower in mathematics) and less positive attitudes than their counterparts in government schools.

- Students in private schools outperformed students in government schools (.88 points higher in mathematics).

60. Second, local public schools had fewer resources than either national public or private schools. In particular, fewer local public schools had laboratories and teachers in local schools were less educated and experienced.

61. Third, the paper explores reasons for these differences, starting with differences in the social composition of the school. Peer effects (average SES) were powerful predictors of achievement and attitudes towards science, although they had little effect on attitudes toward school. With contextual variables included in the models, virtually all school type effects disappeared. That is, no differences between local public, private and government schools with respect to either science or mathematics achievement were observed, once the average SES of students in the school had been entered into the model. However, significant residual variance between schools remained.

62. Correlates of the residual variance included several variables previously identified as significant determinants of achievement: the student's teacher studied science at the post-secondary level, planned his or her instruction, and used a science laboratory; the students were more motivated, and expended more effort on homework and assignments. However, local control over teaching, school management and students were unrelated or even negatively related to achievement.

63. At the outset, we hypothesized that if local public schools were able to harness the managerial strategies of private schools, they might be able to raise the achievement of their students. The results of this study indicate that centrally planned decentralization does not necessarily produce local level control. Local schools were not managed as private schools; they reported little local control over either teaching or school management -- much less than private schools reported. Student motivation was lower in local schools than in either private or government schools. Teachers engaged in less instructional planning than in either private or government schools. Thus, the opportunities presented

by decentralization were not employed to improve student achievement in local schools.

64. Local schools were provided an empty opportunity, with nothing for local control to control. Laya (1987) notes that the per-student expenditures in local schools are significantly lower than those in government schools; this suggests that fewer resources were available about which to make local decisions. Data from the present study indicates that the resources available to school managers in local schools were less abundant than those in either private or government schools. Managers of under-supplied schools, such as the local schools in the Philippines in the early 1980s, cannot easily compensate for absences of material and non-material inputs by managerial sleights-of-hand. They need the basic inputs with which to manage.

65. By comparison, managers of private schools had significant resources over which to exercise control. Teachers were educated and experienced, and they planned their instruction; students were motivated and completed their homework and assignments. Managers of private schools exercised significant control over decisions regarding teaching and school management. These results suggest that policies for decentralization alone do not necessarily change what goes on in schools.

Annex A: Additional statistics

Parameter	Estimated value	Chi square	Statistical significance (p-value)	Reliability of school-level random effects
		Chi Square Table		
		Table 5 (213 degrees of freedom)		
Mean Achievement				
Science	8.90	4250.5	.000	.930
Mathematics	6.65	5352.0	.000	.940
Sciatt+	0.16	1343.3	.000	.775
Sciatt-	0.14	1199.5	.000	.740
Schatt+	0.09	753.3	.000	.626
Schatt-	0.11	871.7	.000	.664
SES Differentiation				
Science	0.10	243.9	.072	.124
Mathematics	0.04	219.6	.363	.075
Sciatt+	0.00	196.4	<.500	.052
Sciatt-	0.00	206.6	<.500	.056
Schatt+	0.00	188.4	<.500	.011
Schatt-	0.00	173.9	<.500	.031
		Table 6 (211 degrees of freedom)		
Mean achievement				
Science	8.70	6885.3	.000	.969
Mathematics	5.76	7388.4	.000	.971
Sciatt++	0.16	1893.1	.000	.890
Sciatt-	0.12	1482.6	.000	.858
Schatt+	0.08	1049.5	.000	.799
Schatt-	0.10	1199.3	.000	.817
		Table 7 (210 degrees of freedom)		
Mean achievement				
Science	8.03	6195.8	.000	.967
Mathematics	5.01	6380.7	.000	.967
Sciatt+	0.14	1644.6	.000	.875
Sciatt-	0.11	1355.7	.000	.846
Schatt+	0.09	1040.6	.000	.798
Schatt-	0.10	1199.6	.000	.818

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