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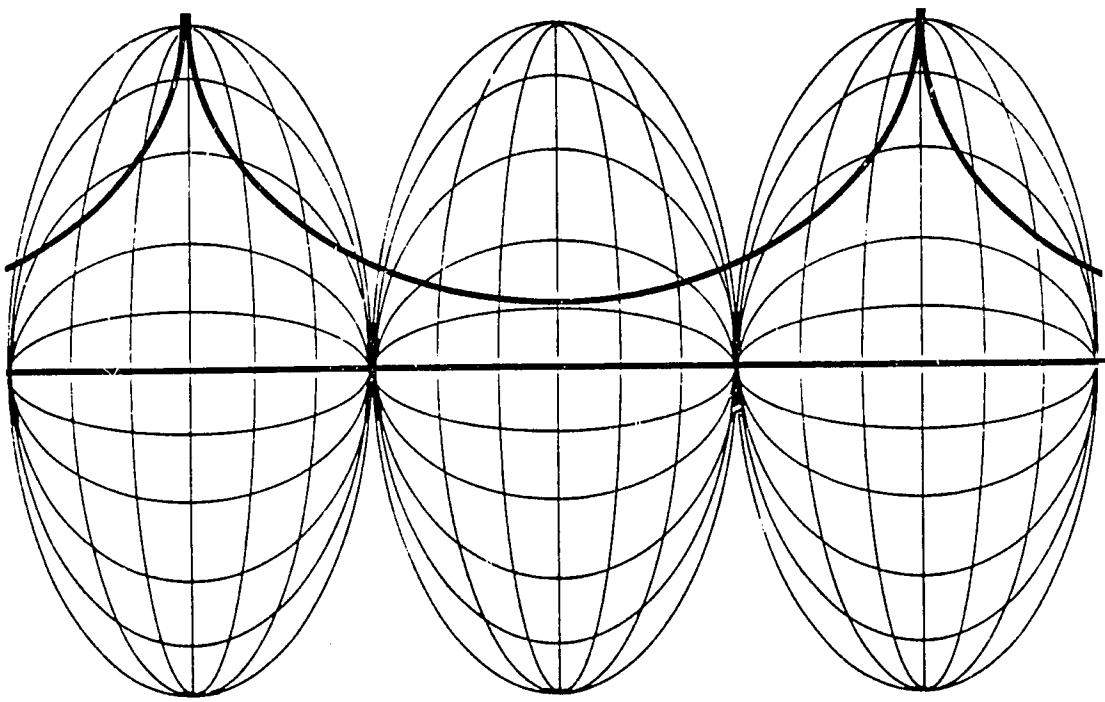

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DO DIFFERENCES BETWEEN SCHOOLS AND BETWEEN SCHOOL ADMINISTRATORS IN PAKISTAN CONTRIBUTE TO DIFFERENCES IN STUDENT ACHIEVEMENT?

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DO DIFFERENCES BETWEEN SCHOOLS AND BETWEEN SCHOOL ADMINISTRATORS IN PAKISTAN CONTRIBUTE TO DIFFERENCES IN STUDENT ACHIEVEMENT?[1]

by Noel McGinn, Donald Warwick and Fernando Reimers

Research in other countries has suggested that differences in the physical and organizational aspects of schools, and between characteristics of the administrators of schools, contribute to differences in student achievement. In the paper "How do Public Primary Schools in Pakistan Differ Across Provinces?" we have seen that there are differences both between provinces in terms of school characteristics, and within provinces. In other words, there are wide variations in actual practice in terms of the physical qualities of buildings, and in terms of the education and training of school administrators. In this paper we ask whether those differences are related to differences in student achievement.

The presence or absence of a relationship of these differences in school and administrator characteristics to differences in student achievement is important for two reasons:

1. If these differences between schools and between school heads could be associated reliably with differences in student achievement, it might be possible to identify policies to improve school facilities, organization and headmasters/headmistresses that would lead to improvements in student achievement.

2. If, on the other hand, there is no reliable relationship between school and administrator characteristics and student achievement, then there is no empirical support for an argument that improving the quality of school facilities, or providing more autonomy or training to administrators, will lead to improvements in student achievement.

A. School Characteristics and Student Achievement

This first section looks at the relationship between the school facilities and organizational characteristics, and four measures of student achievement. These are average scores for the school, on tests of knowledge of mathematics and science contained in the curriculum, for the 4th and 5th classes. Table 1 presents the mean scores for each of the tests, by province.

Table 1.

Average School Achievement Test Scores by Province

Province	Math 4	n*	Math 5	n	Sci 4	n	Sci 5	n
Federal Dist.	12.1	2	13.3	2	14.2	2	21.5	2
Baluchistan	12.2	20	12.2	18	13.5	20	15.3	18
NWFP	14.8	52	13.3	48	15.0	52	16.7	48
Punjab	10.4	296	11.9	294	13.1	296	15.9	294
Sind	13.6	92	13.0	87	15.3	91	16.6	87
Total	11.6	461	12.3	449	13.8	460	16.1	449
sig. of F	.000		.341		.004		.480	

*These are weighted cases. The actual n's for each province are Federal District 26, Baluchistan 74, N.W.F.P. 80, Punjab 201, and Sind 90.

The presentation is divided into three sections:

1. Test Scores and School Size

2. Test Scores and Physical Facilities

3. Test Scores and Teacher and Student Attendance.

Each section begins with a consideration of one variable at a time, as they relate to the student achievement measures. This is followed by a discussion of an analysis of the combined effect of several variables.

1. Test Scores and School Size, Hours of Operation and Gender.

In this section are included seven variables that describe the school: Enrolment, Total Number of Teachers, Student/Teacher Ratio, Length of School Day, Number of Sessions or Shifts, Type of School (Primary vs. Middle/High), and Gender of School.

There are no relationships between Enrolment and scores on any of the achievement tests. Schools that have larger enrollments do as well or as badly as schools with smaller enrollments.[2]

There are no relationships between the number of teachers in the school and the four measures of achievement. Schools with few teachers do as well as those with many.

There are no relationships between the ratio of students to teachers and the four measures of achievement. Schools with large class sizes do as well as schools with small class sizes.

There is no relation between the length of the school day, and level of student achievement. Only 5 per cent of primary schools in Pakistan have more than one session or shift. From previous research we would expect either no difference between one shift and two shift schools in terms of achievement levels,

or that one shift schools would have higher levels, as their school day is longer. Int his study, the few schools with two shifts have higher (15.0) average scores on the Math4 test, than do the schools with one shift (average score 12.0, p= .038). The two shift schools also have higher scores on the Science5 test (20.6 vs. 16.2, p.=.005), and on the Science4 test (16.1 vs. 13.8, p=.067).

There are no relationships between whether the school is only a primary school, or is part of a larger school, and achievement test scores.

There are no differences between schools that are boys only, and schools that are for girls only, in terms of average level of achievement. Mixed schools do <u>less</u> well than single-sex schools on the 4th class Maths achievement test. The 92 mixed gender schools have an average score of 10.9 on the Math4 test, compared to a score of 12.5 for the 369 single-sex schools (p = .03). But there are no differences between single-sex and mixed gender schools on the other three achievement tests.

The combination of these six characteristics of schools does not predict to achievement scores. That is, the combination of these six measures (Enrolment, Number of Teachers, Student/Teacher ratio, Number of Shifts, Gender and Type of School) in a multiple regression equation does <u>not</u> generate a reliable prediction of any of the four achievement scores.

On the basis of this analysis we can conclude that levels of student achievement at the school level are not a function of

these six characteristics of schools in Pakistan. Changes in school size, student/teacher ratios, wider introduction of double shifts, wider adoption of coeducation, or more widespread linking of schools with middle and high schools will not, in themselves, lead to improvements in student achievement.

2. Test Scores and Physical Facilities

For this analysis we used 14 of the school facilities factors listed in the previous section. We have left out the question on whether water was drinkable because this information was missing for about 20 per cent of the schools. The items included in the analysis are:

Rating of the ventilation in the school.
Rating of the illumination of the school.
Rating of the cleanliness of the school.
Are there teacher desks in most classrooms?
Teacher chairs?
Student desks?
Student chairs?
Student mats?
Is there an almarah in most classrooms?
Are the classrooms crowded with students?
Is there a blackboard in all classrooms?
Are there charts on the walls in the classrooms?
Does the school have toilet facilities?
Does the school have electricity?

Responses to the individual items are related to responses to other items. Table 2 presents the matrix of correlations among these 14 measures. The items have been scored so that the "good" score (e.g., school has toilet facilities) is high, and the "poor" score is low. A single asterisk (*) indicates that a relationship of this size would be obtained by chance less than 1 times in 100, if no real relationship existed. A double asterisk (**) indicates that a relationship of that size would be obtained

by chance 1 time in 1000 if no real relationship existed. This matrix has 196 correlations in it. By chance we should expect about 3 single asterisk correlations, and no double asterisk correlations.

The table indicates that schools rated as having good ventilation are also rated as having good illumination (r=.726, p=.001), and as being very clean (r=.288, p=.001). Schools with good ventilation also are more likely to have student desks and student chairs in most rooms (r=.140, r=.158, p=.01), to be not crowded (r=.219, p=.001), to have a blackboard (r=.142, p=.01), and to have toilet facilities (r=.155. p=.01). Ratings of ventilation, illumination and cleanliness are related to each other, and to the presence of student desks and chairs, and toilet facilities.

The presence of teacher desks and teacher chairs in most classrooms is not, however, related to the presence or absence of student desks and chairs. That is, schools with desks and chairs for teachers do not necessarily provide them for students, but they do provide mats (r=.133 and r=.240) and almarah (r=.203 and .169).

The large number of correlations with asterisks indicates that these questions are relatively reliable.

The 14 items were correlated with scores on the four achievement tests. None of the 14 facilities measures are related to scores on any of the Achievement tests.

Table 2. Correlations among all indicators of facilities.

orrelations:	VENTILN	ILLUMN	CLEANLI	TCHDESKS	TCHCHAIR	STUDESK
VENTILN	1.0000	.7262**	.2876**	-.0625	.0332	.1397*
ILLUMN	.7262**	1.0000	.3102**	.0304	.0503	.0908
CLEANLI	.2876**	.3102**	1.0000	.0323	-.0064	.1514*
TCHDESKS	-.0625	.0304	.0323	1.0000	.4758**	.0201
TCHCHAIR	.0332	.0503	-.0064	.4758**	1.0000	-.0005
STUDESK	.1397*	.0908	.1514*	.0201	-.0005	1.0000
STUCHAIR	.1578*	.1398*	.2038**	.0589	-.0058	.5256**
STUMATS	-.0258	-.0125	.0007	.1328*	.2399**	-.0332
ALMARAH	.0180	.0602	.0043	.2028**	.1685**	.0128
CROWDED	.2191**	.1518*	-.0746	-.0865	-.0059	-.0100
BLACKBRD	.1420*	.1463*	.0070	.2477**	.3418**	.0455
CHARTS	.0951	.1449*	.3369**	.0629	.0903	.0500
TOILETS	.1550*	.2247**	.1876**	.1008	.0550	.1768**
ELECTRIC	-.0265	.0736	.0918	.0793	.0523	.1020

orrelations:	STUCHAIR	STUMATS	ALMARAH	CROWDED	BLACKBRD	CHARTS
VENTILN	.1578*	-.0258	.0180	.2191**	.1420*	.0951
ILLUMN	.1398*	-.0125	.0602	.1518*	.1463*	.1449*
CLEANLI	.2038**	.0007	.0043	-.0746	.0070	.3369**
TCHDESKS	.0589	.1328*	.2028**	-.0865	.2477**	.0629
TCHCHAIR	-.0058	.2399**	.1685**	-.0059	.3418**	.0903
STUDESK	.5256**	-.0332	.0128	-.0100	.0455	.0500
STUCHAIR	1.0000	-.1020	-.0826	-.0592	.0379	.1144
STUMATS	-.1020	1.0000	.1083	-.0615	.1830**	.0158
ALMARAH	-.0826	.1083	1.0000	.0733	.1991**	.2460**
CROWDED	-.0592	-.0615	.0733	1.0000	.0470	-.0697
BLACKBRD	.0379	.1830**	.1991**	.0470	1.0000	.1391*
CHARTS	.1144	.0158	.2460**	-.0697	.1391*	1.0000
TOILETS	.2193**	-.0318	.1236	.0326	.0916	.0983
ELECTRIC	.1261	.0823	-.0051	-.0916	.0692	.0824

orrelations:	TOILETS	ELECTRIC
VENTILN	.1550*	-.0265
ILLUMN	.2247**	.0736
CLEANLI	.1876**	.0918
TCHDESKS	.1008	.0793
TCHCHAIR	.0550	.0523
STUDESK	.1768**	.1020
STUCHAIR	.2193**	.1261
STUMATS	-.0318	.0823
ALMARAH	.1236	-.0051
CROWDED	.0326	-.0916
BLACKBRD	.0916	.0692
CHARTS	.0983	.0824
TOILETS	1.0000	.2219**
ELECTRIC	.2219**	1.0000

of cases: 407 2-tailed Signif: * - .01 ** - .001

" is printed if a coefficient cannot be computed

We then entered all the items into a multiple regression equation. This is equivalent to building a composite index, a total score based on all 14 items. The multiple regression coefficient produced was, for all 4 achievement tests, not as large as that which would be expected by chance. In other words, there are no reliable relationships between the presence or absence of school facilities, and scores on achievement tests. Providing schools with more of the school facilities included above is not likely to improve student achievement.

3. Test Scores and Teacher and Student Attendance

Measures of student and teacher attendance are possible predictors of student achievement because they condition the total amount of time that can be spent by teachers on instruction and students on learning from teachers.

We have included (in Table 3) two measures of teacher presence and absence. The first is the proportion of teachers present in the school on the day of the survey. The second is the school head's report of the average number of days a teacher is absent during a month. There is no empirical relationship between these measures. The proportion of teachers present on the day of the survey is unrelated to any of the other attendance measures. The school head's estimate of average absence during a month is related to the school head's estimate of the time teachers require to travel to school each day ($r=.135$, $p=.01$). Average absences are higher when the head estimates a longer time to come to school.

Table 3. Correlates of teachers absences.

Correlations:	AVGTABS	PCTTPRES	PCTABSEN	TURNOVER	DAYSLOST	TCHRDIST
AVGTABS	1.0000	-.0135	-.0227	.0543	-.0267	.0799
PCTTPRES	-.0135	1.0000	-.0771	.1052	.0025	-.0994
PCTABSEN	-.0227	-.0771	1.0000	.1796**	.0444	.1935**
TURNOVER	.0543	.1052	.1796**	1.0000	.1219	.2057**
DAYSLOST	-.0267	.0025	.0444	.1219	1.0000	.0955
TCHRDIST	.0799	-.0994	.1935**	.2057**	.0955	1.0000
TCHRTIME	.1358*	.0264	.0515	.2923**	.1061	.5633**
STUDDIST	.0940	.0374	.1183	.0431	.0233	.0508
STUDTIME	.0181	.0919	-.0208	.0630	.0319	.0629

N of cases: 399 2-tailed Signif: * - .01 ** - .001

" . " is printed if a coefficient cannot be computed

Correlations:	TCHRTIME	STUDDIST	STUDTIME
AVGTABS	.1358*	.0940	.0181
PCTTPRES	.0264	.0374	.0919
PCTABSEN	.0515	.1183	-.0208
TURNOVER	.2923**	.0431	.0630
DAYSLOST	.1061	.0233	.0319
TCHRDIST	.5633**	.0508	.0629
TCHRTIME	1.0000	.1254	.1806**
STUDDIST	.1254	1.0000	.4415**
STUDTIME	.1806**	.4415**	1.0000

N of cases: 399 2-tailed Signif: * - .01 ** - .001

" . " is printed if a coefficient cannot be computed

We asked the school head the number of students absent in each grade. The proportion of total absences to total enrolment is higher when teachers are seen by the head as living father form school (r=.194, p=.001), and when the proportion of teachers who were in the school last year who have left is high (r=.180, p=.001). The higher teacher turnover (proportion not returning from last year), the longer is teacher time to come to school (r=.29) and teacher distance from school (r=.206). Teacher distance from school is of course highly related to teacher time to school (r=.563). Teacher time to school is related to student time to school (r=.181), which suggests that some teachers live in roughly the same population concentration as do their students. And the school head's estimate of student distance from school is related to student's time to come to school (r=.442). The measure of the total number of days the school has been closed for any reason other than a holiday during the year is unrelated to any of the other variables.

None of these variables, when taken individually, relate to the four measures of student achievement.

When the 9 measures are included in a single regression equation, they predict to scores on the Math4 achievement test (R=.23, F=2.39, p=.012--see Table 4). What this regression analysis appears to say is that controlling on days lost, average teacher and student absence, teacher turnover, and student distance and time from school, we can predict mathematics

achievement scores for 4th class students by knowing how far the teacher lives from and how long s/he takes to come to the school. Schools with high average scores have teachers who live close by, but who take longer to come to school.

The combination of variables does not predict to scores on the other three achievement tests.

This analysis provides little help in understanding how policies to affect teacher and student absences could improve achievement levels.

Table 4. Effect of selected variables on achievement in Math 4.

Variable	Slope	Significance
Dayslost	0.06	0.06
Avgtabs	-0.01	0.94
Pcttpres	-1.83	0.20
Studtime	-0.04	0.12
Pctabsen	-1.56	0.45
Turnover	-1.39	0.09
Tchrdist	-0.09	0.06
Studdist	-0.10	0.56
Tchrtime	0.03	0.01

Summary

The analysis presented above does not suggest that with knowledge of the physical facilities and organization of schools that we can predict to the average levels of achievement of students. On the contrary, it appears that these factors make little difference in terms of how well students do in schools, at least on achievement in mathematics and science. The implication is that efforts to improve the quality of schools, in terms of student achievement, should not expect much from increased expenditures on physical facilities.

B. School Heads and Student Achievement

In this section we review the results of attempts to relate characteristics of headmasters, headmistresses and headteachers to the level of achievement of students in their schools. We have grouped the analyses into three sets of variables:

4. Test Scores and the Background of the School Heads
5. Test Scores and the Education and Training of the School Heads
6. Test Scores and the Administrative Practices of the School Heads

The analyses are carried out on the 398 persons clearly identified as either headmaster, headmistress, or headteacher, who were present in their school on the day of the survey.

4. Test Scores and the Background of School Heads

As background information about the school heads we have their title (headmaster/headmistress or headteacher), age, literacy and education of their mother and father, distance of their residence from the school, and their gender.

Each of these variables was compared with the school achievement scores on the Mathematics and Science tests for 4th and 5th class. No reliable relationships exist. That is, one cannot reliably predict level of student achievement knowing something about the age, gender, parents' education, title, or location of residence of the school head.

To determine whether there might be some interactions among

these variables that obscured relationships with achievement scores, we included all variables in a multiple regression equation to predict to student achievement scores. Again, there are no relationships between school head background, and student achievement.

Changes in the criteria of selection of school heads on the basis of gender, parents' education, age or location of residence with respect to the school are not likely to lead to increases in student achievement.

5. Test Scores and the Education and Training of School Heads

The variables included in this section are the level of formal schooling completed by the school head, the certificate s/he has attained, the years of services as a headmaster, headmistress or headteacher, the number of schools in which s/he has served as a head, and the weeks of administrative training received.

None of these variables are related to any of the achievement test scores. On the basis of this analysis we would conclude that changes in procedures of selection of school heads (e.g., to prefer those with higher levels of formal schooling) would make no difference in terms of student achievement test scores. It should be noted that as very few (only 5%) of the heads received any training prior to becoming a school head, that these findings do not make a strong argument against training.

6. Test Scores and the Administrative Practices of School Heads

For each school head we totalled number of hours spent

during the week, and computed the per cent of time spent on administrative activities, such as office work, supervision of teachers, maintenance of discipline, and soliciting funds from the community. We also computed the percent of time spent on teaching activities, including teaching one's own class, teaching other teachers' classes, and preparing lesson plans.

In addition to these variables, this set includes whether the school head supervises teachers, and students, and the number of teacher meetings called during the year.

The greater the number of hours the school head claims to spend on school work, the greater the number of teacher meeting s/he says s/he has called during the year ($r=.217$, $p=.001$). Schools heads who say they supervise teachers hold more teacher meetings than those who say they do not ( ).

But none of the measures of time spent on various activities are related to student achievement test scores. Nor are responses to questions about supervision of teachers and students, or the number of teacher meetings called, related to scores on achievement tests.

In other words, it is not possible to predict achievement test scores knowing answers to the questions we asked about how school heads spend their work week, whether they supervise teachers and students, and the number of teacher meetings they call. Changes in these behaviors are not likely to affect student achievement.

Summary

From this analysis we have learned nothing about school heads that would help in the elaboration of policies to improve student achievement levels. If school heads contribute to student achievement, it would not appear that those contributions are affected by the background of the school heads, nor by their level of formal schooling and training, nor by how they distribute their time in administrative tasks. It is possible that in fact school heads make a vital contribution to student achievement, but based on this analysis the only conclusion that can be drawn is that it is not likely that those contributions could be increased by changes in selection policies, nor by changes in the distribution of time. As noted earlier, most school administrators receive no formal training for their training. It is possible that the provision of this training could contribute to student achievement, but there is nothing in this analysis to support that belief.

Endnotes

1. The research reported in this paper was carried out as part of the BRIDGES Project, a Cooperative Agreement between the Harvard Institute for International Development and the Office of Education, Bureau of Science and Technology, United States Agency for International Development. Comments made in this paper are the responsibility of the authors and not of USAID.

This research could not have been carried out without the participation of a number of persons. The study is a joint project of BRIDGES and the Academy of Educational Planning and Management, Ministry of Education, Pakistan. Professor Laeeq Ahmed Khan, Director of the Academy, provided much help in carrying out this research. Dr. Sarfraz Khawaja of the Academy participated in the design of the study and solved many administrative problems in Pakistan. Aslam Bhatti was the field coordinator for research in the Federal District and supervised the production and distribution of questionnaires. Syed Fazl-Qadir was field coordinator in North West Frontier Province, Ghaffar Siddiqui and M. A. Meher in Sind, Chaudry Anwar Hussain in Punjab, and Kursheed Ahmed and Ijaz Ahmad in Baluchistan. Our deepest appreciation also goes to the more than 100 interviewers, too many to name, who provided hard work, enthusiasm and care in collecting the data. Coding of the data was the responsibility of Haroona Jatoi and Habib Khan of the Academy. Joseph Tham contributed his computer expertise to data entry and data analysis.

2. Because smaller schools are more frequently located in rural areas, we looked at the relationship between the Urban/Rural designation of schools, and the achievement measures. There are no relationships.