PN-ACN-522

INFLUENCES ON ACADEMIC ACHIEVEMENT IN PAKISTAN: Students, Teachers, and Classrooms

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A critical issue in explaining academic achievement is the influence of the student's own background and the background and classroom practices of the teacher. Which carries more weight: the social class of the student, the education of the teacher, or the kind of instruction the student receives in the classroom? The technique of hierarchical linear modeling will be used to deal with these three influences on achievement. This is a type of multilevel analysis suited to situations in which individuals are nested in larger organizations, such as the classroom and the school.

The findings come from a random sample survey of about 500 schools, 1,000 teachers, and 11,000 students across Pakistan.[1] Student achievement was measured by curriculum-based achievement tests in mathematics and science given to students in classes four and five of the schools covered. The study measured student background characteristics through a short questionnaire given to each pupil. It included items such as the gender of the child, how close his or her home was to the school, and the possessions found in the student's home, such as running water, a radio, a television set, and a sewing machine. Three indicators of the socio-economic background of students are used in this analysis: the number of the student's parents who are literate; home wealth, a composite measure of the possessions mentioned; and whether or not the student had electricity at home.

On these indicators about a third of the students in the sample had neither parent literate, about 40 percent had one parent literate, and 25 percent came from homes where both parents were literate. Of the ten possible possessions listed in the questionnaire students reported an average of five, and more than three-fourths had electricity at home.

Interviews with 936 teachers provided information on their background and teaching practices. Preliminary papers suggested that the following items were the most promising for this analysis: whether the school was urban or rural; whether it was for boys, girls, or coeducational; the gender of the teacher; the teacher's level of schooling; the highest teaching certificate held by the teacher; whether the teacher taught more than one class; the number of hours student monitors were in charge of the teacher's classes; whether the teacher had practice teaching before his or her appointment; the coverage of the curriculum in mathematics and in science; the literacy of the teacher's father and mother; the number of in-service courses the teacher had taken; whether the teachers had students translate for pupils who did not speak the language they were using; and the number of years the teacher had been teaching.

Among the teachers interviewed 60 percent were male, and 80 percent were serving in rural schools. Nearly two-thirds came from homes where their father was literate but only a quarter had literate mothers. Their teaching experience ranged from zero to thirty-nine years, with an average of twelve. The most common level of general education, reported by 61 percent, was matriculation, followed by 20 percent who had completed the Fellow of Arts or Fellow of Sciences. The highest teaching credential of almost

[1]This survey was carried out by Project BRIDGES of the Harvard Institute for International Development and the Academy of Educational Planning and Management of the Ministry of Education in Pakistan. The study was made possible by funding from the Agency for International Development and the generous assistance of the provincial departments of education.

two-thirds of the teachers was the primary teaching certificate (PTC) although 10 percent had a certificate of teaching (CT). Less than a third had practice teaching as part of their training, although 45 percent had received some form of inservice training.

Almost 60 percent of the teachers were responsible for more than one grade (class). Among the multigrade teachers, 65 percent used a student monitor with the class that they were not teaching. These monitors supervised other students an average of ten hours a week. When teaching classes in which students spoke a language different from their own, nearly 60 percent of the teachers asked students to serve as translators for pupils who did not understand that language.

Multilevel Analysis

Students differed from each other on all four achievement tests. These differences come from three main sources: the background of the students; the training of the teachers; and the practices used by teachers in the classroom. Multilevel analysis showed that a maximum of 50 percent of the differences between students can be explained by conditions varying across schools, such as the education of teachers and classroom practices, and a maximum of 50 percent by conditions within schools, such as the social class of students. These figures mean that, even with social class and other within-school conditions held constant, there is ample room for schools to influence student achievement.

The multilevel analysis tried to explain as much of the maximum differences between and within schools as possible. The first step was to consider the impact on achievement of the student background conditions, the measures of within-school influence. Taken alone, the literacy of the student's parents, their family's possessions, and the availability of electricity in the home explained little of the differences in achievement. The next step was to examine the influence of teacher background and classroom practices (between-school influences), while controlling for the three student background conditions. This analysis indicated which conditions did or did not maintain an influence on achievement with controls for student background.

The results showed that the best predictors on all four tests are, in order, whether the school is urban or rural; whether the teacher must teach more than one class; whether the teacher uses students to translate for pupils who speak a different language; and how much formal education the teacher had received. These characteristics explained about one-fifth of the differences between schools.

Achievement was higher when:

- the school is located in an urban rather than a rural area;
- teachers have higher levels of formal education;
- student achievement increases with every additional year of the teacher's schooling;
- teachers are responsible for one class rather than several; and
- teachers have students translate their presentations for pupils who do not understand the teacher's language.

The strongest influence in the entire analysis appears only with the two tests of mathematics. With those tests, students of male teachers had scores substantially higher than those of female teachers. These differences by gender were strongest among teachers in rural areas and those who had no university education. Students of urban female teachers and of those with a bachelor's degree or higher had achievement scores approximately the same as students of male teachers in the same areas and with the same education.

Interpretation

The strongest influences on student achievement are those that vary across schools. How can these be explained?

The condition with the greatest impact on test scores is the gender of the teacher. Why do the students of female teachers have achievement scores in mathematics significantly lower than students of male teachers? Because the multilevel analysis builds in automatic controls for the

other variables mentioned, such as rural and urban location, formal education, and multigrade teaching, those conditions are not plausible explanations for the lower performance in mathematics. The most likely reason is that in their own schooling female teachers received less or lower-quality instruction in mathematics than their male counterparts. As a result, when the time came to transmit their knowledge of the field to their own students, they were ill-prepared to do so.

The higher scores of students in urban schools probably arise from several overlapping conditions. With more applicants for teaching positions in urban than rural areas, urban schools can be more selective in filling those posts. They may choose candidates who show more initiative in teaching, are better prepared in subject fields such as mathematics, and are happier with their work as teachers. Students from urban homes may likewise benefit from modern influences and facilities present in cities, including newspapers, television, video cassette recorders, and bookstores. The urban student may thus enter school more prepared to learn and more ready to ask the questions that instruction can answer.

Single-grade teaching has a positive impact on achievement because it allows the teacher to spend more time with each student. In multigrade classes, teachers must divide their time among the groups for which they are responsible. To deal with those they are not teaching many use student monitors. Data from the students show that achievement is higher when students spend more time with teachers than with monitors. Multigrade teaching also means losing time to teach as the different groups shift from room to room or from the classroom to the outdoors, as often happens in rural areas.

The impact of student translators underscores the importance of dealing with linguistic diversity in the classroom. With many different languages spoken across Pakistan, it is not surprising to find that 60 percent of the teachers use translators in class. The simplest interpretation is that students learn more when they can understand the teacher through the help of the translator.

The number of years of the teacher's formal education has a consistent influence on student achievement in the four tests. The main reason is that the more years of schooling the teacher has the greater their command of the subject matter taught in primary school. The lack of relationship between teacher certification and three of the four achievement tests suggests that teacher training courses add little to what the teachers have already learned in their formal schooling.

Although the influences mentioned are helpful in showing what accounts for student achievement in mathematics and science, they leave much to be explained. Nonetheless, the results point to areas on which the government can take action and also to the need for continuing research on academic achievement. It would be particularly helpful in future studies to have tests administered in two different academic years so that changes in achievement, rather than just one-time achievement scores, can be analyzed. That possibility was not open in the survey discussed here.

Policy Implications

The findings point to several areas in which the federal and provincial governments can take action.

1. Steps should be taken immediately to understand and eliminate the disadvantage in mathematics achievement found among students of female teachers. The first challenge is to determine what causes this difference. Is it poor instruction in mathematics given to the girls who eventually become teachers? Or is it attitudes or other conditions leading to the impression that mathematics is not an appropriate subject for girls? The fact that these gender differences disappear in urban schools and when female teachers have a university degree indicates that the problem can be solved. But any solution will require more careful analysis of the teaching of mathematics to girls and by women than was possible in this study.

2. The government should act to reduce the amount of multigrade teaching or, if that is impossible, to help multigrade teachers learn methods of teaching tailored to the unique challenges they face. The Primary Education

Development Project has plans for research on what teachers can do to handle two or more classes at the same time. That information, together with knowledge about multigrade teaching from other countries, could be used to make preservice and inservice teacher training programs more responsive to the problems faced by multigrade teachers.

3. School authorities should determine why students in urban schools have higher achievement scores than those in rural schools. One possibility is that urban schools attract better teachers in all fields, including mathematics and science. If that is the case, the government might change such incentives as salaries and allowances to make it easier to recruit well-prepared teachers for rural schools. Another explanation is that urban areas, for reasons beyond the control of the education system, have students who are more motivated to learn than those in rural areas. Should that be true the government could seek ways to provide greater incentives for academic achievement in rural schools. Assigning and retaining better teachers would be a good start.

4. Special guidance should be given to teachers who instruct students speaking languages different from their own. The present analysis showed that student achievement in mathematics and science rises when teachers in this situation make use of student translators to interpret what is being said. Careful observation should be made of such multilingual classrooms to learn which students become the best translators, what they do, and how student translations might be improved. Where appropriate, the resulting knowledge could be incorporated into teacher training programs.