EXPLAINING THE DIFFERENCES IN ACADEMIC ACHIEVEMENT OF STUDENTS OF FEMALE AND MALE TEACHERS IN PRIMARY SCHOOLS OF PAKISTAN

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One way schooling in Pakistan is different from that of most other countries is that separate schools are operated for male and female children. This practice usually involves the appointment of male teachers in the schools for males and female teachers in schools for females. However, a dynamic change is taking place, Pakistani society is in flux and state of change from orthodox conservatism to liberal modernism. Its influence has manifest itself in growing demand for female teachers in the primary schools of the nation. The reasons for this are apparent, firstly, need for more teachers to universalize primary education and secondly, it is argued that female teachers are more sensitive to the feelings of children, devote more time to teaching, use less physical punishment, increase children's motivation and have better learning among their students. An opposite argument emphasizes the advantage of male teachers, they have fewer attendance problems, more facilities and chances for communication with parents which could lead to more learning. But evidence to support the arguments of both sides is weak. Empirical evidence is needed to inform this debate on the effectiveness of teachers in relation to their gender.

This study is an effort to examine the differences in the effectiveness of female and male teachers teaching Science and Mathematics in the primary schools. The main indicator of the teachers performance and effectiveness is the achievement of their students. The study envisages to seek answers to the following questions:-

1. Is there any relationship between the gender of teachers and the achievement of class 4 and class 5 students in Mathematics and Science?
2. If there is such a relationship, does it hold constant when controls are added for such conditions as level of education, rural urban location, single grade vs multigrade teaching, age and salary grade?
3. Are there differences in the teaching practices of female and male teachers that can help to explain their influence in student achievement?

The data for the study comes from a national survey of primary schools in Pakistan carried out by Project BRIDGES of Harvard University in collaboration with the Academy of Educational Planning and Management of the Federal Ministry of Education in Pakistan. The survey covered 473 primary schools and over 900 teachers were interviewed to collect information on a number of questions related to primary education in Pakistan. The design made use of random sampling applied first to districts and then to schools. The interviewers visited each school,

besides interviewing the headmasters and teachers, administered 4 tests in Mathematics and Science to students of fourth and fifth classes. The tests were based on the official curriculum and were developed by the primary and Non Formal Education Wing of the Ministry of Education. Basically the teachers interviewed were those teaching fourth and fifth classes in their respective schools. Using a separate identification number for each teacher and assigning that same number to students taught Mathematics and Science by him/her, a link was established between scores obtained by students and the information provided by the teachers.

The approach adopted in this paper is to relate mean scores for each class of students tested in mathematics and science with the gender of the teachers who taught them. The average mean scores on each achievement test and the number of teachers who were responsible to teach students in the respective subject area are as follows:

Table 1: Average Achievement Scores on the 50 items tests for each subject.

Test	Number of Teachers	Averaged Mean for Teachers Students.
Math 4	495	11.7
Math 5	472	12.4
Science 4	493	13.8
Science 5	485	16.3

Source: Warwick D., F. Reimers, and N. McGinn "Teachers Characteristics and Students Achievement in Math and Science". BRIDGES, Discussion Papers, June 1989.

The first question in line with the purpose of this paper is Are the levels of achievement reflected in table 1, the same for students of female and male teachers?

Gender of the Teacher and Achievement in Science:

Mean scores of students of female and male teachers on the tests administered to 4th and 5th class students presented in table 2 illustrate the relationship between the gender of the teachers and achievement level of their students in Science.

Table 2: Relationship between Gender of the Teachers and Students. Achievement in Science 4 and Science 5.

	Sex	N	M.Ach Score	SD	Significance
S 4	F	160	13.83	5.45	
	M	243	13.96	5.58	.8115
S 5	F	162	16.23	6.31	
	M	240	16.58	6.46	.5876

We can see in table 2 that there is no relationship between the gender of the teacher and achievement of their students in science. The means of 4th class and 5th class students in relation to sex of their teachers are almost identical. There do not exist statistically significant differences in the mean scores of students of female teachers and male teachers.

Gender of the Teacher and Achievement in Mathematics:

Group means of achievement in Math for students of male and female teacher are shown in table 3.

Table 3: Relationship between Gender of Teacher and Achievement of Students in Math 4 and Math 5

	Sex	N	M.Ach. Score	Significance
M 4	F	160	9.85	
	M	242	13.05	.0000
M 5	F	125	10.42	
	M	233	13.87	.0000

Average achievement test scores in mathematics of 4th class students across the country are significantly different for those taught by female teachers and those taught by male teachers. The mean score of students of female teachers is 9.85, which is lower than what students of male teachers obtained i.e. 13.05. Similar results have been obtained with regard to achievement scores in Mathematics tests for 5th class. Students of female teachers performed much lower than students of male teachers. Averaged mean of 125 groups of students of female teachers is 10.42 in comparison to 13.87 of 233 groups taught by male teachers. These differences both in 4th and 5th class students are statistically significant.

As compared to achievement in Science, where the achievement level of students of male and female teachers does not differ significantly, marked performance gap is observed in Math 4 and Math 5 which underscores the need for further investigation. The proceedings discussion explains the role of various factors which may account for the observed differences in the efficiency of female and male teachers in Math. My purpose is to investigate whether the gender of teacher is the real factor behind the wide disparities in the achievement of students in Math 4 and Math 5, or whether there are some other factors influencing singularly or in interaction with each other the observed differences in achievement. I next examine the role of several variables related to the background of the teachers and their practices which might

influence the students performance in Mathematics. These variables are:

1. Academic background of the teachers. i.e. their maximum schooling level.
2. Professional certification of teachers.
3. Teaching Single or multigrades.
4. Absenteeism of teachers.
5. Urban-rural location of schools.
6. Age of teachers.
7. Home-school distance of teachers.
8. Marital status of teachers.
9. Basic Pay Scale of Teachers.

Influence of Gender of Teacher on Students Achievement Controlling for Academic Qualification of Teachers

The survey obtained data on the formal schooling level and professional certification of teachers. Overall 5.6 percent of the teachers had schooling up to middle school level, 63.4 percent were matriculates, 20.5 percent had higher secondary school level (Fa/FSc) of education and 10.5 percent had passed B.A or above level degree examinations.

Table 4: Mean Scores of Students of 4th and 5th class by Sex of the Teachers and their Academic Qualifications.

Class	Sex	Pr-Mid	Matric	FA/FSc	B.A & above	Total
4th	F	7.81	9.09	11.59	15.61	9.86
	N	13	108	30	10	160
	M	11.96	12.58	14.31	13.77	13.05
	N	5	160	47	28	242
5th	F	7.33	9.61	10.75	17.92	10.42
	N	8	98	34	12	152
	M	10.26	14.28	13.31	13.78	13.87
	N	10	152	45	26	233

Table 4 summarizes the relationship between gender of the teachers and achievement in mathematics when teachers level of education is held constant. Students of male teachers have higher scores than those of female teachers in mathematics tests for both classes when the education of teacher is F.A, F.Sc. or less. However among the teachers with bachelors or master degree the students of female teachers show higher scores on both tests than those of male teachers. These findings suggest that when female teachers have higher levels of education the achievement of the students is equal to and sometimes better than that of those taught by male teachers.

Influence of Gender of the Teacher on Students Achievement Controlling for the Professional Training of Teachers:

The data from the Survey show that primary school teachers in Pakistan differ widely with regard to their level of professional training. There were 9 percent teachers who had no training, while others had professional training certificates ranging from J.V. to B.Ed. Table 5 presents average achievement of students of female and male teachers for groups of teachers with different levels of professional training.

Table 5: Mean Achievement Scores of 4th and 5th Class Students in Mathematics by Sex of the Teacher and Professional Training Level.

Class	Sex		No.Training	J.V.	SV/PTC	CT & Higher	Total
4th	F	X	8.23	9.99	9.83	13.08	9.86
		N	20	13	117	10	160
	M	X	11.97	13.24	13.19	13.09	13.05
		N	28	24	175	15	242
5th	F	X	8.33	9.47	10.41	13.14	10.42
		N	17	7	111	16	152
	M	X	11.20	14.89	14.10	14.29	13.87
		N	25	22	173	13	233

We can see in table 5 that students of female teacher obtain lower scores than those of the male teachers for all categories of professional training except CT or higher. Students of

untrained female teachers obtained mean scores of 8.23 on test for 4th class and 8.33 on test for 5th class, while students of male teachers obtained 11.97 and 11.20 respectively. Similar trends are available in examination of mean scores obtained by students of trained female and trained male teachers. The performance of female teachers is relatively weaker than the performance of male teachers, when training level of teachers is J.V. and SV/PTC. Differences are smaller when the training of the teachers is C.T. and above. There is almost no difference in the achievement of 4th class and 5th class students of female and male teachers when teachers are C.T. and higher level training. We should keep in mind, however, that C.T. and above level Programmes demand higher level of general education from teachers than other professional training courses, so the strong impact of schooling analyzed earlier is probably influencing the findings for C.T. teachers. These results support that the impact of professional training on the influence of gender of teachers on students achievement is limited.

Influence of Gender of Teachers on Students Achievement Controlling for Single Grade and Multigrade Teaching:

Table 6: Mean Scores of 4th and 5th Class Students in Mathematics by gender of Teachers and Single vs Multigrade Teaching

Class	Sex	SG Teachers	MG Teachers	Total
4th	F	12.69	8.06	9.83
		60	98	158
	M	13.80	12.45	12.95
		86	150	236
5th	F	13.36	8.65	10.42
		56	93	149
	M	15.32	13.17	13.84
		82	146	228

Table 6 shows the differences in achievement of students of female and male teachers separately for single grade and multigrade teachers. Two categories of female and male teachers were formed for the purpose of the study, one category comprised of teachers teaching only one class, while the other one of teachers teaching more than one class. The results indicate that the scores on achievement tests in Mathematics were lower for those students whose teachers were teaching more than one class. The differences in mean scores are statistically significant. Both single grade and multigrade male teachers had their students achieve higher averaged scores than students of the females

teachers. The mean scores of 4th and 5th class students taught by female teachers responsible for teaching more than one class were 8.06 and 8.65 respectively, whereas 4th class students of male teachers obtained 12.45 and class 5 students obtained 13.17. Gender of the teacher and achievement of the students relates to each other independently irrespective of the number of classes a teach has to teach.

Influence of Gender of the Teacher on Students Achievement Controlling for Teachers Absenteeism:

The survey measured the absence of teachers asking them to indicate the number of days during the school year they did not attend the school for specific reasons i.e. illness, collecting salary or participating in meetings etc. The total number of absences has been used as control variable to see if it has any relation with the achievement of students taught by female or male teachers.

Table 7: Mean Scores of Students of 4th and 5th Classes in Mathematics By Sex of Teachers and Absenteeism.

Class	Sex	Less than 7 days	7 to 15 days	More than 15 days	Total
4th	F	9.50	12.24	7.01	9.51
		46	31	33	110
	M	14.07	13.30	12.97	13.39
		44	59	58	160
5th	F	10.12	10.98	9.92	10.38
		40	38	27	105
	M	13.21	13.43	14.38	13.71
		56	43	53	151

Table 7 shows that the differences in the achievement of students of female and male teachers remain essentially the same for different levels of absenteeism of the teachers. Higher rate of absenteeism by the teacher causes the achievement of students to be lower but gender effects remain persistent. Both in 4th and 5th class mean scores of students of female teachers were lower than of students of male teachers irrespective of the number of days a female or male teacher remains absent.

Influence of Gender of the Teacher on Students Achievement Controlling for Location of the School:

Is the effect of gender the same for urban and rural schools? Table 8 summarizes that information.

Table 8: Mean Scores of 4th and 5th class Students in Mathematics by Gender of the Teacher and Location of Schools

Class	Sex	Urban	Rural	Total
4th	F	14.10	7.90	9.86
		49	102	160
	M	13.05	13.19	13.05
		33	204	237
5th	F	13.95	8.72	10.42
		50	95	152
	M	14.14	13.91	13.87
		33	196	229

On the basis of scores obtained by students on tests in Mathematics, the performance of female teachers is lower than that of their male counterparts in rural schools. However, differences in the mean scores of students of male teachers and students of female teachers are negligible in urban schools. Average scores of 4th class students of female teachers in urban schools are 14.10 on test in Mathematics for 4th class as compared students of male teachers in urban schools who obtained mean score of 13.05. A different picture emerges for rural schools, students of female teachers averaged 7.90 as compared to 13.19 average of the students of male teachers. The same is observed for class 5 students, urban students of female and male teachers have similar average scores (13.95 and 14.14 respectively). A large difference is observed for rural students.

Students of female teachers obtained 8.72 average while rural students of male teachers obtained 13.91. Findings regarding the lower score of the students of rural female teachers and non significant differences in urban female and male teachers warrant further examination adding other controls. Distribution of averaged mean scores of students of female and male teachers by location of the school and educational level of teachers are presented in table 9.

Table 9: Mean Scores of 4th & 5th Class Students in Mathematics by Gender of the Teachers and Educational Level and Location of the School

	Pr - Mid		Matriculation		FA/FSc		BA & above	
Sex	U	R	U	R	U	R	U	R
Math 4								
F	11.77	6.56	12.82	7.97	15.42	8.55	15.69	-
N	3	10	22	81	15	12	10	-
M	-	11.96	13.85	12.46	13.90	14.52	11.12	14.82
N	-	5	21	136	4	42	8	20
Sig	-	.2015	.5949	.0000	.7481	.0083	.2323	-
Math 5								
F	14.27	6.22	11.67	9.06	13.74	7.66	18.57	13.41
N	1	7	20	73	18	14	11	2
M	-	10.26	14.32	14.38	10.18	13.81	17.03	12.91
N	-	10	22	127	5	39	6	21
Sig	-	.3011	.0856	.0000	.2435	.0006	.6847	.9136

Table 9 shows that the differences in the achievement of the students of female and male teachers are specially large for rural females with low levels of education (less than B.A.). Means of the students of female teachers when their education is primary or middle school level is 6.56 which is lower than the mean of 11.96 of the students of male teachers, the differences are not statistically significant. Significant differences are found in the achievement of students of matriculate female

teachers and matriculate male teachers in the rural schools. The same is true when education of teachers is FA/FSc. There are no significant differences between students of female and male teachers in rural schools for teachers with B.A. or higher level of education. Also there are no significant differences in the achievement of students of female and male teachers in urban schools for teachers with any level of education.

There were many other controls added to find out whether the relationship between gender of the teacher and the achievement of students remains the same? The analysis of data provides evidence that the relationship between the gender of teacher and students achievement in mathematics tests for 4th and 5th class remains essentially the same, when controls are added for the age of the teachers, the number of years they have been teaching, the distance of their homes from the schools and the amount of time it takes them to reach school. Under all these conditions the average scores of students taught by female teachers are consistently lower than those of students taught by male teachers.

Age of the teachers and length of their teaching experience have no direct impact on gender differences in teaching of mathematics. Although students of older and more experienced female teachers obtained higher means then the students of the young female teachers but remain significantly lower than the

students of male teachers with similar characteristics.

An added control for marital status of the teachers does not provide evidence to point out any other direction of relationship between gender of the teachers and achievement of their students. The averaged means of the students of female teachers remained lower than those of the students of male teachers.

The relationship between the gender of the teachers and the achievement of their students remains essentially the same when a control for pay scale of the teachers was added.

Are there Differences in the Teaching Practices of Male and Female Teachers:

The purpose of this section of the paper is to identify the differences in the teaching practices of female and male teachers which might contribute to the observed differences in student achievement. The survey gathered information on several issues related to classroom practices of teachers in primary schools. One measure of classroom practices is the time allocated for teaching. There is no difference between male and female teachers with regard to number of hours per week spent for teaching of mathematics, this therefore cannot explain the differences in the achievement of students of female and students of male teachers. One aspect of classroom practices that seems to influence the difference in achievement of students of female and male teachers is the amount of course coverage. On the average

female teachers in rural schools reported to have covered 17 units of the textbook in mathematics, while the male teachers reported an average of 32 units. This difference in coverage of the curriculum may account for the lower achievement of the students of female teachers. In urban schools the differences in male and female teachers with regard to coverage of the curriculum are not significant. On the average female teachers had covered 26 units as compared to an average of 28 units by male teachers. Amount of curriculum coverage is significantly related to the differences in the achievement of students of female and male teachers for rural schools.

There is no difference between male and female teachers in the practice of assigning homework to students. Both female and male teachers assign on the average 7 exercises daily.

Use of physical punishment is fairly common in teachers in rural schools. 62.3 percent of male teachers in rural schools reported that they use punishment, whereas 48.2% of female teachers in rural schools use punishment. 51.4 percent of male teachers in urban schools and 22.9 percent of female teachers report the use of punishment in their classroom teaching. The differences in percentage are statistically significant. There was, however, no significant relationship between use of punishment and student achievement.

Female teachers in rural schools are relatively younger than male teachers. The difference is statistically significant, whereas in urban schools the difference in the age of male and female teachers is not significant. Average age of rural female teachers is 30 years and of male teachers is 33 years. Although the differences in the age of teachers are significant they do not explain the relationship between gender of teachers and students achievement as the correlation between average achievement of students and age of teachers is not significant for rural teachers nor for urban teachers.

Conclusions, Interpretation and Implications for Policy and Research

The main objective of this paper was to explain the relationship between gender of the teacher and achievement of students of measured by curriculum based tests in science and mathematics for 4th and 5 class. There is no difference in the average achievement of students of female and male teachers in science. In Mathematics average scores of the students of female teachers are significantly lower, than the Scores of the students of male teachers. The relationship between gender of the teacher and students achievement in mathematics has been examined adding different controls such as academic and professional qualifications of the teachers, teaching single grade-multigrade, absences of teachers, rural urban location of schools, age, experience, marital status and pay scale of the teachers. The

observed lower achievement of students of female teachers hold for all conditions of the controls examined except academic qualifications and rural urban location of schools. Achievement of students of male and female teachers in urban schools is essentially the same, whereas students of female teachers have significantly lower achievement scores than students of male teachers in rural schools. When we examine the relationship between gender and achievement separately for different levels of education we observed most students of female teachers had lower scores then their male counterpart only when the teachers had less than B.A. For teachers with B.A. or higher levels of education there was no difference in the achievement of students of male and female teachers.

Examining the impact of gender on student achievement controlling simultaneously for urban rural location of the schools and level of education of the teachers show that the differences analyzed in the paper hold only for rural teachers with education less than B.A.

I then examined the differences in the teaching practices of male and female teachers in rural schools in an attempt to find an explanation for the differences in student achievement which are observed in rural but not in urban schools.

There is no difference in the use of blackboard, and use of

monitor between female and male rural teachers. The use of teaching kit is essentially similar in femal and male teachers.

All the rural teachers both female and male teach textbooks in sequence to the last page Rural female teachers do not differ significantly in the practice of assigning homework from the rural male teachers.

There are significant differences in the amount of course covered by female and male rural teachers. Reported coverage by female teachers is 17 units in comparison to 32 units by the male teachers.

There is a significant difference between female and male teachers with regard to use of physical punishment. Comparatively smaller number of female teachers use physical punishment than male teachers.

Female teachers are comparatively younger than the male teachers. Average age of female teachers is 30 years and of male teachers is 33 years.

In sum there are few differences in the teaching practices of rural male and female teachers and of the practices in which these groups differ only coverage of the curriculum has a significant effect in student achievement. The principal

conclusion of this paper is that there is a difference in the quality of education received by boys and girls in rural schools in Pakistan as reflected in their academic qualifications and that this gap does not exist in urban schools or in rural schools with highly educated teachers. This represents a challenge for educational policy if we want to achieve equality of educational opportunity regardless of gender for our rural population. The reasons for the observed differences in the achievement of the students of our rural male and female teachers do not seem to be associated with the teaching practices examined in this survey. With the exception of amount of the curriculum covered which is higher among male teachers than female teachers in rural schools. Instead, a promising area of explanation seems to be the general education received by male and female teachers. It is plausible that there are qualitative differences in the education received by boys and girls at the levels of higher secondary school or lower, which places the students of female teachers at a disadvantage in the field of mathematics. These differences in turn, could contribute to explain the fact that rural male teachers cover more units of the curriculum than their female counterparts. Exploring the precise nature of these differences could be a worthwhile topic to investigate in order to serve educational policy initiatives directed to improve education for all.

ENDNOTES

1. This paper was produced during the BRIDGES Training Workshop on Analysis of Survey Data which took place at the Academy of Educational Planning and Management from January 6 to February 8, 1990. The workshop was conducted by Donald Warwick and Fernando Reimers from Harvard University. Earlier drafts of this paper were discussed in the training workshop and received feedback from the instructors as well as from the participants: Ijaz Ahmad, Nawaz Ahmad, Islamuddin Baluch, M. Anwar Hussain, Syed Fazal-Qadir, Nasim Qaisrani and Ikram Qureshi. The contents of this paper are the sole responsibility of the author.

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