

**IMPACT OF MULTI GRADE AND SINGLE GRADE TEACHING
ON STUDENTS ACHIEVEMENT IN PAKISTAN**

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INTRODUCTION.

The purpose of this paper¹ is to examine the differences between single and multigrade teaching in Pakistan. The differences are examined in terms of the impact of these two modalities of teaching in the academic achievement of primary school children in Mathematic and Science.

Multi Grade Teaching is a system where a Single Teacher is teaching more than one class either in one class-room or in other class-rooms. Mostly this type of teaching is found in rural area, sparsely populated areas, where the number of students enrolled does not warrant posting of one teacher for each class. Sometimes, due to financial constraints, the posting of more teachers is not possible. Multiple class teaching may also be practiced in large schools, when a teacher is absent for one reason or other and a substitute is not available.

The role of the teacher either in Single and Multi Grade Teaching Schools is very important, as he is the principal agent of education. He should be a curriculum planner; a good administrative worker; an effective instructor and a good role

model for children.

Here in this analytical research report we are going to find out the impact of Single and Multi Grade Teaching on achievement of Math 4 and 5 Science 4 and 5.

DATA USED IN THIS PAPER.

A survey of 473 primary schools was carried out in 1989 in Pakistan's four provinces and in the federal district. This survey, conducted by Project BRIDGES and the Academy of Educational Planning and Management (AEPAM), Islamabad, included interviews with over 900 teachers and achievement tests, given to more than 11,000 students in class 4 and 5. The main purpose of that survey was judging the effectiveness of primary schools as how much learning took place among their students. Student learning was evaluated through a standardized achievement test in Mathematics and Science, developed by the World Bank and the Primary and Non-Formal Education Wing of the Federal Ministry of Education. The data used in this paper are based on that national survey. The analysis reported here is based on the 663 cases of teachers who replied that they were teaching one class or teaching more than one class for whom we had an average of student achievement in at least one class and one subject.

Out of 663 teachers, 278 (42.0%) were single grade teachers and 372 (56.1%) teachers, were teaching more than one class. 147 (22.1%) were urban teachers and 496 (74.9%) were rural teachers. 277 (41.8%) were female teachers and 386 (58.2%) were male teachers.

SECTION II

ANALYSIS OF DATA.

The main purpose of this paper is to find out the influence of Single and Multi Grade Teaching on student achievement of math and science controlling for conditions such as rural/urban and male/female.

The following table will indicate the mean of student achievement in single and multigrade teaching, in math 4, math 5, and science 4, science 5.

Table I

Achievement of students in M4, M5, S4, S5
under SGT and MGT.

	M4 Mean	M5 Mean	S4 Mean	S5 Mean
SGT	13.29 (152)	14.18 (144)	15.50 (147)	18.60 (154)
MGT	10.82 (268)	11.55 (258)	12.95 (272)	15.21 (267)
T. Pop.	11.72 (420)	12.49 (402)	13.85 (419)	16.45 (421)
Significance of the difference.	.0001	.00001	.00001	.00001

The results of table 1 show that there is a significant difference in achievement of students of Single and Multi Grade Teachers, Students of Single Grade Teachers, have higher achievement levels than students of Multi Grade Teachers.

This result can further be elaborated by adding

controls for urban/rural and male/female.

The following table will indicate the achievement level of students of Single and Multigrade teaching separately in urban/rural schools.

Table II.
Achievement of students in urban/rural schools.

	urban				rural			
	M4	M5	S4	S5	M4	M5	S4	S5
T.Pop.	13.79 (83)	14.27 (79)	16.64 (79)	19.89 (83)	11.28 (324)	12.08 (310)	13.19 (327)	15.52 (325)
SGT.	14.95 (58)	15.40 (52)	17.63 (55)	20.85 (66)	12.25 (89)	13.18 (86)	13.99 (87)	17.17 (94)
MGT.	11.03 (24)	12.09 (27)	14.39 (24)	17.89 (27)	10.91 (235)	11.51 (223)	12.89 (240)	14.85 (231)
Sig.	.019	.018	.02	.06	.07	.001	.08	.001

This table indicates that the mean student achievement of urban single grade teachers is significantly higher in the case of Math 4, Math 5, Science 4. While in the case of rural Single Grade School, the achievement of students is significantly higher in case of Math 5 and Science 5. Although achievement of students of single grade teachers is also higher than that of Multi Grade Teachers in math 4 and science 4, the differences are not statistically significant.

In all, the mean student achievement, either in urban or rural Single Grade Schools, is significantly higher than achievement in Multi Grade Teaching Schools, and when controls of

urban or rural were added they did not influence the differences observed in Table-I.

If the control of male/female is added will the results be the same ?

The following table will show the mean student achievement, in M4, M5, S4, and S5, in Single and Multi Grade Teaching, separately for male and female teachers.

Table III

Achievement of students in science and math in Single and Multigrade teachings for male and female teachers.

	Female				Male			
	M4	M5	S4	S5	M4	M5	S4	S5
T.Pop.	9.99 (166)	10.42 (136)	13.85 (165)	16.26 (169)	12.84 (254)	13.82 (245)	13.84 (254)	16.58 (252)
SGT	12.73 (61)	13.19 (58)	16.81 (58)	19.38 (62)	13.67 (91)	14.85 (86)	14.65 (81)	18.07 (92)
MGT.	8.39 (104)	8.77 (98)	12.23 (107)	14.43 (106)	12.37 (163)	13.26 (160)	13.41 (165)	15.72 (160)
Sign.	.00001	.00001	.00001	.00001	,09	,017	.086	.0044

It can be seen from table III that there is a highly significant difference between the Single and Multi Grade Teaching achievement, even if the control of gender of the teacher is added. The mean student achievement of Single Grade Teaching is significantly higher.

In all , the mean student achievement is significantly higher in Single Grade Teaching schools both for female and male teachers.

SUMMARY.

1. There is a significant difference between achievement of students taught by Single and Multi Grade Teachers.

2. This significant difference between Single and Multi Grade Teachings holds even if for controls by urban/rural are added and for male and female teachers.

SECTION III

DIFFERENCE IN TEACHING PRACTICES OF SINGLE
GRADE AND MULTIGRADE TEACHING TEACHERS.

The analysis in section II showed that there is a significant difference in the mean student achievement in Single and Multi Grade Schools. The mean student achievement of Single Grade Schools is significantly higher than Multi grade Schools, even if controls for urban/rural and male/female are added.

The critical question is why is the mean student achievement of Single Grade Teaching significantly higher?

Some variables of class practices are examined here in Single and Multigrade schools in an attempt to explain the observed difference in effectiveness.

1.TASK ASSIGNMENT TO GROUPS.

How do teachers with more than one class manage instruction for children whom they are not teaching? Most 82.1% of Multi Grade Teachers and 31.3 % Single Grade Teachers assign tasks to groups,when they are not teaching them. This difference is statistically significant (.00001). The Single Grade Teacher devotes more time in instructions to students rather to assign work to students.

2.USE OF MONITOR.

55.6% of the Single Grade Teacher and 74.1% of the Multigrade Teachers use monitors to supervise the group of students, who are not being taught at that time. This difference is statistically significant (.00001). This again shows that the Single Grade Teachers devote more time in instructions to students instead of deputing monitors to teach students.

3.HOURS OF MONITORS TO SUPERVISE THE STUDENTS.

Single Grade Teachers use monitors an average of 3.0 hours per week and Multi Grade Teachers an average of 5.9 hours per week. This difference is statistically significant (.00001) between the Single and Multi Grade Teachers. It shows that the Single Grade Teacher spends more time in teaching while the Multi Grade Teacher, keep his students under the supervision of monitor about 6 hours a week.

4.NUMBER OF PERIODS,EXERCISES AND TEACHING TIME IN A WEEK DEVOTED TO MATH AND SCIENCE.

In the case of mathematics there is no significant difference between the Single Grade Teachers and Multi Grade Teachers regarding the No of periods (T.Pop: 7.1 periods), No of exercises (T.Pop:23.3 exercises) and teaching time (in minutes) (T.Pop:301.1 minutes per week), while there is a significant difference in the case of Science. The Single Grade Teachers take 5.2 periods and Multi Grade Teachers 6.0 periods per week in science . The Multi Grade Teachers are taking more periods per

week, in science, and this is a significant difference between Single Grade Teachers and Multi Grade Teachers.

The Multi Grade Teachers spend 217.0 minutes on average and Single Grade Teachers 196.2 minutes per week in science teaching, as such here the Multi Grade Teachers spend more time in science-teaching and this is a significant difference between Single Grade Teaching and Multi Grade Teaching.

5. HOME WORK.

No significant difference between Single and Multi Grade Teachings is found in assigning home work to students. 99.5% of total population assign home work to students.

There is a marginal difference (.0820) between Single and Multi Grade Teaching in case of number of days in a week for home work. Mostly, in our total population of cases, teachers give 5.3 days in a week for the home work.

No significant difference is found between Single and Multi Grade Teaching in whether the home work is read by teacher or by someone else. 96.7% of the teachers in our sample read the home work of the students and 85% teachers said no one else reads the home work.

There is also no significant difference between Single and Multi Grade Teaching in discussion on home work and time devoted to discussion. Teachers spend on average 38.8 minutes in a day for discussion on home work.

6. PHYSICAL PUNISHMENT.

There is no significant difference between the Single and Multi Grade Teachers in use of physical punishment to students. 51.89 of the teachers use physical punishment to the students.

7.LESSON PLANS.

92.2% of the Single Grade Teacher and 85.5% of the Multi Grade Teachers make lesson plans, there is a statistical significant difference (.012) between these two modalities.

SUMMARY.

This analysis showed that there is a significant difference between Single and Multi Grade Teaching Schools in cases of classroom practices regarding:-

1. Task assignment to groups.
2. Use of monitors .
3. Time of monitor.
4. Lesson plan.

There is no significant difference between Single and Multi Grade Teaching Schools in the following classroom practices.

1. Home work given.
2. No. of days in a week of home work.
3. Home work read by teacher.
4. Home work read by some one else.
5. Home work discussion.

6. Time on home work discussion.
7. Physical punishment.
8. No. of periods.
9. Minutes per week.

In our total population of cases , the Single Grade teachers assign less tasks to group; use monitor less and monitors spent less time to supervise the students. They prepare lesson plans. The Multi Grade Teachers take more periods and take more time (in minutes) in the teaching of Science, compared the Single Grade Teachers.

There is no statistical significant difference between the Single and Multi Grade Teachings in the case of homework activities (listed above) and physical punishment to the students.

SECTION IV

RELATION OF SCHOOL PRACTICES IN WHICH SINGLE AND MULTIGRADE
TEACHINGS DIFFER WITH ACHIEVEMENT OF MATH AND SCIENCE.

We have found significant difference between the mean student achievement of Single Grade Schools, and Multi Grade Schools, inspite of adding the controls of urban/rural and male/female . While examining the school practices we have found some significant differences between the Single and Multi Grade Teachers. The purpose of this section is to establish whether these variables have any relationship with the achievement of students in math 4 and 5, science 4 and 5.

TASK ASSIGNMENT TO GROUP.

The teachers were asked a question about the assignment of task to group, 31.3% of Single Grade Teachers and 82.1% of Multi Grade Teachers assign tasks to groups. The significance of the difference is .00001.

The difference in the mean student achievement in M5 , S4 S5 is not significant while in case of math 4, it is highly significant .018.

The assignment of tasks to groups has no relation with achievement except in M4. So we can say that assignment of tasks affects the achievement of students in M4.

USE OF MONITOR.

When teachers were asked whether they use monitors when they are not teaching. It was found that 55.6% Single Grade Teachers, and 74.1% Multi Grade Teachers use monitors in classes to look after the children. Thus there is a significant difference between Single and Multi Grade Teachers with regard to the use of monitors. But there is no significant effect of use of the monitors with the achievement of students, in Math and Science.

HOURS OF MONITORS.

The teachers were asked, about the amount of time they use the monitors to look after the children.

The Single Grade Teachers used monitor for about 3 hours a week while Multi Grade Teachers 5.9 hours use the monitors for supervision of students, and there is a significant difference between Single and Multi Grade Teachers about the use of monitors.

The number of hours a monitor is used, is significantly negatively related to achievement in S4 and S5. The correlation is significant at the .01 level.

In the case of M4, M5 the correlation of number of hours is negative but not significant.

This shows that as the number of hours of using monitors increases the mean achievement decreases in the case of science 4 and science 5.

LESSON PLANS.

The teachers were asked whether they make any lesson plan, 92.2% of the Single Grade Teachers and 85.5% of the Multi Grade Teachers 85.5% replied 'yes'. There was a significant difference (.012) between Single and Multi Grade Teachers regarding the use of monitors. The mean student achievement in Math or Science is not significantly different between the schools where lesson plans are prepared or not. The lesson plan has no relation with student achievement either in math or science.

Summary of Findings:

1. There is a highly significant difference in M4, M5, S4, S5, between Single and Multi Grade Teachings. Students of Single Grade Teachers have higher achievement scores than students of Multi Grade Teachers. This is true even if we examine the effect of Single Grade Teachers separately for urban and rural and for female and male teachers.

2. When we examined the differences in the teaching practices of Single and Multi Grade Teachings, we found that on average :-

- i. Single grade teachers assign less tasks to group.
 - ii. Single grade teachers use the monitors less.
 - iii. Single grade teachers use monitors 3 hours a week and Multi grade teacher use monitor 5.9 hours a week.
 - iv. Proportionately more Single grade teachers prepare lesson plans.
5. There is low and no significant difference between the Single and Multi Grade Teachers regarding the following school practices i.e. home work practices; physical punishment; No. of periods and exercises in math and science and minutes per week spent by teacher teaching math or science.

We then examined the impact of the Teaching Practices in which Single and Multi Grade Teachers differs on student achievement to establish which ones helped the difference in

student achievement between Single and Multi Grade Teachings.

The following Table summarizes the differences in class practices between Single and Multi Grade Teaching and the relationship of these class practices with student achievement in math and science.

Variables.	SGT	MGT	Sig.	M4	M5	S4	S5
Task plan.	No.68.7%	17.9%	.00001	13.4	11.5	14.5	15.8
	Yes.31.3%	82.1%	.00001	11.0	11.8	13.3	15.3
			Sig.-----	.018	.757	.163	.590
Use of Monit:	No. 44.4%	25.9%	.00001	12.3	13.0	14.0	16.8
	Yes.55.6%	74.1%	.00001	11.5	12.2	13.7	16.2
			Sig.-----	.219	.191	.625	.364
Lesson plan.	No. 7.8%	14.5%	.012	12.8	11.6	13.8	16.2
	Yes. 92.2%	85.5%	.008	11.6	12.6	13.8	16.5
			Sig.-----	.178	.195	.970	.735
Hours of monit.	Hours 3.	5.9	.00001	Correlation.			
				-.08	-.03	-.156*	-.161*

Significant Correlation: * - .01

- 1 The assignment of tasks to groups has no relation with the achievement of students in M5, S4, S5, but has a negative impact on M4.
2. There is no significant impact between the use of monitors with achievement of students in M4, M5, S4 and S5.
3. The hours monitor used in class has relation with achievement of students. As the number of hours increases the achievement diminishes.
4. The use of lesson plans has no relation with the

achievement of students in math or science.

CONCLUSION.

After an extensive analysis of limited available data, we conclude that the teaching practices of the Single and Multigrade Teachers are the same except the Task assignment to groups; Use of monitors; Hours of monitors; and Lesson plan. Out of these four variables of class practices, the Task assignment and hours of monitor have relation with the mean student achievement in math and science.

The Single Grade Teachers spend more time with his students by assigning less tasks to them, and use monitors only 30 minutes per day (3 hours a week), which shows that the Single Grade teachers have more time for instruction to students. Obviously if a teacher has a more time for instruction or remains more time with his students he will teach them more, which is supported by our data showing that the assignment of task and hours of monitor (with students) critically affect -negatively- the results of math and science.

Compared to instruction for pupils in a single grade, the pupils in multigrade schools receive less direct teaching from teacher but remain engaged in other activities.

If a teacher is trained to teach in a single grade schools, how can we expect better results from him while teaching multigrade schools.

There may be many other reasons which distinguish the single and multigrade teachers from each other, as this

analytical paper is limited we cannot give the whole reasons which are an obstacle in the way of better achievement by multigrade schools.

IMPLICATIONS.

1. Since the class practices of teachers of Single and Multigrade teachers are the same but the achievement of their students is different, this requires some specific change in the teaching system.
2. The teachers teaching multigrade schools, should be given a separate training for teaching in multigrade schools.
3. The curriculum of multigrade schools should be kept same as of single grade schools, otherwise it may create problem for students approaching to secondary schools.
4. This paper has indicated two variables from class practices which are possible reasons for low achievement of students of multigrade schools. These two reasons are related to time of instructions by teacher, as such question is of TIME OF INSTRUCTION, again leads us to arrange a separate training program for multigrade teachers, because posting of more teacher will create financial problem for the country.
5. If a separate training program for multigrade teachers is impossible than some literature should be developed and provided to the multigrade teachers.

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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