VOLUME 1: SECONDARY ANALYSIS OF THE EXAMINATION RESULTS OF GRADE 5 AND 8 STUDENTS IN 2008

PUNJAB EXAMINATIONS COMMISSION

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EXECUTIVE SUMMARY

This report presents a secondary analysis of the data arising from the examinations for grades 5 and 8 in the Punjab. The report is mainly concerned with a comparison of mean levels of student performance between districts, between tehsils within districts, and between union councils within tehsils and within districts. The secondary analysis complements the primary analysis of the 2008 Grade 5 and 8 examinations which assessed candidate performance and calibrated curriculum competencies according to level of difficulty.

The 2008 Grade 5 and 8 examinations were conducted by the Punjab Examinations Commission (PEC) with administrative and logistical support provided by the Ministry of Education of the Government of the Punjab, and with financial and technical assistance provided by UNICEF. The examinations had a candidature of approximately 1.2 million students for grade 5 and 800,000 students for grade 8. The students were from public and private schools and they sat for the following six subjects: Urdu, English, Islamiyat, Mathematics, Science and Social Science. The examination process was based upon the twin foundations of the SOLO (Structure of Learning Outcomes) taxonomy and the RASCH statistical model.

The major findings of the secondary analysis were:

1. For grade 5 and 8 there were major differences between districts in mean levels of student performance. For grade 5 Lodhran, D G Khan and Muzaffargarh performed exceptionally well while Okara, Attock and Gujrat were among the districts that performed poorly. While for grade 8 again Lodhran, D G Khan and Muzaffargarh did exceptionally well and Okara, Attock and Gujrat were again among the districts that performed poorly.

2. For grade 5 and 8 student performance within districts, tehsils and union councils exhibited large variances. Thus, there were tehsils in high performing districts such as D. G. Khan that performed at low levels, and tehsils in low performing districts like Rawalapindi that performed at a very high level. That diversity was also evident in the distribution of performance levels by union councils within districts.

3. In general, for grade 5 and 8, private schools performed at a higher level than public schools though that was not the case in every district. For grade 5 public school students in Lahore, Gujranwala and Shiekhupura did better than those in private schools. While for grade 8 public school students in Lahore, Gujranwala and Rawalpindi did better than those in private schools.

4. In most districts for grade 5 and 8, and for the Punjab as a whole, schools with only female students performed better than male only schools.

5. Assessed across all subjects grade 5 students attending mosque schools did better than those attending primary, middle, high and higher secondary schools, while for grade 8 students attending middle school did better than those attending high and higher secondary schools.

6. In most districts grade 5 and 8 students attending schools located in urban areas did better than those attending schools in rural areas. However, there were some exceptions where rural

candidates did better than those in urban areas. For grade 5, the major exceptions were DG Khan and Rahimyar Khan, and for grade 8 they were Attock and Mandi Bahauddin.

7. For grade 5, and for male only and female only schools, performance was higher where the medium of instruction is English.

8. In many districts for grade 5 and 8 students there was evidence of an interaction between school type, level, gender, location and medium of instruction; that is, the individual effect of each of these factors on learning performance was moderated by the effects of other factors.

9. For grade 5 and 8 there is limited evidence that school rehabilitation promotes higher levels of learning achievement. However, these effects vary substantially between districts, school type, level and location. Hence, the effect of school rehabilitation on learning achievement is not yet clear. When the analysis is confined simply to the effect of school rehabilitation the efficacy of that investment remains obscure. Primarily, this is because such an analysis ignores the interaction of school rehabilitation with other factors, especially those relating to the socio-economic context of schools. In this regard, it would be helpful if PMIU, DSD and PEC were to coordinate the development of education management information systems (EMIS) that capture and keep current the range of data needed for monitoring and evaluation studies that facilitate evidence-based, comprehensive policy and planning processes. These databases need to be coordinated because each offers a crucial perspective on education development: PMIU's database already holds statistical data concerning schools, teachers and students in the public sector (this database should be enhanced to include relevant socio-economic data); DSD is planning to develop a database covering all teachers in the public sector in terms of qualifications, experience and in-service training; PEC is building up an extensive database covering learning achievement in the public sector and in many private schools. If these databases were to be coordinated they would provide an invaluable resource for both operational management of schools and policy and planning.

10. For grade 5 students classroom and teacher ratios were significant predictors of learning achievement. The relationship between school mean score and student and teacher classroom ratios was negative; that is, the higher the student classroom and teacher ratios the lower the school mean score.

11. Additionally, five variables were used in a multiple regression analysis linking learning achievement at district level with socio-economic factors. The outcome was that the only significant predictor was female net enrolment ratio; the greater the female net enrolment ratio, the lower the district mean score, presumably because higher enrolment ratios lead to over-crowded classrooms which reduce levels of learning.

12. For grade 8, student classroom ratio but not student teacher ratio was a significant predictor of learning achievement. However, the relationship was positive indicating that the higher the student classroom ratio the higher the level of learning achievement. However, when separate analyses are done for urban and rural schools it emerges that this positive relationship applies only to urban schools; in rural schools the relationship was negative.

13. At district level the only significant socio-economic predictor of learning achievement was

district literacy, but the association was negative; that is, higher levels of literacy were associated with lower levels of learning achievement. This is an unexpected outcome and is in conflict with a substantial body of research in developing countries the burden of which is that adult literacy is positively associated with learning achievement in both primary and middle school. This outcome raises serious questions about the validity of the literacy levels reported by the Pakistan Integrated Household Surveys. Given that these surveys depend upon reporting of adult literacy levels by heads of household and not on empirically measured levels of literacy it is suggested that little credence can be placed on the finding of a negative relationship between literacy and learning achievement in the present case.

14. It should be emphasised that the associations found at school and district level, and for both grade levels, in these regression studies accounted for only a minor proportion of variance in student mean scores. This implies that there are other factors which were not taken into account in these regression analyses that exert more powerful influences on learning achievement.

The following major recommendations were offered:

I. A secondary analysis be undertaken in 2009 of the examination results of that year and then a trends over time and contrasts over grouping factors such as districts and school type be undertaken covering the period 2006 to 2009. These kinds of analysis are necessary to optimise the efficacy of the investment required to improve primary education in the Punjab.

II. The Ministry of Education instruct DSD, PMIU and PEC to implement a teacher competency survey that covers both pedagogical and subject content knowledge and skills and to relate the findings of that survey to the PEC examination results so as to provide evidence regarding the effect of teacher competency on student learning achievement. The findings of such a survey and the subsequent analyses involving teacher competence and student learning achievement would inform policy development in respect of teacher pre- and in-service training, curriculum development, text book writing and, ultimately, classroom teaching and learning practices.

III. PEC undertake field-based, qualitative studies to uncover reasons for the wide diversity of learning outcomes across and within districts.

IV. PEC, DSD and PMIU collaborate to provide district level workshops to explain and interpret district level findings of the secondary analysis with a view to identifying those schools, union councils and tehsils which are most in need of urgent intervention to improve education quality in primary and middle school.

V. PMIU, DSD and PEC collaborate to develop coordinated EMIS databases within each agency that can be used to facilitate operational management of a large, complex and widely dispersed school system and to provide for comprehensive, evidence-based education policy and planning.

SECTION 1: INTRODUCTION

Purpose

The main objective of this report is to present a secondary analysis of the data arising from the 2008 Grade 5 and 8 examinations. The report compares mean levels of student performance between districts, between tehsils within districts, and between union councils within tehsils and within districts. Additionally, the report presents taxonomies of districts, tehsils, union councils and schools according to categories of student learning performance ranging from "exceptional" to "below average". The report also presents the findings of multiple regression analyses linking school and district performance to system factors, such as student teacher ratio, and socio-economic variables.

Background

In 2006 for the first time grade 5 examinations were conducted by the then newly established Punjab Examinations Commission (PEC) with administrative and logistical support provided by the Ministry of Education of the Government of the Punjab, and with financial and technical assistance provided by UNICEF.

In 2007 PEC again held examinations for grade 5 students and for the first time for grade 8 students. In 2008, as previously mentioned, PEC again held examinations for students in grade 5 and 8 and is expected to do so in following years.

Since 2006 the examinations conducted by PEC covered the following six subjects: Urdu, English, Islamiyat, Mathematics, Science and Social Science. The examinations conducted by PEC implement a methodology based upon the twin foundations of the SOLO (Structure of Learning Outcomes) taxonomy and the RASCH statistical model. SOLO is a cognitive framework that can be used to interpret curriculum objectives in the form of hierarchically organised examination questions, and to interpret student responses. SOLO was used to design the examination papers and answer keys for all papers.

The RASCH model is a statistical process that enables researchers to transform students' raw scores on examinations which are expressed on an ordinal scale into interval level scores. The transformed scores are then used in multiple regression studies that build causal models of students' performance. Moreover, the RASCH model allows researchers to estimate levels of difficulty for curriculum competencies.

This methodology enables examinations to be used not only as a gate keeping mechanism for determining who should be promoted to the next grade but, also, to identify what each student knows, understands and can do in direct relation to the curriculum.

The 2008 examinations had a candidature of approximately 1.2 million grade 5 and 800,000 grade 8 students in all 35 districts of the Punjab. Candidates were submitted by both public and private schools.

The primary analysis of the examination results focussed on individual student performance and the calibration of curriculum competencies. The focus of the present secondary analysis shifts from students and curriculum to district, tehsil, union council and school level performance. As such, the secondary analysis is mainly directed at policy analysts in central office and education planners at both central office and district levels.

Methodological Issues

Before presenting the secondary analysis it is important to draw attention to two methodological issues.

The first is that the examination data provide only an internal frame of reference, or standard, to assess performance. This is because the examination papers were set to reflect the school curriculum of the Punjab, and the only candidates were those drawn from schools in the Punjab. Consequently, all comparisons apply only internally to students and schools in the Punjab. In the analysis, if a school's level of performance, or that of a district, is said to be "exceptional" that judgement refers only internally to the Punjab. It may be that students or schools assessed in this analysis to have performed at an "exceptional" level would also have been deemed to be "exceptional" if their performance had been compared with Grade 5 and 8 students in other provinces of Pakistan or in other countries, but that kind of external comparison cannot be made from the data of the 2008 Grade 5 and 8 examinations in the Punjab.

The second methodological issue refers to the large number of students and schools participating in the examinations. When comparisons of mean scores are made between districts where there are hundreds of thousands of students small differences in district means can be significantly different when testing at an α level of .05 or .01, which is international standard practice in education studies. This should be borne in mind when considering mean score comparisons illustrated in the tables and figures presented in later sections of this report.

With this in mind, supplementary analyses have been carried out that use a statistical parameter known as "effect size" to assess district, tehsil, union council and school performance. The results of this analysis are given in the Volume 2 for grade 5 and Volume 3 for grade 8 students.

Organisation of the Report

This report is organised in six sections. The present introduction is Section 1. Section 2 provides an analysis of comparison of mean scores by districts, tehsils and union councils. It also provides analyses of mean scores according to school type (public and private), school level (high, middle, primary and mosque), school gender (male only, female only), school location (urban and rural), and medium of instruction (Urdu and English). Section 3 provides taxonomies of districts, tehsils, union councils and schools according to levels of student performance. Section 4 presents an analysis of the effect of school rehabilitation on mean levels of performance. Section 5 gives the results of multiple regression studies that link school and district performance to system (student teacher ratios, student classroom ratios) and socio-economic factors (district literacy rate, district male net enrolment ratio, district female enrolment ratio and prevalence of under-weight five year olds were used as proxies). Section 6 provides a summary of the findings and several recommendations.

SECTION 2: MEAN SCORE COMPARISONS OF PERFORMANCE

Comparison of District Mean Scores

Figure 1 shows district mean scores by subject. The mean scores have been computed taking into account all schools in each district; that is, the mean scores refer to all schools whether public or private, English or Urdu medium, boys only, girls only, urban and rural, primary, middle, high and mosque.

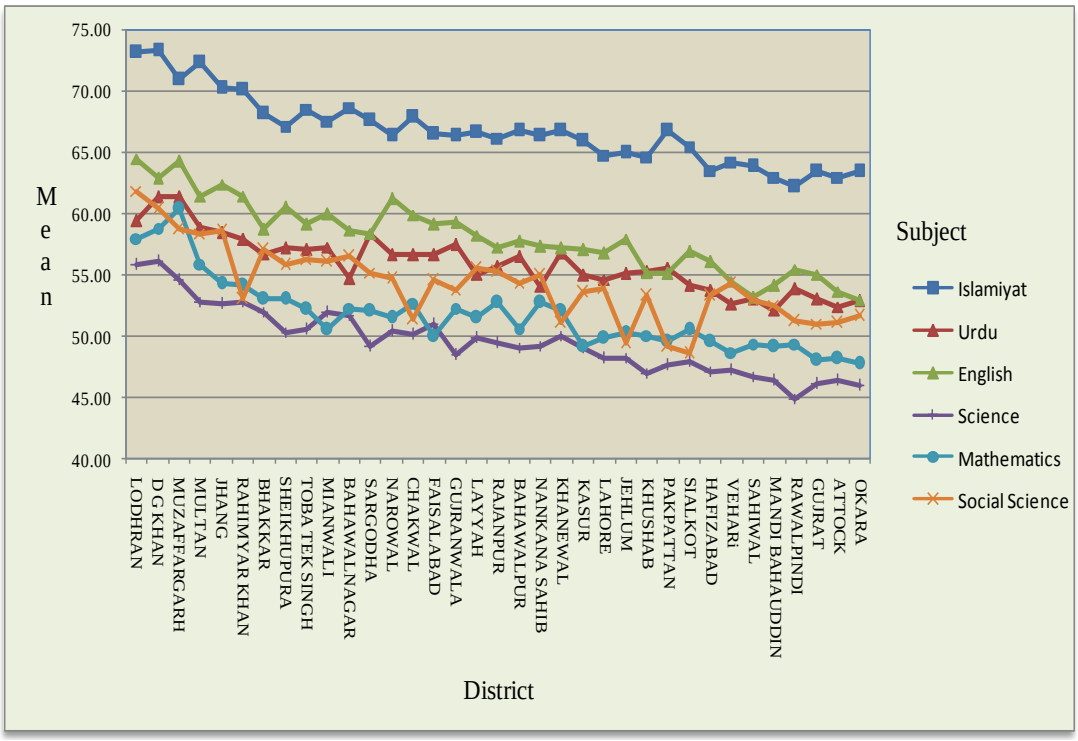

Figure 1: District Mean Scores for Grade 5 by Subject

Figure 1 has been arranged with districts listed from left to right in order of performance with the best performing district on the left and the worst performing district on the right of the graph. In determining overall levels of performance mean scores have been computed taking all subjects into account, however, separate subject profiles are shown on Figure 1.

The most striking characteristic of Figure 1 is the high degree of parallelism between subject profiles; that is, if district mean performance in one subject is high then it is likely to be high in all other subjects. Similarly, if a district's mean score in one subject is low then it is very likely to be low in all other subjects. This perception of parallelism is supported by a correlation analysis which reveals that district mean scores by subject are significantly, positively correlated ($p<.01$). It is also noteworthy that across all districts student performance was substantially better in the Islamiyat, and substantially worse in Science.

Figure 1(a) presents the same analysis by district for grade 8 students.

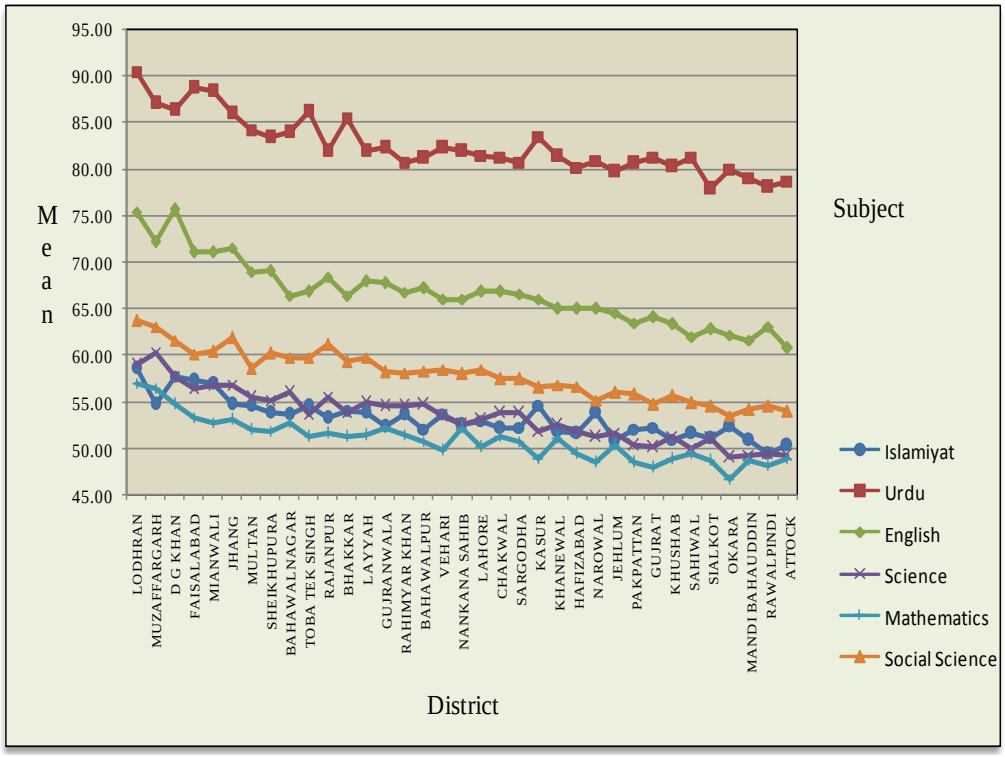

Figure 1(a): District Mean Scores for Grade 8 by Subject

As was the case for the grade 5 examinations, there is a high degree of parallelism between subjects across districts for grade 8 students. However, it is noteworthy that in contrast to grade 5, students in grade 8 performed poorly in the Islamiyat and at the highest level in Urdu. It is also important that the two best subjects were Urdu and English, language subjects that are often seen as the foundations of school education. Moreover, if the subject profiles shown in Figures 1 and 1(a) are compared it is evident that there has been a very substantial improvement in language learning achievement between grade 5 and 8, assuming, of course, that the language papers at each grade level adequately sampled across curriculum difficulty distributions in each grade level.

It is concerning that the lowest level of performance was in mathematics but this is consistent with student performance in mathematics at grade 5. This should not be surprising because, to a very large extent, mathematical concepts are hierarchical and, hence, performance in grade 8 is heavily dependent upon performance in grade 5.

There is also a remarkable consistency between the grade 5 and 8 results across districts. For example, two of the best performing districts for grade 5 were Lodhran and D G Khan, and two of the worst performing districts were Attock and Rawalpindi. That was also the case for grade 8.

Comparison of Public and Private School Mean Performance

As mentioned above, this analysis does not distinguish between public and private schools in terms of levels of student performance. This is explored in Figure 2 which presents district mean scores taken across all subjects by school type.

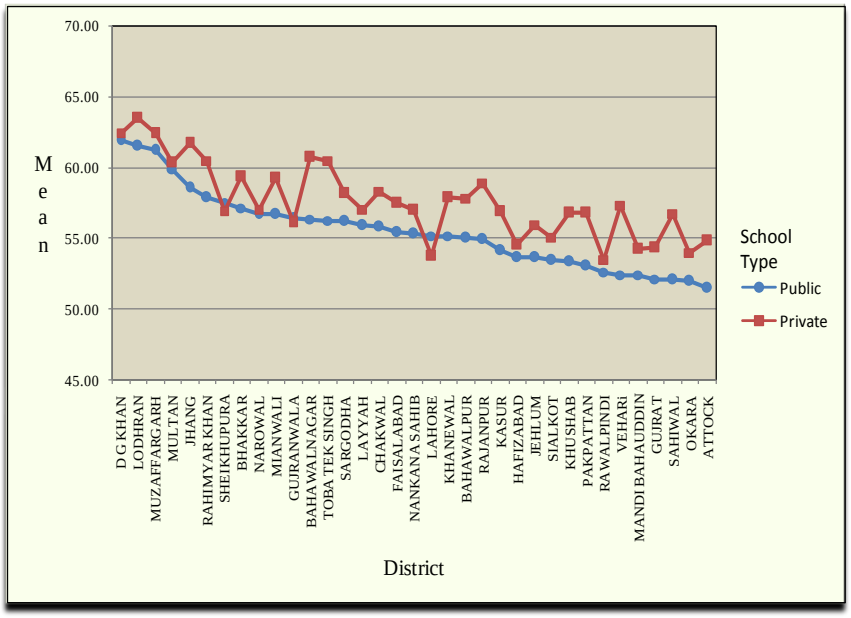

Figure 2: District Mean Scores across all Subjects for Grade 5 by School Type

It is evident from Figure 2 that, in general, private school students did better than those in public schools. However, the magnitude of the difference varies from district to district; indeed, public school students did marginally better than those in private schools in Lahore, Gujranwala and Shiekhupura. In a few districts like Bahawalnagar, Bahawalpur, Toba Tek Singh, Vehari and Sahiwal the difference in performance in favour of private school students is very substantial.

Figure 2(a) shows the distribution of district mean scores for grade 8 by school type.

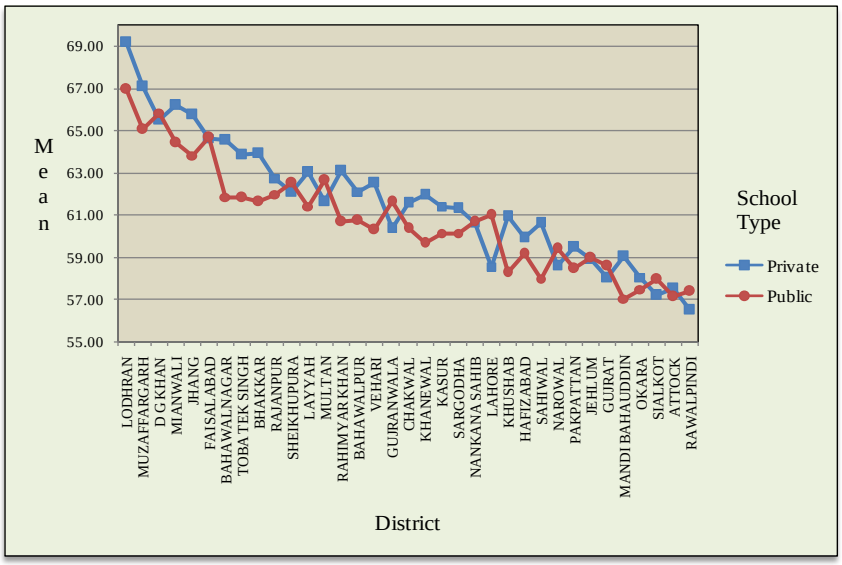

Figure 2(a): District Mean Scores across all Subjects for Grade 8 by School Type

Again it is evident from Figure 2(a) that for grade 8 private school students did better than those in public schools in most districts. In Lodhran, Bhakkar, Layyah, Rahimyar Khan, Vehari, Chakwal, Khushab, Sahiwal and Mandi Bahauddin private school students had substantially higher mean

scores than those in public schools. Conversely, in Lahore, Gujranwala and Rawalpindi public school students did better than those in private schools. In general, the magnitude of the difference in performance in favour of private school students was greatest in the best performing districts and least in the lowest performing districts.

Comparison of Mean Performance by School Gender

Figures 3 and 3(a) show district mean scores taken across all subjects by school gender for grade 5 and 8 students, respectively.

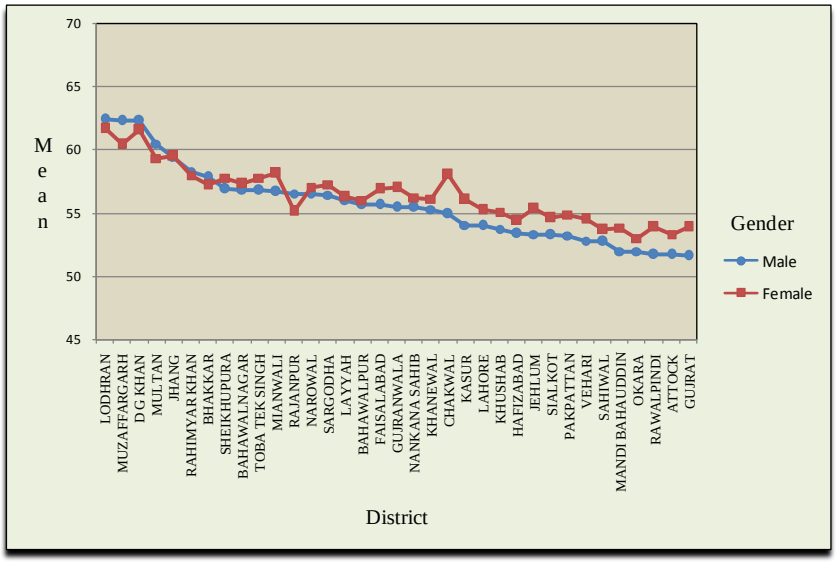

Figure 3: District Mean Scores for all Subjects for Grade 5 by Gender

It is clear from Figure 3 that in all but six districts female students have done better than male. The exceptions are Lodhran, Muzaffargarh, D G Khan, Multan, Bhakkar and Rajanpur. It is notable that these districts are among the best performing in the Province. However, the differences though significant because of the large sample sizes are, in substantive terms, quite small.

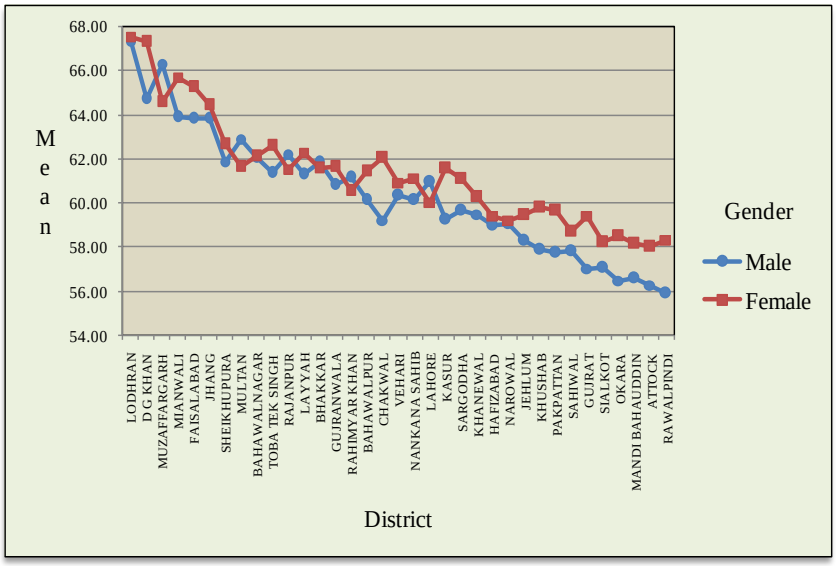

Figure 3(a): District Mean Scores for all Subjects for Grade 8 by Gender

An inspection of Figure 3(a) reveals that for grade 8 students female performance exceeds that of the males in 26 of the 35 districts. It is notable that, in general, the gap in performance is least in the best performing districts and greatest in the worst performing districts. This is similar to the pattern observed for grade 5 students.

The preceding analyses, whether Punjab or district based, have focussed on just one grouping factor such as school type or school gender. Although these analyses have shown that, for example, private schools performed better than public schools and girl only schools performed better than boy only schools, it is not known whether the superior performance of female only schools applies both to the public and private sectors. To explore this interactive effect of school gender and school type it is necessary to examine Figures 4 and 4(a) for grade 5 and 8 students, respectively.

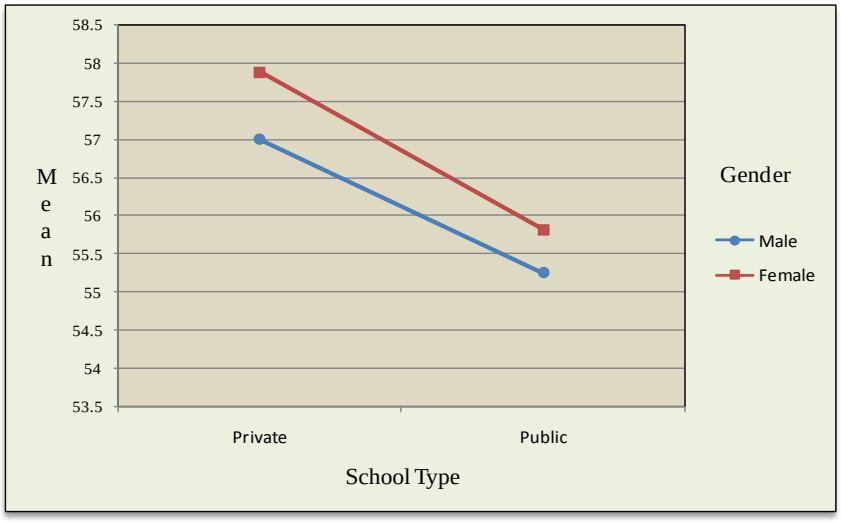

Figure 4: Punjab Mean Scores across all Subjects for Grade 5 by School Type and Gender

Figure 4 reveals that for grade 5 students there was no interaction of school type and gender; that is, female students performed better than males in both public and private schools.

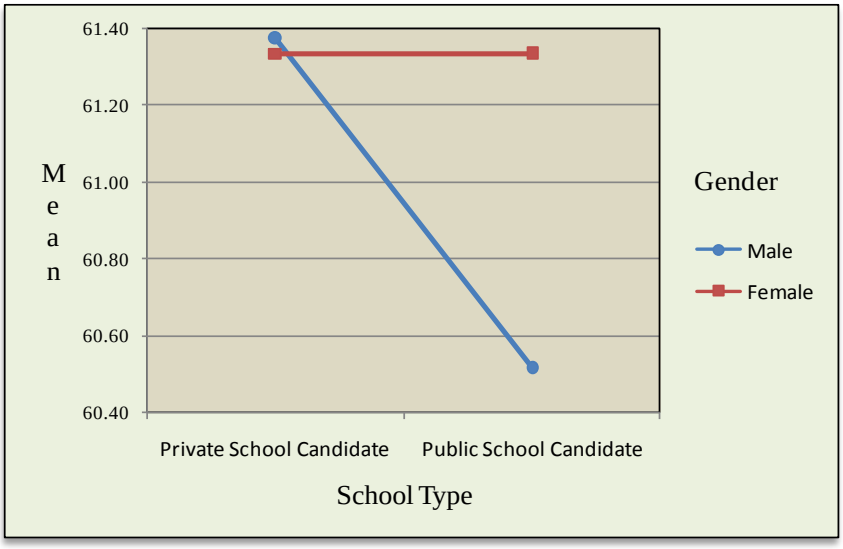

Figure 4(a): Punjab Mean Scores across all Subjects for Grade 8 by School Type and Gender

This, however, was not the case for grade 8 students. Whilst there was no difference between public and private schools in terms of female performance there was a marked difference in favour of private schools for grade 8 male students.

Effect of Language of Instruction on Student Performance

In most schools in the Punjab the language of instruction is Urdu, however, there are both public and private schools where the language of instruction is English. Figures 5 and 5(a) illustrate the effect of language of instruction and school type on levels of performance assessed across all subjects grouped together for grade 5 and 8 students, respectively.

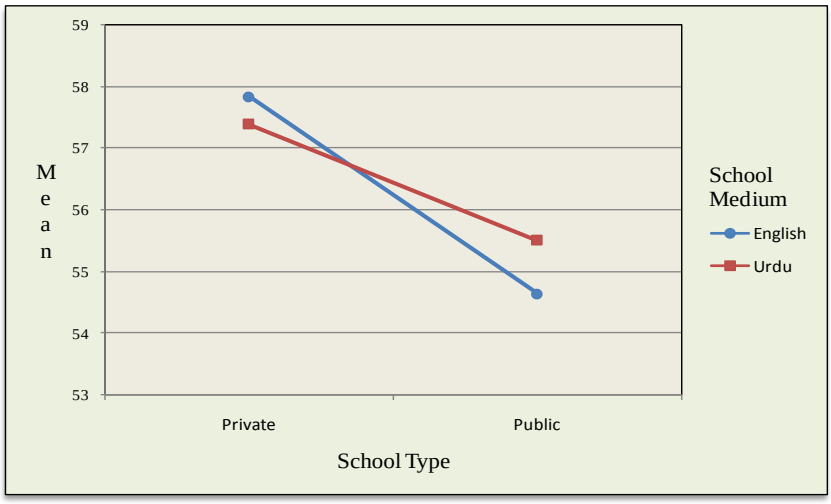

Figure 5: Punjab Mean Scores across all Subjects for Grade 5 by School Type and School Medium

Figure 5 indicates that there is an interaction between school type and medium of instruction for grade 5 students; that is, private schools students whose language of instruction is English do better than those whose language of instruction is Urdu, but the converse is true of students attending public schools.

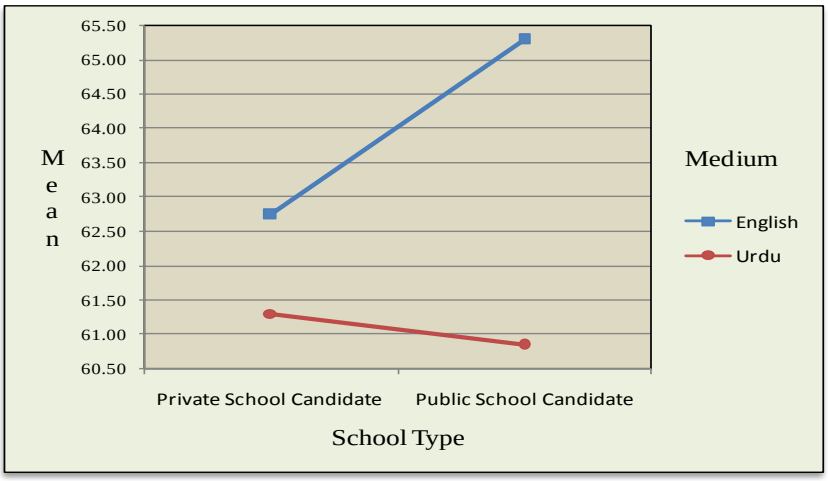

Figure 5(a): Punjab Mean Scores across all Subjects for Grade 8 by School Type and School Medium

,It is clear from Figure 5(a) that the pattern is very different for grade 8 students. In this case

students whose language of instruction is English do better than those who language of instruction is Urdu for both public and private schools and that difference is greatly amplified for public school students.

Comparison of Urban and Rural Schools

It is often the case in developing countries that schools located in urban areas perform at a higher level than those located in rural areas. Figures 6 and 6(a) illustrate that this is also the case for the Punjab for grade 5 and 8 students. Moreover, this difference is evident across all subjects, but for both grade levels the differences are minor.

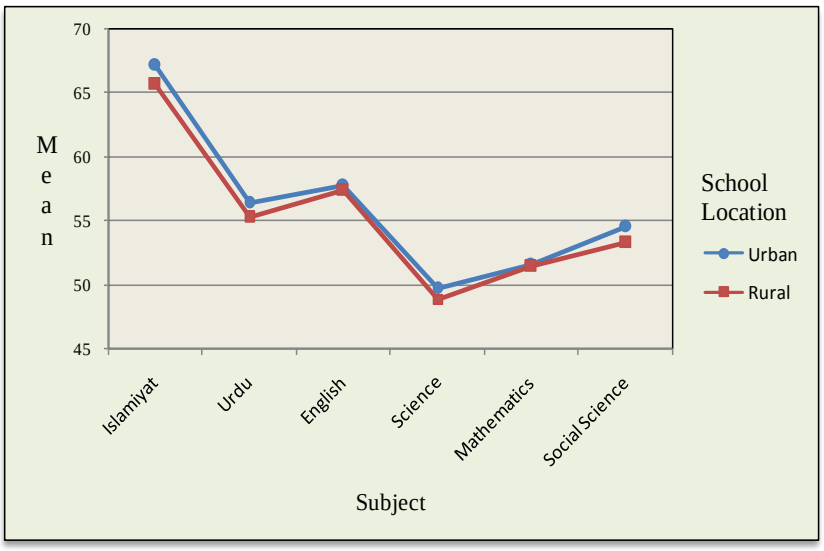

Figure 6: Punjab Mean Scores across all Subjects for Grade 5 by School Location

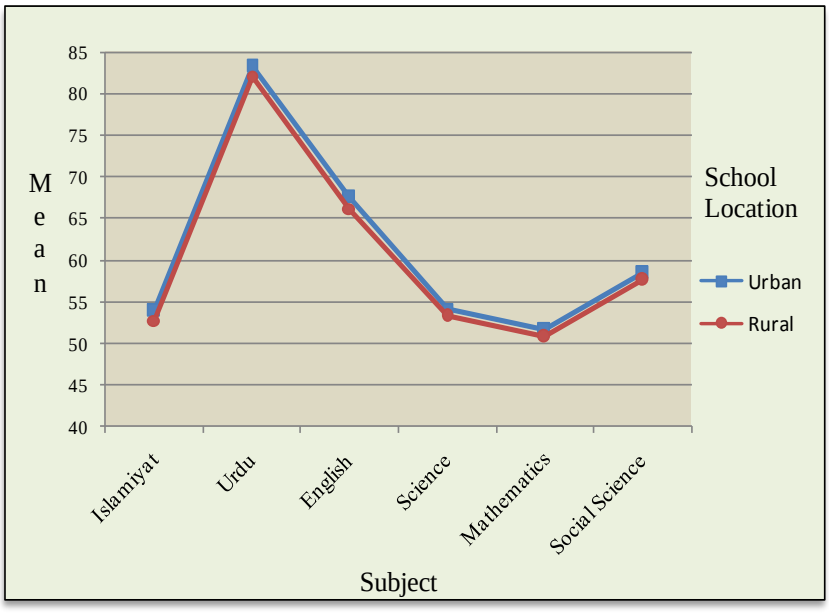

Figure 6(a): Punjab Mean Scores across all Subjects for Grade 8 by School Location

Although Figures 6 and 6(a) indicate that urban schools performed at a marginally higher level than rural schools for the Punjab as a whole, it is not clear whether this is the case for every district. To see whether that is so, it is necessary to inspect Figures 7 and 7(a) which show district mean scores by school location across all subjects for grade 5 and 8 students, respectively.

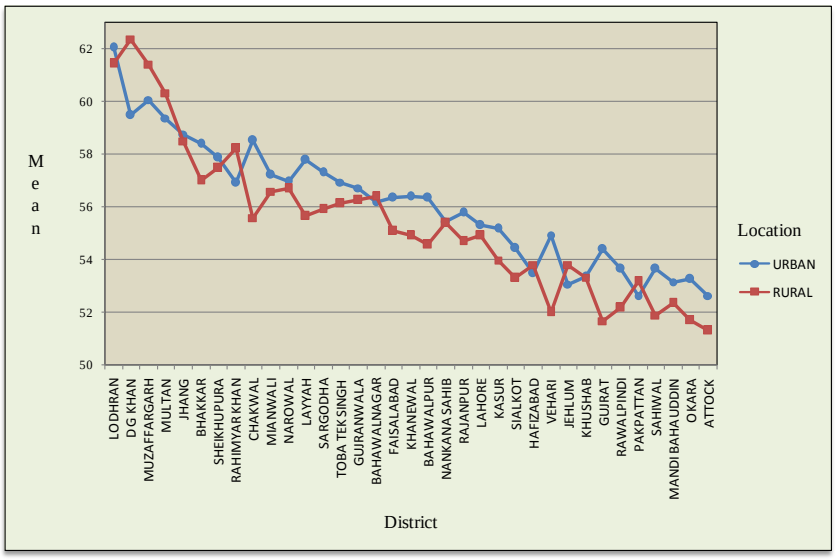

Figure 7: District Mean Scores across all Subjects for Grade 5 by School Location

It is evident from Figure 7 that in 24 districts urban schools had higher mean scores than rural schools. In four districts the difference in level of performance in favour of rural schools was quite substantial; they are D G Khan, Muzaffargarh, Multan, Shiekhupura. It is noteworthy that these are among the best performing districts.

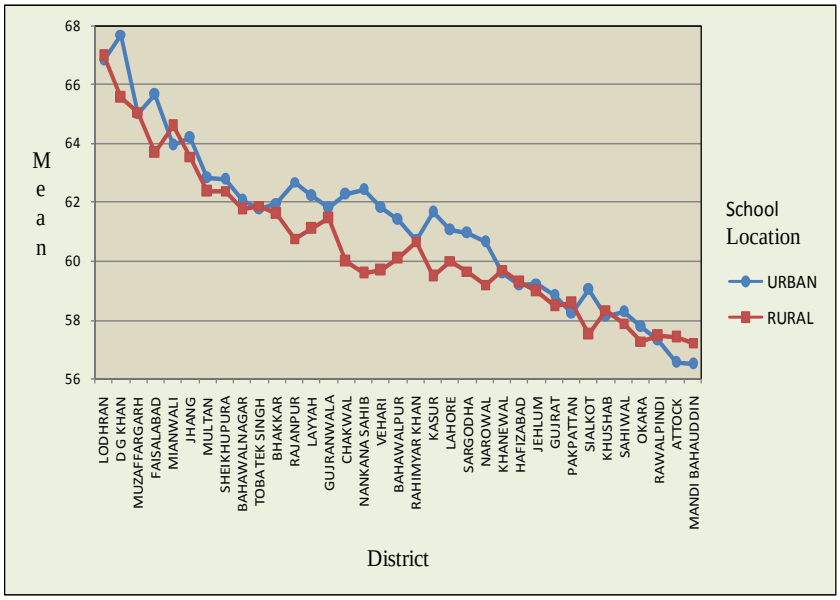

Figure 7(a): District Mean Scores across all Subjects for Grade 8 by School Location

An inspection of Figure 7(a) reveals that for grade 8 students in all but three districts urban schools performed better than those in rural areas. The exceptions are Mianwali, Rawalpindi, Attock and Mandi Bahauddin.

Comparison of Mean Scores by School Level

Most Grade 5 students in the Punjab attend primary school, but there are primary sections of both middle, high and higher secondary schools that also cater for these students. Additionally, many mosques provide education to Grade 5 students. The effect of school level on school performance in all subjects across the Punjab is illustrated in Figure 8.

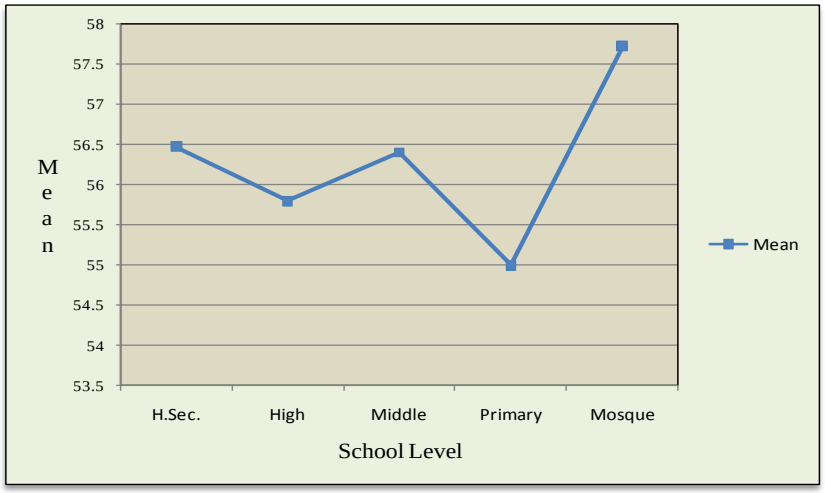

Figure 8: Punjab Mean Scores across all Subjects for Grade 5 by School Level

Figure 8 shows that for grade 5 students the mean level of performance was similar for those attending the primary sections of middle, high and higher secondary schools. However, the best level of performance was exhibited by students attending mosque schools and the worst level of performance by those attending primary schools.

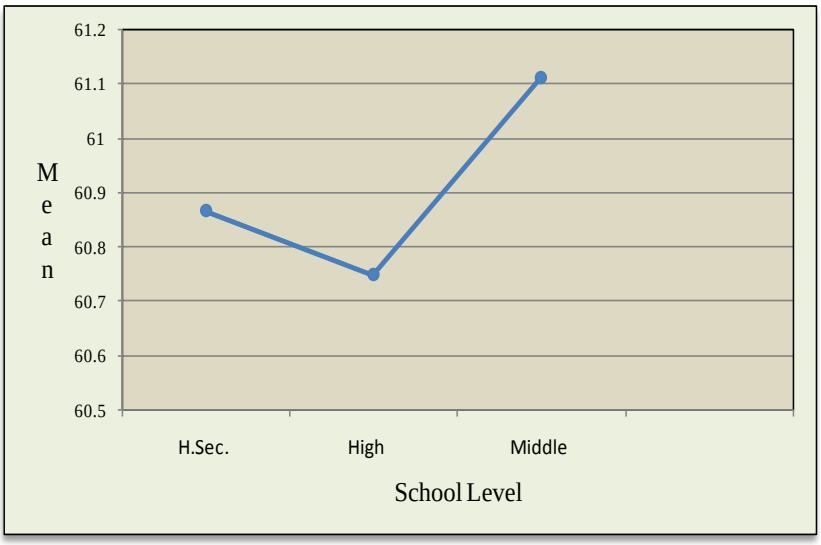

Figure 8(a): Punjab Mean Scores across all Subjects for Grade 8 by School Level

Figure 8(a) shows that for grade 8 students there is little difference in performance between high and higher secondary schools and that the best level of performance was shown by students attending middle school. It will be noted that the differences in mean levels of performance across these school types is small; however, as previously remarked, it should be borne in mind that there are large sample sizes involved and, hence, small differences in mean scores between for example, high and middle schools are statistically significant.

This effect may mask important subject by subject differences in performance according to school level. Figures 9 and 9(a) illustrate Punjab mean scores by subject according to school level for grade 5 and 8 students, respectively.

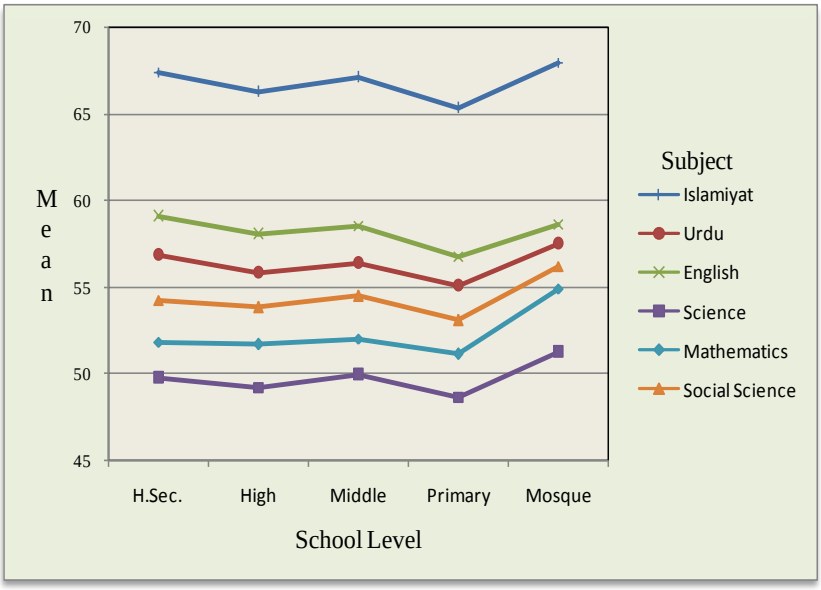

Figure 9: Punjab Mean Scores across all Subjects for Grade 5 by School Level

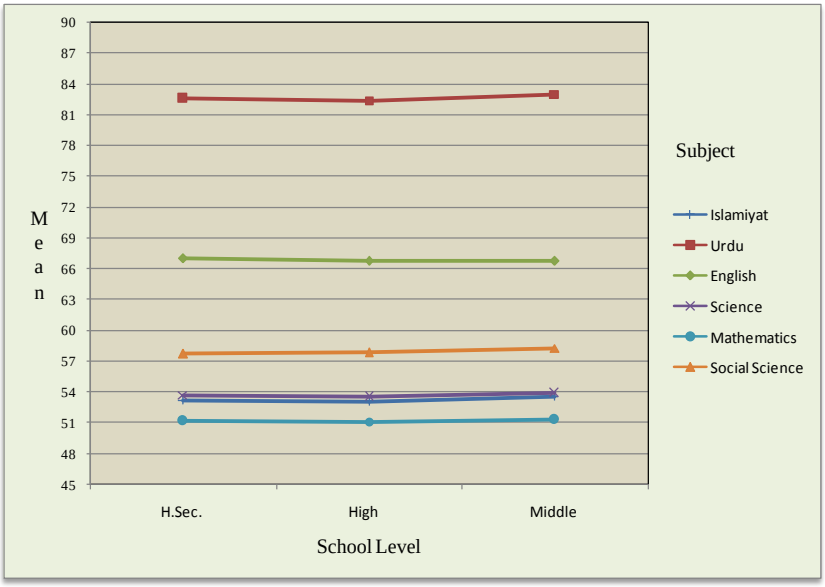

Figure 9(a): Punjab Mean Scores across all Subjects for Grade 8 by School Level

The profiles shown in Figures 9 and 9(a) are almost parallel which indicates that performance across school level for both grade 5 and 8 students is not differentiated by subject; that is, the superior level of performance shown by students attending mosque schools in, say, mathematics is also evident in all other subjects relative to other school levels.

Although as previously indicated students attending female only schools performed at a higher level than students attending male only schools, there is a possibility that this relationship may not hold for all school levels. To investigate that possibility it is necessary to consult Figures 10 and 10(a) which show Punjab mean scores taken across all subjects by school level and gender.

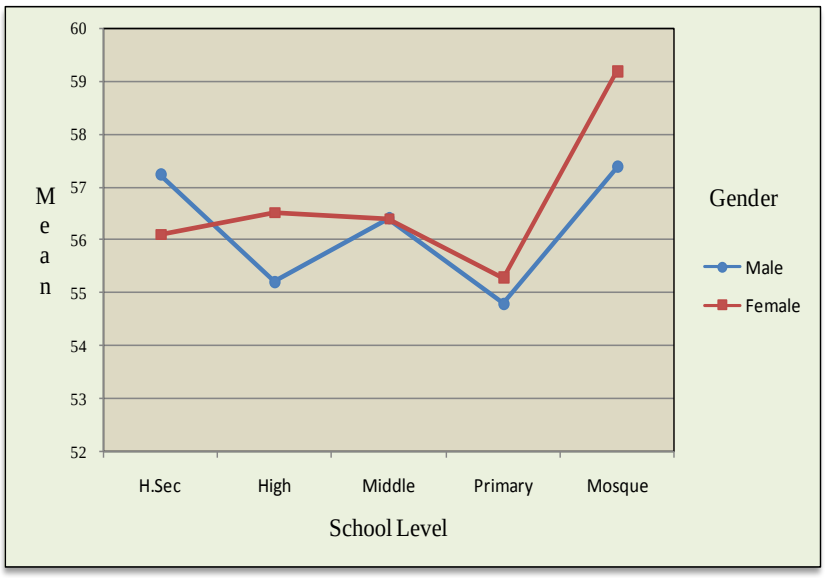

Figure 10: Punjab Mean Scores for all Subjects for Grade 5 by School Level and Gender

It is evident from Figure 10 that female grade 5 students do better in high, primary and mosque schools, but less well in the primary sections of higher secondary schools. In middle schools there is no difference in levels of performance.

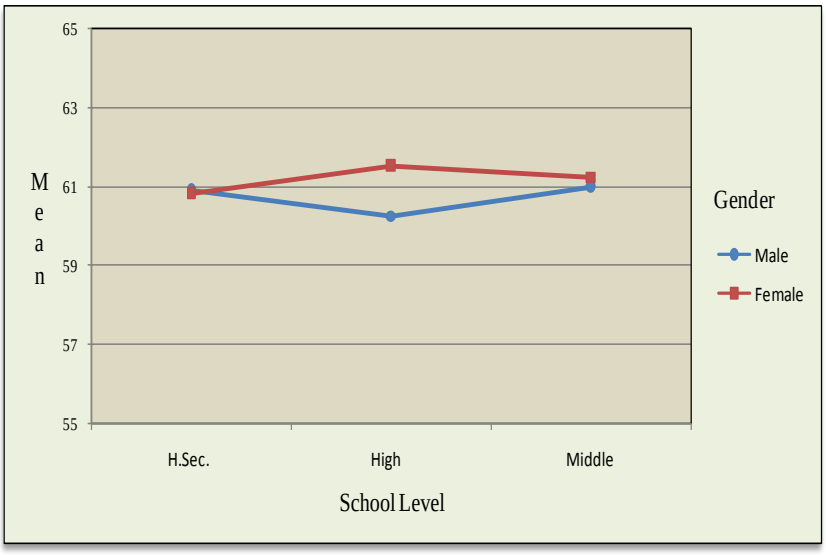

Figure 10(a): Punjab Mean Scores for all Subjects for Grade 8 by School Level and Gender

Figure 10(a) shows that for grade 8 students the superior level of performance by female students is limited to those attending high schools.

Interaction Effect of School Gender and Language of Instruction

Another possible interaction effect is between school gender and language of instruction. This is illustrated in Figures 11 and 11(a) for grade 5 and grade 8 students, respectively.

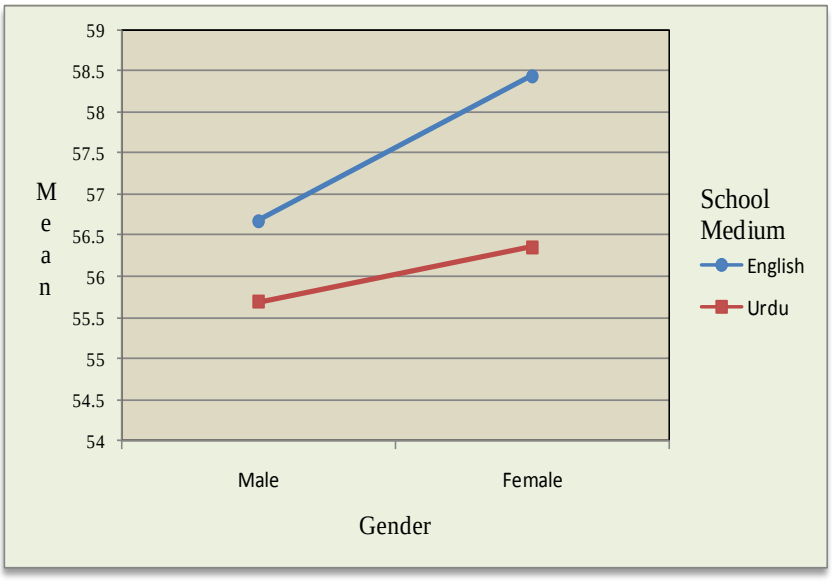

Figure 11: Punjab Mean Scores for all Subjects for Grade 5 by School Medium and Gender

An inspection of Figure 11 reveals that those schools where English is the medium of instruction perform better than those where Urdu is the language of instruction and this is the case for both male and female students. It is also noteworthy that the difference in level of performance in favour of English medium schools is more marked for female students.

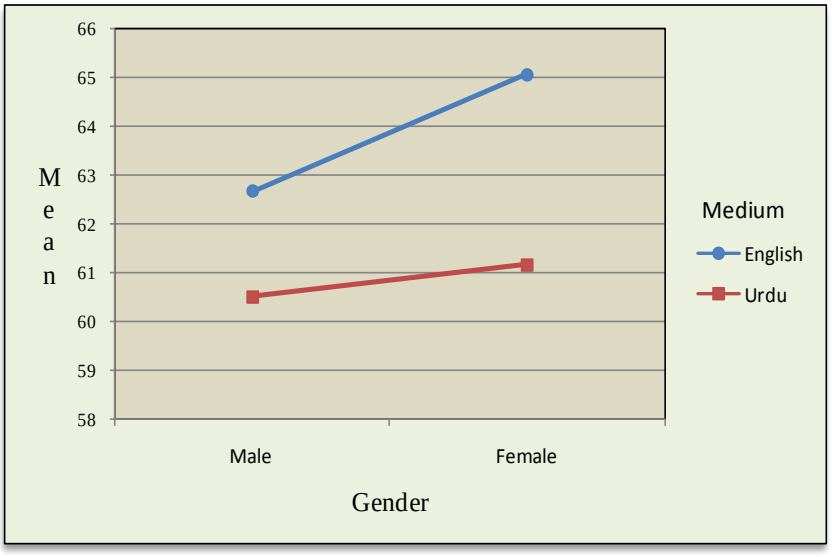

Figure 11(a): Punjab Mean Scores for all Subjects for Grade 8 by School Medium and Gender

It is interesting that the pattern shown in Figure 11(a) for grade 8 students is strikingly similar to that exhibited in Figure 11 for grade 5 students. This means that English medium schools are particularly effective in promoting higher levels of learning for female students across both grade levels.

Interaction Effect of School Gender and Location

Another possible interaction effect is that of school gender and school location on mean level of performance. This effect is illustrated in Figures 12 and 12(a) for grade 5 and 8 students, respectively.

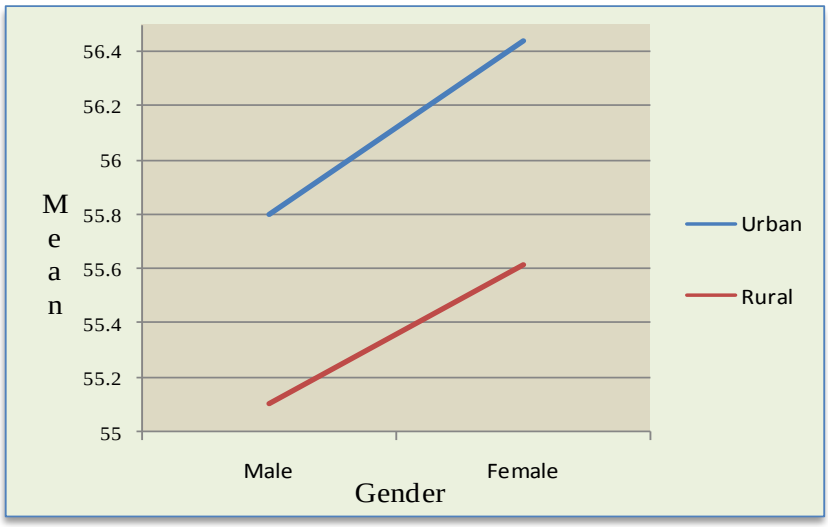

Figure 12: Punjab Mean Scores for all Subjects for Grade 5 by School Location and Gender

It is noteworthy that the gradients for urban and rural schools for grade 5 students shown in Figure 12 are almost identical; this indicates that the superior performance of female students is the same for both urban and rural schools.

Figure 12(a): Punjab Mean Scores for all Subjects for Grade 8 by School Location and Gender

Figure 12(a) shows a similar pattern for grade 8 students, however, the difference in mean levels of performance in favour of urban schools is less pronounced for female than male students.

SECTION 3: CLUSTER ANALYSIS OF DISTRICTS, TEHSILS, UNION COUNCILS AND SCHOOLS ACCORDING TO PERFORMANCE LEVELS.

Introduction

The above analyses have explored the main and interaction effects of grouping factors like school type, gender, level, location and medium of instruction on mean levels of student performance at district and Punjab levels. It is clear from these analyses that there is a great deal of diversity across districts according to these different factors. Objective statistical procedures (hierarchical cluster analysis, K-means cluster analysis and discriminant function analysis) were used to classify districts in the Punjab according to levels of performance, and then to classify tehsils and union councils within districts according to performance. The district level classification should be useful for Punjab level policy and planning, and the tehsil and union council classifications for decentralised planning and operational management.

Classification of Districts According to Performance

The analysis yielded four distinct clusters of districts. Districts in each cluster are all similar in terms of mean scores and standard deviations for each subject and significantly different from those in other clusters. The cluster structure is presented in Table 1 and 1(a) for grade 5 and 8 students, respectively.

Table 1: District Cluster Analysis for Grade 5

EXCEPTIONAL	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE
MUZAFFARGARH	MULTAN	PAKPATTAN	KHUSHAB
LODHRAN	RAHIMYAR KHAN	SIALKOT	RAWALPINDI
D G KHAN	JHANG	JEHLUM	GUJRAT
	BAHAWALNAGAR	NAROWAL	HAFIZABAD
	MIANWALI	CHAKWAL	VEHARI
	SHEIKHUPURA	LAHORE	OKARA
	TOBA TEK SINGH	SARGODHA	ATTOCK
	BHAKKAR	NANKANA SAHIB	MANDI BAHAUDDIN
		FAISALABAD	SAHIWAL
		RAJANPUR	
		GUJRANWALA	
		KHANEWAL	
		LAYYAH	
		KASUR	
		BAHAWALPUR	

It will be seen from Table 1 that grade 5 students in Muzaffargarh, Lodhran and D G Khan performed exceptionally well, while among that did not perform well were Rawalapindi, Attock, and

Sahiwal. To a large degree this clustering of districts is also evident from Figure 1. Within the above average and average clusters shown in Table 1, districts are ordered according to decreasing levels of performance, thus, Multan performed at a much higher level than Bhakkar although both are in the "above average" category.

Table 1(a): District Cluster Analysis for Grade 8

EXCEPTIONAL	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE
D G KHAN	FAISALABAD	BAHAWALNAGAR	ATTOCK
LODHRAN	JHANG	BAHAWALPUR	GUJRAT
MUZAFFARGARH	MIANWALI	BHAKKAR	HAFIZABAD
		CHAKWAL	JEHLUM
		GUJRANWALA	KHUSHAB
		KASUR	MANDI BAHAUDDIN
		KHANEWAL	NAROWAL
		LAHORE	OKARA
		LAYYAH	PAKPATTAN
		MULTAN	RAWALPINDI
		NANKANA SAHIB	SAHIWAL
		RAHIMYAR KHAN	SIALKOT
		RAJANPUR	
		SARGODHA	
		SHEIKHUPURA	
		TOBA TEK SINGH	
		VEHARI	

It will be noted that the same three districts, D G Khan, Lodhran and Muzaffargarh, performed exceptionally well in both grades. Similarly, Attock, Rawalpindi and Sialkot were again among the districts that performed least well. A notable difference, however, is that there are only three districts, Faisalabad, Jhang and Mianwali in the above average category for grade 8 while there were eight in that category for grade 5. It is also notable that Faisalabad was in the above average category for grade 8 but in the lower half of the average category for grade 5.

Classification of Tehsils within Districts According to Performance

Tables 2 and 2(a) show the classification of tehsils within districts assessed across all subjects for grade 5 and 8 students, respectively. The cluster procedure used the same variables as those used for the district level analysis shown in Tables 1 and 1(a).

Table 2: Listing of Tehsils within Districts by Performance Category Assessed across all Subjects for Grade 5

DISTRICT	TEHSIL	DISTRICT	TEHSIL	DISTRICT	TEHSIL	DISTRICT	TEHSIL
EXCEPTIONAL		ABOVE AVERAGE		AVERAGE		BELOW AVERAGE	
CHAKWAL	CHOA SAIDAN SHAH	BAHAWALNAGAR	BAHAWALNAGAR	BAHAWALNAGAR	FORT ABBAS	ATTOCK	ATTOCK
D G KHAN	D G KHAN	BAHAWALNAGAR	CHISHTIAN	BAHAWALPUR	AHMADPUR EAST	ATTOCK	FATEH JANG
D G KHAN	TAUNSA	BAHAWALNAGAR	HAROONABAD	BAHAWALPUR	BAHAWALPUR	ATTOCK	HASSANABDAL
JHANG	SHORKOT	BAHAWALNAGAR	MINCHINABAD	BAHAWALPUR	KHAIRPUR TAMEWALI	ATTOCK	HAZRO
LODHRAN	DUNYAPUR	BAHAWALPUR	HASILPUR	BAHAWALPUR	YAZMAN	ATTOCK	JAND
LODHRAN	KAROR PACCA	BHAKKAR	BHAKKAR	CHAKWAL	CHAKWAL	ATTOCK	PINDI GHEB
LODHRAN	LODHRAN	BHAKKAR	KALLUR KOT	FAISALABAD	CHAK JHUMARA	GUJRAT	GUJRAT
MULTAN	JALALPUR PIRWALA	BHAKKAR	MANKERA	FAISALABAD	JARANWALA	GUJRAT	KHARIAN
MULTAN	MULTAN SADAR	CHAKWAL	TALAGANG	FAISALABAD	TANDLIAN WALA	GUJRAT	SARAI ALAM GIR
MUZAFFARGARH	JATOI	FAISALABAD	FAISALABAD CITY	GUJRANWALA	KAMOKE	HAFIZABAD	PINDI BHATTIAN
MUZAFFARGARH	KOT ADU	FAISALABAD	FAISALABAD SADDAR	GUJRANWALA	WAZIRABAD	JEHLUM	JHELUM
MUZAFFARGARH	MUZAFFARGARH	FAISALABAD	SAMUNDARI	HAFIZABAD	HAFIZABAD	KASUR	CHUNIAN
RAHIMYAR KHAN	LIAQATPUR	GUJRANWALA	GUJRANWALA	JEHLUM	DINA	LAYYAH	CHAUBARA
		GUJRANWALA	NOSHERA VIRKAN	KASUR	KASUR	MANDI BAHAUDDIN	MALIKWAL
		JEHLUM	PIND DADHAN KHAN	KASUR	PATTOKI	MANDI BAHAUDDIN	MANDI BAHUDDIN
		JEHLUM	SOHAWA	KHANEWAL	KHANEWAL	MANDI BAHAUDDIN	PHALIA
		JHANG	CHINIOT	KHANEWAL	MIAN CHANNU	OKARA	DEPALPUR
		JHANG	JHANG	KHUSHAB	KHUSHAB	OKARA	OKARA
		KHANEWAL	KABIRWALA	KHUSHAB	NOORPUR THAL	RAJANPUR	TRIBAL AREA
		LAYYAH	LEYYAH	LAHORE	LAHORE CANTT	RAWALPINDI	GUJAR KHAN
		MIANWALI	ISA KHEL	LAHORE	LAHORE CITY	RAWALPINDI	KAHUTA
		MIANWALI	MIANWALI	LAYYAH	KAROR LALISAN	RAWALPINDI	MURREE
		MULTAN	MULTAN CITY	MUZAFFARGARH	ALIPUR	RAWALPINDI	RAWALPINDI
		MULTAN	SHUJA ABAD	NANKANA SAHIB	SANGLA HILL	RAWALPINDI	TAXILA
		NANKANA SAHIB	NANKANA SAHIB	NANKANA SAHIB	SHAHKOT	SAHIWAL	CHICHAWATANI
		NANKANA SAHIB	SAFDARABAD	PAKPATTAN	AIRIFWALA	SAHIWAL	SAHIWAL
		NAROWAL	NAROWAL	PAKPATTAN	PAKPATTAN	SIALKOT	SIALKOT
		NAROWAL	SHAKARGARH	RAHIMYAR KHAN	SADIQABAD	VEHARI	BUREWALA
		RAHIMYAR KHAN	KHANPUR	RAJANPUR	RAJANPUR	VEHARi	MAILSI
		RAHIMYAR KHAN	RAHIMYAR KHAN	RAJANPUR	ROJHAN	VEHARI	VEHARI
		RAJANPUR	JAMPUR	RAWALPINDI	KOTLI SATTIAN		
		SARGODHA	SHAHPUR	SARGODHA	BHALWAL		
		SARGODHA	SILLANWALI	SARGODHA	SARGODHA		
		SHEIKHUPURA	FEROZWALA	SIALKOT	DASKA		
		SHEIKHUPURA	MURIDKE	SIALKOT	PASRUR		
		SHEIKHUPURA	SHARAQPUR				
		SHEIKHUPURA	SHEIKHUPURA				
		TOBA TEK SINGH	GOJRA				
		TOBA TEK SINGH	KAMALIA				
		TOBA TEK SINGH	TOBA TEK SINGH				

The tehsils shown in the exceptional category are located mainly in the districts that were classified as either exceptional or above average and, similarly, those shown in the average category are located in districts which were classified as either average or below average.

Table 2(a): Listing of Tehsils within Districts by Performance Category Assessed across all Subjects for Grade 8

DISTRICT	TEHSIL	DISTRICT	TEHSIL	DISTRICT	TEHSIL	DISTRICT	TEHSIL
EXCEPTIONAL		ABOVE AVERAGE		AVERAGE		BELOW AVERAGE	
BAHAWALNAGAR	MINCHINABAD	MUZAFFARGARH	ALIPUR	BAHAWALNAGAR	BAHAWALNAGAR	ATTOCK	ATTOCK
D G KHAN	D G KHAN			BAHAWALNAGAR	CHISHTIAN	ATTOCK	FATEH JANG
D G KHAN	TAUNSA			BAHAWALNAGAR	FORT ABBAS	ATTOCK	HASSANABDAL
FAISALABAD	CHAK JHUMARA			BAHAWALNAGAR	HAROONABAD	ATTOCK	HAZRO
FAISALABAD	FAISALABAD CITY			BAHAWALPUR	AHMADPUR EAST	ATTOCK	JAND
FAISALABAD	FAISALABAD SADDAR			BAHAWALPUR	BAHAWALPUR	ATTOCK	PINDI GHEB
FAISALABAD	SAMUNDARI			BAHAWALPUR	HASILPUR	GUJRAT	GUJRAT
FAISALABAD	TANDLIAN WALA			BAHAWALPUR	KHAIRPUR TAMEWALI	GUJRAT	KHARIAN
JHANG	CHINIOT			BAHAWALPUR	YAZMAN	GUJRAT	SARAI ALAM GIR
JHANG	JHANG			BHAKKAR	BHAKKAR	HAFIZABAD	HAFIZABAD
JHANG	SHORKOT			BHAKKAR	KALLUR KOT	HAFIZABAD	PINDI BHATTIAN
LODHRAN	DUNYAPUR			BHAKKAR	MANKERA	JEHLUM	DINA
LODHRAN	KAROR PACCA			CHAKWAL	CHAKWAL	JEHLUM	JHELUM
LODHRAN	LODHRAN			CHAKWAL	CHOA SAIDAN SHAH	KASUR	CHUNIAN
MIANWALI	ISA KHEL			CHAKWAL	TALAGANG	KHANEWAL	KHANEWAL
MIANWALI	MIANWALI			FAISALABAD	JARANWALA	KHUSHAB	KHUSHAB
MULTAN	JALALPUR PIRWALA			GUJRANWALA	GUJRANWALA	LAYYAH	CHAUBARA
MUZAFFARGARH	JATOI			GUJRANWALA	KAMOKE	MANDI BAHAUDDIN	MALIKWAL
MUZAFFARGARH	KOT ADU			GUJRANWALA	NOSHERA VIRKAN	MANDI BAHAUDDIN	MANDI BAHUDDIN
MUZAFFARGARH	MUZAFFARGARH			GUJRANWALA	WAZIRABAD	MANDI BAHAUDDIN	PHALIA
RAJANPUR	ROJHAN			JEHLUM	PIND DADHAN KHAN	NANKANA SAHIB	SANGLA HILL
SHEIKHUPURA	FEROZWALA			JEHLUM	SOHAWA	NANKANA SAHIB	SHAHKOT
SHEIKHUPURA	SHARAQPUR			KASUR	KASUR	NAROWAL	NAROWAL
				KASUR	PATTOKI	OKARA	DEPALPUR
				KHANEWAL	KABIRWALA	OKARA	OKARA
				KHANEWAL	MIAN CHANNU	PAKPATTAN	ARIFWALA
				KHUSHAB	NOORPUR THAL	PAKPATTAN	PAKPATTAN
				LAHORE	LAHORE CANTT	RAHIMYAR KHAN	SADIQABAD
				LAHORE	LAHORE CITY	RAWALPINDI	GUJAR KHAN
				LAYYAH	KAROR LALISAN	RAWALPINDI	KAHUTA
				LAYYAH	LEYYAH	RAWALPINDI	MURREE
				MULTAN	MULTAN CITY	RAWALPINDI	RAWALPINDI
				MULTAN	MULTAN SADAR	RAWALPINDI	TAXILA
				MULTAN	SHUJA ABAD	SAHIWAL	CHICHAWATANI
				NANKANA SAHIB	NANKANA SAHIB	SAHIWAL	SAHIWAL
				NANKANA SAHIB	SAFDARABAD	SIALKOT	DASKA
				NAROWAL	SHAKARGARH	SIALKOT	PASRUR
				RAHIMYAR KHAN	KHANPUR	SIALKOT	SIALKOT
				RAHIMYAR KHAN	LIAQATPUR		
				RAHIMYAR KHAN	RAHIMYAR KHAN		
				RAJANPUR	JAMPUR		
				RAJANPUR	RAJANPUR		
				RAWALPINDI	KOTLI SATTIAN		
				SARGODHA	BHALWAL		
				SARGODHA	SARGODHA		
				SARGODHA	SHAHPUR		
				SARGODHA	SILLANWALI		
				SHEIKHUPURA	MURIDKE		
				SHEIKHUPURA	SHEIKHUPURA		
				TOBA TEK SINGH	GOJRA		
				TOBA TEK SINGH	KAMALIA		
				TOBA TEK SINGH	TOBA TEK SINGH		
				VEHARI	BUREWALA		

Again, the majority of tehsils shown in the exceptional category for grade 8 are in those districts, D G Khan, Lodhran, and Muzaffargarh, which were classified in that category in the district cluster analysis. Noticeably, there are tehsils in that category which are located in districts that were in lower categories in the district cluster analysis. For example, there are five tehsils in the exceptional category that are located in Faisalabad which was in the above average district category; three in Jhang which was in the above average district category; and two tehsils in Mianwali which was also in the above average district category. Similarly, there are four districts, Bahawalnagar, Multan, Rajanpur and Shiekhupura, that were classified as average districts but there are tehsils in those districts which are in the exceptional tehsil category.

The frequency distributions of tehsils according to performance category by district is shown in Table 3 and 3(a) for grade 5 and 8 students, respectively.

Table 3: Number of Tehsils within Districts by Performance Category Assessed across all Subjects for Grade 5

DISTRICT	EXCEPTIONAL	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE
ATTOCK				6
BAHAWALNAGAR		4	1	
BAHAWALPUR		1	4	
BHAKKAR		3		
CHAKWAL	1	1	1	
D G KHAN	2			
FAISALABAD		3	3	
GUJRANWALA		2	2	
GUJRAT				3
HAFIZABAD			1	1
JEHLUM		2	1	1
JHANG	1	2		
KASUR			2	1
KHANEWAL		1	2	
KHUSHAB			2	
LAHORE			2	
LAYYAH		1	1	1
LODHRAN	3			
MANDI BAHAUDDIN				3
MIANWALI		2		
MULTAN	2	2		
MUZAFFARGARH	3		1	
NANKANA SAHIB		2	2	
NAROWAL		2		
OKARA				2
PAKPATTAN			2	
RAHIMYAR KHAN	1	2	1	
RAJANPUR		1	2	1
RAWALPINDI			1	5
SAHIWAL				2
SARGODHA		2	2	
SHEIKHUPURA		4		
SIALKOT			2	1
TOBA TEK SINGH		3		
VEHARI				3

It will be noted from Table 3 that in most cases tehsils within districts are classified into adjacent performance categories. This implies that the diversity evident in the district classification does not extend to tehsils. In other words, whilst the Punjab is characterised by diversity at the district level, within districts there is a substantial degree of consistency among tehsils.

Table 3(a): Number of Tehsils within Districts by Performance Category Assessed across all Subjects for Grade 8

DISTRICT	EXCEPTIONAL	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE
ATTOCK				6
BAHAWALNAGAR	1		4	
BAHAWALPUR			5	
BHAKKAR			3	
CHAKWAL			3	
D G KHAN	2			
FAISALABAD	5		1	
GUJRANWALA			4	
GUJRAT				3
HAFIZABAD				2
JEHLUM			2	2
JHANG	3			
KASUR			2	1
KHANEWAL			2	1
KHUSHAB			1	1
LAHORE			2	
LAYYAH			2	1
LODHRAN	3			
MANDI BAHAUDDIN				3
MIANWALI	2			
MULTAN	1		3	
MUZAFFARGARH	3	1		
NANKANA SAHIB			2	2
NAROWAL			1	1
OKARA				2
PAKPATTAN				2
RAHIMYAR KHAN			3	1
RAJANPUR	1		2	
RAWALPINDI			1	5
SAHIWAL				2
SARGODHA			4	
SHEIKHUPURA	2		2	
SIALKOT				3
TOBA TEK SINGH			3	
VEHARI			3	

An inspection of Table 3(a) indicates that there is even more consistency within districts than was the case for grade 5. For example, in every district other than Faisalabad, Multan, Shiekhupura, Rajanpur, and Bahawalnagar, tehsils are classified in adjacent performance categories; that is, with those exceptions there is no instance within district where tehsils are classified in more than two categories. It is also noteworthy that in Faisalabad there is only one tehsil that is not in the exceptional category.

Classification of Union Councils within Districts According to Performance

The same kind of statistical clustering procedure was used to build a taxonomy of union councils within districts. Results of that procedure are shown in Tables 4 and 4(a) for grade 5 and 8 students respectively.

Table 4: Percentage of Union Councils within Districts by Performance Category Assessed across all Subjects for Grade 5.

DISTRICT	EXCEPTIONAL	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE
ATTOCK	0	8	35	57
BAHAWALNAGAR	7	44	44	5
BAHAWALPUR	1	38	45	16
BHAKKAR	15	46	33	5
CHAKWAL	15	29	45	11
D G KHAN	59	30	11	0
FAISALABAD	7	34	44	15
GUJRANWALA	14	31	38	17
GUJRAT	0	11	35	54
HAFIZABAD	0	15	59	26
JEHLUM	3	29	32	37
JHANG	24	50	24	2
KASUR	5	21	49	25
KHANEWAL	5	29	47	20
KHUSHAB	0	15	52	33
LAHORE	2	32	52	14
LAYYAH	8	29	57	6
LODHRAN	60	29	9	1
MANDI BAHAUDDIN	0	8	48	44
MIANWALI	5	60	32	3
MULTAN	45	37	17	1
MUZAFFARGARH	62	25	10	3
NANKANA SAHIB	11	27	51	11
NAROWAL	10	44	39	6
OKARA	1	4	43	52
PAKPATTAN	0	12	58	30
RAHIMYAR KHAN	25	43	31	2
RAJANPUR	6	33	42	19
RAWALPINDI	0	10	46	44
SAHIWAL	0	10	39	51
SARGODHA	7	37	49	7
SHEIKHUPURA	15	55	16	14
SIALKOT	1	22	39	38
TOBA TEK SINGH	8	44	40	8
VEHARI	0	9	43	49
PUNJAB	12	29	39	21

An interesting aspect of Table 4 is that it reveals that even in the best performing districts there are union councils with low levels of performance, and in the worst performing districts there are union councils that have performed at an exceptional level. For example, Lodhran was one of the best districts and, not surprisingly, 60% of its union councils are in the exceptional category, but only 1% of its union councils are in the below average category. Similarly, Shiekhupura, which is in the above average category for districts, has 15% of its union councils in the exceptional category, 55% in the above average category, 16% in the average category and 14% in the lowest category. At the other end of the spectrum, Rawalpindi, which is in the lowest category for districts, has 10% in the above average category, 46% in the below average category and 44% in the lowest category.

Table 4(a): Percentage of Union Councils within Districts by Performance Category Assessed across all Subjects for Grade 8.

DISTRICT	EXCEPTIONAL	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE
ATTOCK	0	9	18	73
BAHAWALNAGAR	6	44	46	4
BAHAWALPUR	4	31	46	18
BHAKKAR	14	34	49	3
CHAKWAL	9	23	49	19
D G KHAN	40	45	16	0
FAISALABAD	32	43	21	3
GUJRANWALA	19	31	39	11
GUJRAT	2	14	40	45
HAFIZABAD	2	12	62	24
JEHLUM	2	16	42	40
JHANG	31	48	18	4
KASUR	3	27	38	33
KHANEWAL	1	16	63	20
KHUSHAB	0	10	48	42
LAHORE	6	23	58	13
LAYYAH	2	43	43	11
LODHRAN	68	25	5	2
MANDI BAHAUDDIN	0	6	27	66
MIANWALI	32	51	15	2
MULTAN	12	45	35	9
MUZAFFARGARH	48	31	16	6
NANKANA SAHIB	5	20	56	20
NAROWAL	4	14	48	34
OKARA	1	1	29	69
PAKPATTAN	0	9	40	52
RAHIMYAR KHAN	5	35	37	23
RAJANPUR	15	29	37	20
RAWALPINDI	0	8	35	57
SAHIWAL	0	7	43	51
SARGODHA	4	22	49	25
SHEIKHUPURA	24	37	25	13
SIALKOT	1	5	43	52
TOBA TEK SINGH	4	51	43	3
VEHARI	1	24	49	25
PUNJAB	**12**	**26**	**37**	**25**

As was the case for grade 5 students, not all UCs within the best performing districts are in the best performing categories for UCs. For example, in Lodhran 68% of UCs are classified as exceptional but 25% are in the above average category, 5% in the average and 2% in the below average category. Similarly, not all UCs that are in the lowest performing districts are in the lowest performing categories for UCs. Attock is in the lowest performing category for district but 9% of its UCs are in the above average category and 18% are classified as average.

Classification of Schools by Performance

The same kind of statistical clustering procedure was used to build a taxonomy of schools. A summary of the frequency distribution of schools by performance category is given in Tables 5 and 5(a) for grade 5 and 8 students, respectively.

Table 5: Percentage of Schools by Performance Category for Grade 5

DISTRICT	EXCEPTIONAL	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE
ATTOCK	6	29	45	20
BAHAWALNAGAR	19	49	28	4
BAHAWALPUR	14	40	38	8
BHAKKAR	25	43	26	6
CHAKWAL	22	40	28	10
D G KHAN	68	25	6	1
FAISALABAD	14	43	37	6
GUJRANWALA	23	42	26	9
GUJRAT	6	31	40	23
HAFIZABAD	7	42	41	10
JEHLUM	15	38	30	17
JHANG	32	43	21	4
KASUR	11	39	39	11
KHANEWAL	18	41	33	8
KHUSHAB	7	41	38	14
LAHORE	14	45	33	8
LAYYAH	21	40	30	8
LODHRAN	60	27	11	2
MANDI BAHAUDDIN	6	32	48	14
MIANWALI	20	52	22	5
MULTAN	41	40	16	2
MUZAFFARGARH	56	29	13	2
NANKANA SAHIB	19	43	30	7
NAROWAL	24	46	25	6
OKARA	3	32	48	18
PAKPATTAN	8	37	42	12
RAHIMYAR KHAN	36	41	19	4
RAJANPUR	12	39	39	10
RAWALPINDI	5	36	42	17
SAHIWAL	4	27	49	19
SARGODHA	21	42	31	6
SHEIKHUPURA	32	42	20	6
SIALKOT	13	34	36	18
TOBA TEK SINGH	20	43	31	5
VEHARI	4	30	53	13
PUNJAB	20	39	32	9

The most notable feature of Table 5 is that the distribution of schools over categories by district is very similar to that shown in Table 4 for the distribution of UCs within districts. This implies that within UCs there is a consistent level of performance by schools which, in turn, may reflect the influence of local socio-economic factors.

Table 5(a): Percentage of Schools by Performance Category for Grade 8

DISTRICT	EXCEPTIONAL	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE
ATTOCK	7	26	19	48
BAHAWALNAGAR	22	50	17	10
BAHAWALPUR	16	24	39	21
BHAKKAR	29	54	6	12
CHAKWAL	25	25	25	26
D G KHAN	64	22	9	5
FAISALABAD	50	41	4	5
GUJRANWALA	35	24	25	17
GUJRAT	10	28	21	41
HAFIZABAD	11	25	37	27
JEHLUM	15	20	30	35
JHANG	53	29	11	7
KASUR	18	39	15	29
KHANEWAL	13	36	27	24
KHUSHAB	8	32	25	35
LAHORE	17	35	28	19
LAYYAH	24	34	28	15
LODHRAN	69	21	8	2
MANDI BAHAUDDIN	2	24	23	50
MIANWALI	58	34	6	2
MULTAN	37	33	16	14
MUZAFFARGARH	62	25	9	5
NANKANA SAHIB	19	28	28	26
NAROWAL	14	24	26	36
OKARA	3	25	16	56
PAKPATTAN	9	30	22	38
RAHIMYAR KHAN	24	29	25	21
RAJANPUR	24	30	31	15
RAWALPINDI	7	16	34	43
SAHIWAL	6	32	18	44
SARGODHA	16	25	36	23
SHEIKHUPURA	36	33	19	12
SIALKOT	4	20	32	44
TOBA TEK SINGH	26	57	7	9
VEHARI	11	40	27	23
PUNJAB	**24**	**31**	**21**	**24**

It is also the case that the distribution of schools by performance category over district for grade 8 is very similar to the distribution of UCs by performance category within district. Again, this implies that within UCs there is a consistency of performance between schools. The other noticeable feature of Table 5(a) is that there is a generally "flat" distribution of schools by performance category for the Punjab as a whole. Thus, 24% of schools are classified as exceptional, 31% as above average, 21% as average and 24% as below average.

Summary of Cluster Analyses

The outcome of the cluster analyses emphasises the difficulty of generalising about student performance at different levels of aggregation of the administrative hierarchy in the Punjab. For example, if attention is focussed only on district clustering the fact that there are union councils in districts like Lodhran, D.G Khan and Muzaffargarh that performed at very low levels is not evident. Similarly, Table 1 does not reveal that districts like Rawalapindi which, in general, performed at a very low level had union councils in the above average and average categories. It is clear, therefore, that there is great diversity across the Punjab at district level, and within districts by union council, in terms of mean levels of student performance. This diversity should be taken into account in education policy analysis and planning in the Punjab.

SECTION 4: EFFECT OF SCHOOL INFRASTRUCTURE ON MEAN LEVELS OF PERFORMANCE

School Level

Over the last few years PMIU has made substantial capital investment in the rehabilitation of primary school buildings and classrooms, in addition to distributing text books and teaching and learning materials. It has been an expectation that the rehabilitation of schools will lead, in the longer term, to improvements in learning outcomes. With this in mind, an analysis of variance was carried out over all schools that provided candidates for the Grade 5 and 8 examinations, linking school performance aggregated over all subjects with school infrastructure and school location as grouping variables. This analysis compared performance in schools that had been rehabilitated with that of schools that had not been rehabilitated. In some respects this is not a fair comparison because the relative performance of schools that had been rehabilitated with those that had not been rehabilitated before the investment had been made in the former is unknown. A fairer comparison would be a longitudinal comparison of rehabilitated schools; that is, "before" and "after" rehabilitation. Regrettably, the data needed for such comparison is not available. The outcome of the analysis for grade 5 is summarized in Figures 13 and 13(a) for grade 5 and 8 students, respectively.

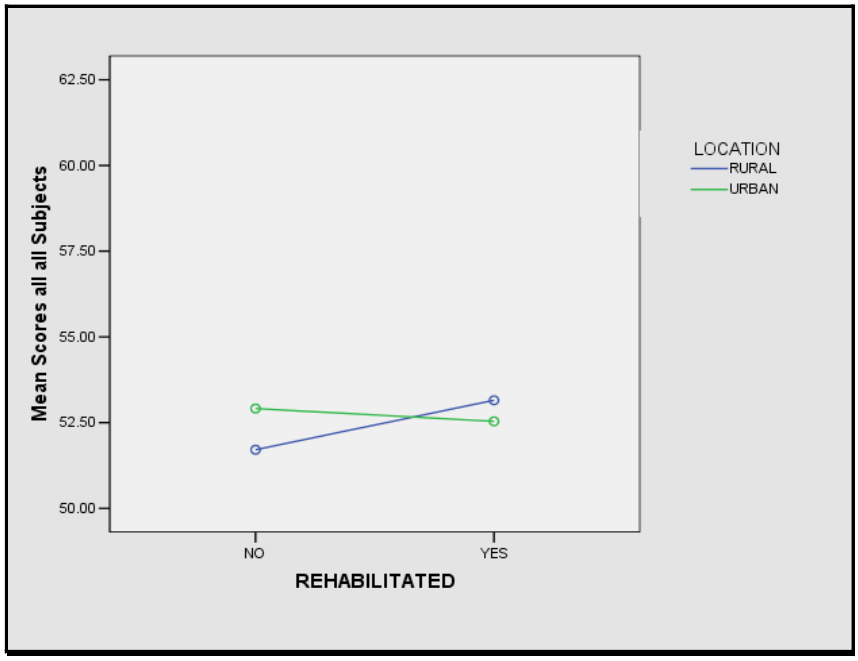

Figure 13: Comparison of School Mean Scores by School Infrastructure and Location for the Punjab for Grade 5

It would appear from Figure 13 that rehabilitation has been effective in promoting higher levels of learning achievement in rural but not urban schools. However, this is not true for all districts. For example, in Rajanpur there is no evidence that rehabilitation has yet been effective in rural schools in that district, as is illustrated in Figure 13(a).

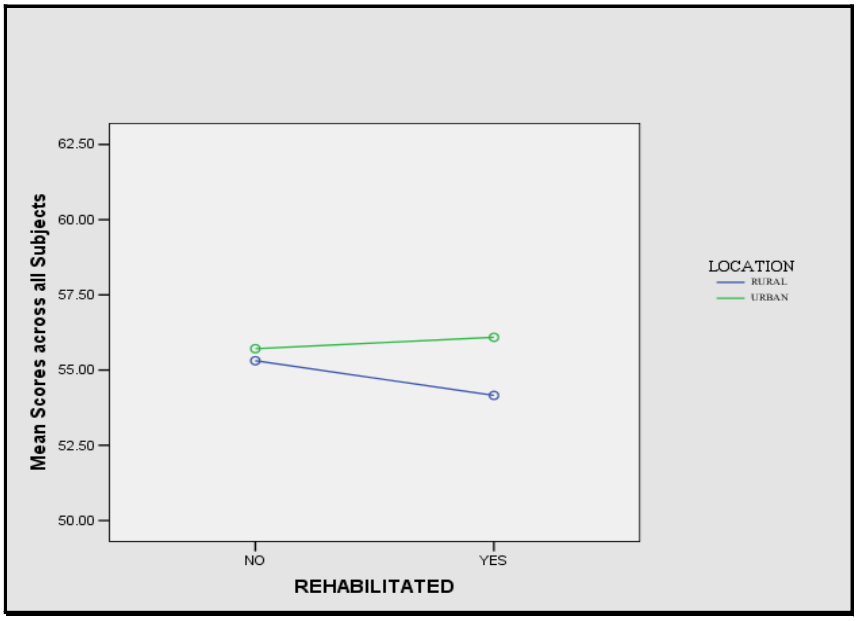

Figure 13(a): Comparison of School Mean Scores by School Infrastructure and Location for Rajanpur for Grade 5

It should not be inferred from this that investment in rehabilitation of school infrastructure will not in the longer run be effective in urban schools as it has been in rural schools. It may be the case that the condition of the rural schools that have been rehabilitated was worse than that of the urban schools that have been rehabilitated, and that the rural schools may have been rehabilitated before the urban schools. It should also be remembered that the learning achievement used to measure school performance relates to Grade 5 students only. Some of these students may be attending urban schools that were rehabilitated only one year before they sat the Grade 5 examinations, meaning that they spent four of the five years of their primary schooling in schools that had not been rehabilitated. Unfortunately, data needed to assess the degree of rehabilitation required and when rehabilitation occurred was not available to take into the analysis. Of course, it should be emphasised that there are social and health reasons for rehabilitating schools; rehabilitation of school infrastructure is not directed only at improving enrolment and attendance rates and lifting learning outcomes.

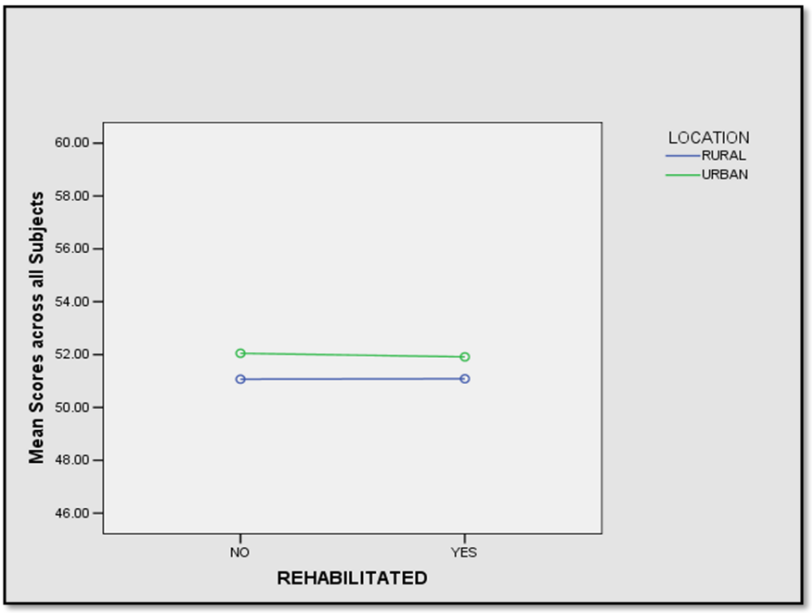

Figure 13(b): Comparison of School Mean Scores by School Infrastructure and Location for the Punjab for Grade 8

It is clear from Figure 13(b) that there is no evidence that school rehabilitation has been effective in promoting higher levels of learning achievement for grade 8 students in urban or rural schools. However, this is not the case for all districts as is illustrated in Figures 13(c) below for Narowal and Toba Tek Singh respectively.

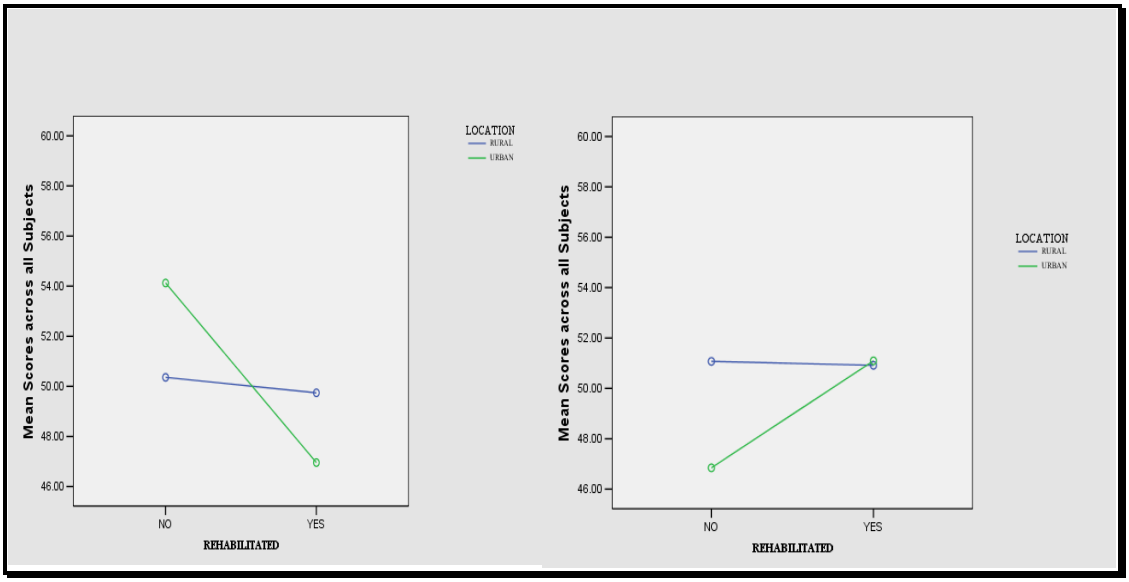

Figure 13(c): Comparison of School Mean Scores by School Infrastructure and Location for Narowal and Toba Tek Singh for Grade 8

The left hand panel of 13(c) shows that for Narowal rehabilitated urban schools performed at a substantially lower level than those that had not been rehabilitated. In contrast, the right hand panel of Figure 13(c) shows that the reverse is true for urban schools in Toba Tek Singh.

It is obvious from the above analysis that the effect of school rehabilitation on learning achievement is not yet clear and, moreover, if the analysis is confined simply to the effect of school rehabilitation the efficacy of that investment will remain obscure. Primarily, this is because such an analysis ignores the interaction between other factors, especially those relating to the socio-economic context of schools, and school rehabilitation. In this regard, it would be helpful if PMIU, DSD and PEC, were to discuss the coordinated development of education management information systems (EMIS) that capture and keep current the range of data needed for monitoring and evaluation studies that facilitate evidence-based, comprehensive policy and planning processes. These databases need to be coordinated because each offers a crucial perspective on education development: PMIU's database already holds statistical data concerning schools, teachers and students in the public sector (this database should be enhanced to include relevant socio-economic data); DSD is planning to develop a database covering all teachers in the public sector in terms of qualifications, experience and in-service training; PEC is building up an expensive database covering learning achievement in the public sector and in many private schools. If these databases were to be coordinated they would provide an invaluable resource for both operational management of schools and policy and planning.

SECTION 5: MULTIPLE REGRESSION ANALYSIS

Multiple Regression Analysis for Grade 5

School Level: To further explore the effect of system level factors that might impact on learning performance at the school level, a multiple regression analysis was carried out that used school mean score as the dependent variable and school student teacher ratio and student classroom ratio as predictor variables. The outcome was that student classroom and teacher ratios were significant predictors. The relationship between school mean score and student classroom and teacher ratios was negative; that is, the higher the student classroom and teacher ratios the lower the school mean score. This is an intuitively expected outcome that is consistent with international research findings.

District Level: Another multiple regression analysis was carried out with district mean score as the dependent variable and district literacy rate, district male net enrolment ratio, district female enrolment ratio and prevalence of under-weight five year olds as the predictive variables. These predictor variables are significantly correlated and were used as proxy variables for district socio-economic status. The outcome was that the only significant predictor was female net enrolment ratio; the greater the female net enrolment ratio, the lower the district mean score.

This is an interesting outcome because it implies that high net enrolment ratios lead to more crowded classrooms which lead to a lowering of learning achievement. Remembering that net enrolment ratio is a proxy variable for socio-economic status the further implication is that campaigns to improve access and participation rates may be effective in districts with higher socio-economic status but paradoxically these quantitative improvements may lead to declines in learning outcomes; that is, an interaction between quantitative and qualitative factors.

Multiple Regression Analysis for Grade 8

School Level: The same kind of regression analysis was carried out for grade 8. The finding was that student classroom but not student teacher ratio was a significant predictor of learning achievement. However, paradoxically, the relationship was positive; that is, the higher the student classroom ratio the higher the level of learning achievement. To explore this, separate regression analyses were done for urban and rural schools. For urban schools the association between student classroom ratio and learning achievement was positive, but for rural schools it was negative. This needs to be interpreted against the background that student mean scores in urban schools are substantially higher than those in rural schools. This suggests that students in urban schools do better than those in rural schools despite studying in classrooms that are more crowded. There are many possible reasons for this outcome. They range from differences in teacher competency between urban and rural schools to a socio-economic context that may provide greater opportunities for urban students to utilise private tutoring.

District Level: The district level regression for grade 8 revealed that the only significant predictor was level of adult literacy. However, the relationship was negative; that is, the higher the level of adult literacy the lower district mean scores. This is a profoundly counter-intuitive outcome and stands in stark contrast to international research in developing countries. Indeed, the outcome questions the validity and reliability of the literacy data. It is understood that the literacy data collected by the PIHS and MICS studies are self-reported – usually by head of household – and not measured using standardised instruments.

It should be emphasised that the associations found at school and district level, and for both grade levels, in these regression studies accounted for only a minor proportion of variance in student mean scores. This implies that there are other factors which were not taken into account in these regression analyses that exert more powerful influences on learning achievement. This also adds further weight to the argument given in the closing paragraph of Section 4 to the effect that there needs to be a more comprehensive EMIS developed for the Punjab.

SECTION 6: SUMMARY

The secondary analysis of the grade 5 and 8 data reveals a diversity and complexity that mirrors the diversity and complexity of the human and physical geography of the Punjab. This means that it is dangerous to make generalised statements about performance levels for the Punjab as a whole, and for districts, because they may well mask underlying patterns of diversity and complexity that should be taken into account in policy formulation and education planning.

Moreover, the analyses that looked at the effect of factors such as school type, level, gender, location and medium of instruction amply illustrate that in many districts these factors interact to produce varying levels of learning attainment. Again, policy formulation and education planning must take account of these interactions so as to design interventions that are locally appropriate.

For grades 5 and 8, there is limited evidence that school rehabilitation promotes higher levels of learning achievement. However, these effects vary substantially between districts, school type, level and location. The effect of school rehabilitation on learning achievement is not yet clear. If analysis is confined simply to the effect of school rehabilitation the efficacy of that investment will remain obscure. Primarily, this is because such an analysis ignores the interaction between other factors, especially those relating to the socio-economic context of schools, and school rehabilitation. In this regard, it would be helpful if PMIU, DSD and PEC, were to discuss the coordinated development of education management information systems (EMIS) that capture and keep current the range of data needed for monitoring and evaluation studies that facilitate evidence-based, comprehensive policy and planning processes. These databases need to be coordinated because each offers a crucial perspective on education development: PMIU's database already holds statistical data concerning schools, teachers and students in the public sector (this database should be enhanced to include relevant socio-economic data); DSD is planning to develop a database covering all teachers in the public sector in terms of qualifications, experience and in-service training; PEC is building up an expensive database covering learning achievement in the public sector and in many private schools. If these databases were to be coordinated they would provide an invaluable resource for both operational management of schools and policy and planning.

For grade 5, student classroom and teacher ratios were significant predictors of learning achievement. The relationship between school mean score and student and teacher classroom ratios was negative; that is, the higher the student classroom and teacher ratios the lower the school mean score.

Additionally, five variables were used in a multiple regression analysis linking learning outcomes at district level with socio-economic factors. The outcome was that the only significant predictor was female net enrolment ratio; the greater the female net enrolment ratio, the lower the district mean score, presumably because higher enrolment ratios lead to over-crowded classrooms which reduce levels of learning.

For grade 8, student classroom ratio but not student teacher ratio was a significant predictor of learning achievement but the relationship was positive indicating that the higher the student classroom ratio the higher the level of learning achievement. However, when separate analyses are done for urban and rural schools it emerges that this positive relationship applies only to urban schools; in rural schools the relationship was negative.

At district level the only significant socio-economic predictor of learning achievement was district literacy, but, the association was negative; that is, higher levels of literacy were associated with lower levels of learning achievement. This is an unexpected outcome and is in conflict with a substantial body of research in developing countries the burden of which is that adult literacy is positively associated with learning achievement in both primary and middle school. This outcome raises serious questions about the validity of the literacy levels reported by the Pakistan Integrated Household Surveys. Given that these surveys depend upon reporting of adult literacy levels by heads of household and not on empirically measured levels of literacy it is suggested that little credence can be placed on the finding of a negative relationship between literacy and learning achievement in the present case.

It should be emphasised that the associations found at school and district level, and for both grade levels, in these regression studies accounted for only a minor proportion of variance in student mean scores. This implies that there are other factors which were not taken into account in these regression analyses that exert more powerful influences on learning achievement.

Recommendations

The following major recommendations are offered:

1. A secondary analysis be undertaken in 2009 of the examination results of that year and then a trends over time and contrasts over grouping factors such as districts and school type be undertaken covering the period 2006 to 2009. These kinds of analysis are necessary to optimise the efficacy of the investment required to improve primary education in the Punjab.

2. The Ministry of Education instruct DSD, PMIU and PEC to implement a teacher competency survey that covers both pedagogical and subject content knowledge and skills and to relate the findings of that survey to the PEC examination results so as to provide evidence regarding the effect of teacher competency on student learning achievement. The findings of such a survey and the subsequent analyses involving teacher competence and student learning achievement should inform policy development in respect of teacher pre- and in-service training, curriculum development, text book writing and, ultimately, classroom teaching and learning practices.

3. PEC undertake field-based, qualitative studies to uncover reasons for the wide diversity of learning outcomes across and within districts.

4. PEC, DSD and PMIU collaborate to provide district level workshops to explain and interpret district level findings of the secondary analysis with a view to identifying those schools, union councils and tehsils which are most in need of urgent intervention to improve education quality in primary and middle school.

5. PMIU, DSD and PEC collaborate to develop coordinated EMIS databases in each agency that can be used to facilitate operational management of a large, complex and widely dispersed school system and to provide for comprehensive, evidence-based education policy and planning.

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