

The Comparative Study of Achievement of Male and Female Mathematics Students of Higher Secondary Schools and Colleges at Intermediate Level in Punjab

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Abstract

The main purpose of the study was to compare the achievement of male and female mathematics students of higher secondary schools and colleges at intermediate level in Punjab. The major objectives of the study were: To compare the achievement of male and female students in the subject of mathematics at higher secondary school level, to compare the achievement of male and female students in the subject of mathematics with respect to teachers' teaching experience, to compare the achievement of male and female students in the subject of mathematics with respect to teachers' qualifications and to examine gender difference, gender difference in positive attitude of teachers towards students. The population of the study comprised 1336 mathematics teachers and 73455 male and female mathematics students of higher secondary schools and colleges of Punjab province. The study was delimited to two Boards, i.e. Rawalpindi and Sargodha. The researchers used two questionnaires as research instruments. The researchers personally visited the selected institutions and the questionnaires were administered to 440 mathematics students of part-2 at intermediate level, and 60 mathematics teachers from higher secondary schools and colleges. The data were analyzed by using t-test and chi-square-test. The main conclusions of the study were: The performance of girls was better than performance of boys. Students taught by experienced teachers showed better performance. Teachers' qualification influenced students' performance. Students taught by highly qualified teachers (M. Phil. /Ph.D.) showed better performance than those taught by less qualified teachers. The female teachers had more positive attitude towards students than male teachers.

Keywords: Comparative, achievement, male and female students, mathematics

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Introduction

Education is one of the basic human needs. It enables human beings to lead a balanced life and contribute to society in the best possible way. Our Holy Prophet Muhammad (SAWW) advised the Muslims to seek knowledge from cradle to grave. Education is a progressive development of the individual in all faculties: physical, intellectual and moral. As a result of disciplined growth of the entire personality, an educated person shows balanced development in all aspects. The teaching pedagogy is vital because method is nothing but a scientific way of presenting the ideas, keeping in mind the psychological requirements of the children. The better achievement of educational institutions can bring prosperity in a country. Responsible supervisory staff should be well trained for effective check and balance that helps the staff to solve the academic problems. In Pakistan educational supervision very scarcely takes advantages of the modern ideas and theories. Management keeps work of supervision-limited to the achievement of faculty staff (Government of Pakistan, 2009). The deficiencies impaired the quality of teaching and learning that contributed to health and safety problems for staff and students. Building design had been linked with teacher motivation and student achievement (Filardo, 2008). One of the most essential duties for administrators was to provide suitable facilities (Kowalski, 2006).

Mathematics occupies central position in education because mathematics is a science and the nucleus of all other sciences, which lays strong emphasis on both theory and practical. Mathematics is also called the science of reasoning. There were a few premises on which we based our reasoning. Reasoning in Mathematics is of two types: Inductive and deductive. When statements containing mathematical truths were based on general observations and experience, reasoning is called inductive whereas deductive type the statements are products of mind. The method of teaching is very important for teacher of any subject generally and for the mathematics teacher particularly. Method is nothing but a scientific way of presenting the subject, keeping in mind the psychological and physical requirements of the children. For effective learning of mathematics the method has to be as good as the content. It is through method only that it is possible to make a subject interesting and useful. While teaching a set of pupils with varying interests, aptitudes and attitudes, one should be aware of the psychological basis of teaching learning process. Communication of ideas and development of concepts in a precise manner based on a logical development of subject is the most important pre-requisite in teaching a subject like mathematics. Generally students were afraid of studying mathematics, as there are various reasons for that method being one of them. Pupils tend to learn mathematics through a meaningful approach rather than by a mechanical process. Education has

many aspects e.g. learning, guidance and counseling, evaluation, teaching and testing. Testing is a process for accurate evaluation. An instrument used for testing is called test. Tests may be used as an evaluative, teaching, guiding, supervisory and research device (Garrison, 1960). Tests are used to measure the quality or genuineness. Achievement tests are used to measure students' knowledge (Aiken, 1985), actual learning in education subject matter (Freeman, 1965).

The goals of teaching at college level are countless, and include not only academic objectives, but social ones as well (Darder, Baltodano & Torres, 2003; Gutierrez, 2002). Still, mathematics and reading are typically considered by the majority of society to be the fundamental subjects to know and are therefore what are most commonly used to measure a student's or school's success or failure. In particular, mathematics is said to serve as a "critical filter," or a gateway to many high-status occupations (Schoenfeld, 2004), as quantitative skills are crucial in such areas as commerce, medicine, technology and defense (National Mathematics Advisory Panel, 2008). In addition, mathematics achievement is considered to be a better indicator of school effects because it is thought to be less influenced by family background and home effects than other subjects (Heyneman, 2005). Therefore, the research presented herein focuses on mathematics achievement as a measure of school effectiveness.

Proficiency of achievement is a given skill or body of knowledge (Swan, 2000). Statistics has great importance in all fields of researches. Statistical techniques were used for elaborating of results. Statistics is suitable tool for the analysis (quantitative as well as qualitative) used also in achievement testing. No worth-mentioning research work has been seen in the field of testing in the subject of Mathematics, especially at Higher Secondary stage. The major purpose of study was a comparison study of gender wise achievement of the students of mathematics at intermediate level. Mathematics is being taught as a core subject up to secondary level. However it becomes an optional subject from Higher Secondary School level onwards. No one could deny the importance of mathematics in every sphere of life. Mathematics is the most fascinating discourse of human knowledge. It is based on logic. In mathematics, by using widely accepted statements, conclusions were drawn and mathematical systems were developed. The basic mathematics taught in higher secondary schools involved the study of numbers quantity form and relationship. For example, the contents and scope of mathematics include: Arithmetic Algebra, Trigonometry, Basic Statistics, Information System, Functions, Differentiation, Integration, Analytic Geometry, Linear Programming, Conic Section, Vector Analysis, Computer Technology and many new emerging concepts associated with

mathematical reasoning. No doubt that a larger proportion of failures have been reported in Science subjects particularly in mathematics. Of course, it is universally recognized that the quality of testing controls the quality of teaching. Proficiency of achievement is a given skill or body of knowledge (Swan, 2000). The study was designed for comparison analysis of gender wise students' achievement in Mathematics at intermediate level.

Objectives

The major objectives of the study were as under:

1. To compare the achievement of male and female students in the subject of mathematics at higher secondary school level.
2. To compare the achievement of male and female students in the subject of mathematics at higher secondary school level with respect to teachers' teaching experience.
3. To compare the achievement of male and female students in the subject of mathematics at higher secondary school level with respect to teachers' qualifications.
4. To examine gender difference gender difference in positive attitude of teachers towards students.

Hypotheses

To achieve the above objectives following null hypotheses were tested:

1. There is no significant difference in the achievement of male and female students of mathematics at intermediate level.
2. There is no significant difference between the achievement of male and female students in the subject of mathematics at higher secondary school level with respect teachers' teaching experience.
3. There is no significant difference between the achievement of male and female students in the subject of mathematics at higher secondary school level with respect teachers' qualifications.
4. There is no significant gender difference with respect to positive attitude of teachers towards students.

Research Methodology

This study was descriptive in nature which adopted quantitative approach to obtain the results. The study was delimited to two Boards of Intermediate and Secondary Education, i.e. BISE, Rawalpindi and BISE Sargodha. For evaluation of achievement of the students in Mathematics at intermediate level in comparative perspective, the results of the students of Mathematics HSSC-I in higher secondary schools and colleges of Punjab Province were obtained.

Population

The data has been taken from Ph. D dissertation author No.1. Population of the study included all 1336 teachers and 73455 students of higher secondary schools and colleges of sampled BISEs in Punjab province.

Sample

Sixty Two (60) Mathematics Teachers and Four Hundred Forty (440) Mathematics Students (appeared in F.A /F.Sc. Part-1) from 24 higher secondary schools and 24 colleges of Sargodha and Rawalpindi Board of Intermediate and Secondary Education were selected as the sample of the study using Stratified and Simple Random Sampling techniques.

Research Instrument

Two questionnaires were developed and administered on the sample.

- 1 Questionnaire for mathematics teachers
- 2 Questionnaire for mathematics students at intermediate level

Collection of Data

The researcher personally visited the sample institutions and collected the information from mathematics teachers and mathematics students of part-2 at intermediate level. The researcher also visited BISE Rawalpindi and BISE Sargodha for HSSC-I Annual Examination 2012 results.

Analysis of Data

The data were analyzed by using SPSS (Version-21) and statistical techniques (t-test and chi-square-test Monte-Carlo simulation method) for describing, analyzing and interpreting the situational analysis of achievement of male and female students of higher secondary schools and colleges at intermediate level. Comparison of successful students by gender was found by applying t-test. Its description is given in table 1.

H_{o1} : There is no significant difference in the achievement of male and female students of mathematics at intermediate level

Table 1

Comparison of Pass Percentage between Male and Female Students of HSS's and Colleges

Category	Male	Female	<i>t</i> -value	p-value
Colleges	60%	72%	3.408	0.000
HSS	59%	69%	3.467	0.000
Overall	59%	70%	3.832	0.000

Table 1 shows that difference between overall achievement of male and female was found significant difference between them, thus the null hypothesis H_{o1} was rejected. The achievement of girls was better than the achievement of boys in HSSs and Colleges.

Comparison of successful students by gender was found by applying t-test. Its description is given in table 2.

Table 2

Gender wise Comparison of Pass Percentage between HSS's and Colleges

Gender	HSS's	Colleges	<i>t</i> -value	p-value
Male	59%	60%	0.06	0.952
Female	69%	72%	0.423	0.672
Overall	62%	66%	1.235	0.186

Table 2 shows that there was no significant difference found between the achievement of male and female students of HSSs' and colleges; thus, the null hypothesis H_o was accepted.

H_{o2} : There is no significant difference between the achievement of male and female students in the subject of mathematics at higher secondary school level with respect teachers' teaching experience.

Table 3

Analysis of the Performance of the Students Due to Teacher Experience

Type of Institute	Less than 10 years Exp	More than 10 years Exp	<i>t</i> -value	p-value
Overall	53%	68%	1.077	0.028
Male	52%	69%	0.152	0.879
Female	54%	67%	2.402	0.017

Table 3 indicates that the overall achievement of the male and female students who were taught by the teacher having teaching experience up to ten years or more than ten years was found significant. The null hypothesis H_0 2 was rejected. The achievement was better in male and female students due to experienced teachers.

The comparison of the performance of students taught by the teachers having the degree of M. Sc. and M. Phil/Ph. D was found by applying t-test. Its description is given in table 4.

H_0 3: There is no significant difference between the achievement of male and female students in the subject of mathematics at higher secondary school level with respect teachers' qualifications.

Table 4

Comparison of male and female students' performance due to higher qualification of teachers

Type of Institute	MSc	MPhil/PhD	t-value	p-value
Overall	65%	64%	-0.014	0.989
Male	64%	65%	0.014	0.989
Female	44%	64%	2.24	0.019

Table 4 states that overall performance of the students taught by teachers holding M. Phil degree was non-significantly different from those taught by teachers holding M.Sc. degree. In colleges the students taught by M. Phil qualified teachers had better performance as compared to M. Sc. teachers.

H_0 4: There is no significant gender difference with respect to positive attitude of teachers towards students.

Table 5

Positive Attitude toward Students

Category	Mostly	To Some Extent	Not at All	Total	χ^2	p
Male	24(66.7%)	9(25.0%)	3(8.3%)	36	6.68*	0.32
Female	20(83.3%)	2(8.3%)	2(8.3%)	24		
Total	44	11	5	60		

df=2

Chi. Sq. at 0.05= 5.988

*Non-significant

Table 5 indicates that the chi-square value was found to be significant at 0.05 level. The female teachers had more positive attitude towards students than male teachers.

Conclusions

The findings of the study led to the following main conclusions. The overall performance of boys and girls significantly differed. The performance of girls was better than performance of boys. Teachers' experience influenced students' performance. Students taught by experienced teachers (more than ten years) showed better performance than those taught by less experienced teachers. Teachers' qualification influenced students' performance. Students taught by highly qualified teachers (M. Phil. /Ph.D.) showed better performance than those taught by less qualified teachers. The female teachers had more positive attitude towards students than male teachers.

Recommendations

On the basis of conclusions, the following are recommendations. As female students showed better results than male students because the female teachers are more dutiful, responsible and committed towards their profession, it is recommended that female teachers' expertise may be shared for increasing male mathematics teachers' expertise. It is recommended that both male and female mathematics teachers of higher secondary school and colleges may also be given opportunities to enhance their pedagogical skills by participating in annually in-service refresher courses and workshops. It was further concluded that experienced teachers (more than 10 years) influenced the better performance of the students as compared to less experienced teachers, it is recommended that experienced teachers be given opportunities to share their experience with inexperienced teachers during in-service refresher courses. The highly qualified (M. Phil/Ph.D.) teachers showed better performance as compared to less qualified teachers. It is suggested that teachers who improve their qualification, be offered special incentive i.e. promotion in higher grades or special financial benefits. More similar research studies may be conducted in other subjects at intermediate level in these boards as well as in other boards of Pakistan.

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