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GENDER DIFFERENCE IN STUDENT'S ATTITUDE TOWARDS MATHEMATIC AND THEIR ACADEMIC ACHIEVEMENTS AT SECONDARY LEVEL

Nazish Bashir
M. Phil Scholar, Department of Psychology, Hazara University Mansehra, Pakistan.

Kiran Akram
M. Phil Scholar, Department of Psychology, Hazara University Mansehra, Pakistan

Rabia Bashir*
Lecturer, Department of Psychology, Hazara University Mansehra, Pakistan
rabiaadeel1617@yahoo.com

ABSTRACT
The study was in purpose to find gender differences in student's attitude towards mathematic and their academic achievement at secondary level. Data for this study was collected through the questionnaires from the students at Secondary schools of Rawalakot (three schools) and Muzaffarabad (two schools). Two hundred students (100) boys and (100) girls were selected randomly from available selected schools. Attitude scale towards mathematics (39 items) and academic achievement scale (65 items) were used as research instruments. The analysis of data revealed non-significant gender differences on the basis of enjoyment and motivation of mathematics. Significant gender differences were found regarding fear and anxiety of mathematics, females had more anxiety and fear then males. Furthermore, male students had more confidence and self-concept of mathematics then female students. Value and utility of mathematics is more in males then females. However, parents and teachers expect more from boys for good achievement and attitude of male students towards mathematics was greater than females. It was also observed that there were non-significant gender differences in overall academic achievement in mathematics.
Keywords: Academic Achievement; Gender differences; Attitude; Mathematics; Secondary School Students.

INTRODUCTION
Higher Education Curriculum Committee (1959) report has indicated the importance of mathematics in the following words. Mathematics is required for two purposes: firstly, for the daily life of ordinary citizens and secondly, for academic purpose as a tool for generating future scientists, engineers, and technicians. Attitude is an indicator of how we think and look at society, different items, and problems in our surroundings. In adding, it can offer clue about the expectations and prediction about how we will meet the object of our faith (Santrock, 2002). Akin and Oulu (2011) noted that the importance of mathematics is undeniable, because implications of mathematics in our daily life are very big. employees, housewives, farmers and even a schoolboy will not be able to do a simple calculation, weight and other measures without the involvement of mathematics. In addition, usually citizens and heads need to use math in calculating their income and overheads.

Many of the studies compared gender differences in mathematics with respect of self-control and confidence. It was found that girls are at lower level then boys (Norton & King, 1998). In several cases, the boys are better than girls, and even more confident about their math scores (Casey et al., 1997). Vermeer et al. (2000); Boaler, (2000) further showed that gender differences in confidence is more significant than computational problems, and girls showed considerably reduced application problems in confidence. Minano and Hund (2011) indicated that girls feel pleasure in learning math, mathematical task and increase their positive emotional responses for teaching mathematics.

Sixth-grade girls discussed the effects of cooperative learning as boys and girls can learn more effectively through combine study. Firstly, girls had more positive attitudes than boys, but when they

* Corresponding Author

continued in school, their attitude became more negative. To get better the performance of girls in mathematics, teachers need to promote positive attitudes for math among girls (Sakiz & Hoy, 2012). Students attitude can be prejudiced by the teacher's attitude and her method of teaching. Study has shown that method of teaching mathematics and encouraged behavior develop positive attitude towards mathematics (Gil & Guerrero, 2005).

In the history, many of the American scientists and engineers were women. Women do pursue careers in science, engineering, and mathematics most often choose field in the natural sciences. Gender differences do not affect to all aspects of math skills. Men and women have the same essential knowledge of mathematics, and the females have good calculation skill (Miranda, 2012). For the presentation in the mathematical reasoning and geometric skills there is the biggest difference. Males showed greater self-confidence in their math skills, good prediction of mathematics achievement (Kaix et al., 2001).

Halpern (2004) founded that in many of the young women education is affected by the poor math skills. Socio-cultural factor can affect the attitude of girls in mathematics and sciences. For example, parents think that math is more important for boys while language, arts and social studies are important for girls. Parents are more expected to persuade the children to attend in chemistry, mathematics and physics, advanced high school courses and have higher expectations for their achievement (Wigfield et al., 2002).

The history of mathematics is one of the oldest in human history. With the creation of man in the world, he faced the problems of shelter, food, and clothing. To deal with these fundamental issues, men feel the need to count and measure, provide this much needed appears as a mathematics course. Mathematics has a huge modern life, it is the queen of all sciences and plays a vital role in the development of mathematics in the sciences (Ladot, 2005).

Languages of instruction in the schools are mainly Urdu, but most teachers use English language as the language of instruction. Now the language of math has been converted into the English, for better understanding later in life. At the secondary stage students can choose to take the scientific group or universal group. Including other subjects; physics, chemistry, biology, advanced mathematics (which is more focused on algebra, functions, and trigonometry) (Ali, 2006).

Gender Differences and Mathematics

The study of Anokye and Ampadu (2020) revealed that, both genders held positive attitudes towards mathematics without any gender difference. However, the study found that there was difference on basis of achievement in mathematics. Parents, teachers and educators should develop should create ways for motivation of students and helping them. In this way especially female students can build self confidence in mathematics learning. If the teaching and learning process will not be effective and productive then learning math skills may get worst. Mathematical skills are important to develop analytical skills for decision making and solving problems of daily life (Mountain & Kaufman, 2008).

According to Markman (2008) girls and boys from the childhood get a different reaction from mathematics teachers. Teachers are more likely to give confidence to the boys by telling them that math complexes can be solved, and it is simple to obtain skills. On the other hand, when the girls are in trouble often convey how mathematics is difficult and do not necessarily flow ability to get confidence in girls, to understand the critical problems. Because of these different points, the girl only sees the mathematics in a limited time. Boys are more likely to understand mathematical concepts, because they can understand it as a skill, which can be implicit only from side-to-side preparation.

Gender Differences and Academic Achievement

The meta-analyses tell us that in many countries small gender differences in mathematics achievement can be observed. Studies also provide evidence of gender differences in size has also declined compared to the past few decades (Else et al., 2010). According to Quist et al. (2010) the gender gap still exists in some countries but not in others. Boys feel more confidence in their math abilities and feel less anxiety, more extrinsic and intrinsic motivation to do good in mathematics than girls. Boys scored higher than girls in mathematics self-concept and self-efficacy.

On the other hand, current studies point to the mathematics and positively related to academic achievement of students and attitudes towards mathematics. As revealed major correlation between attitude and performance. Having a positive attitude, makes better student (Sanchez, 2014).

METHODS

This chapter includes procedures, strategies, and implementation, to complete the research study. The study is essentially a descriptive type on attitudes and academic performance of the students on the school level mathematics. Sample is discrete, small proportion selected from population for data collection and analyses. Random sampling technique was adopted for selecting 100 students (50 males and 50 females). Sampling allocated students from 5 schools out of which 3 schools of Rawalakot and 2 from Muzaffarabad were chosen. From each school 20 students (10 boys and 10 girls) were taken.

The research instruments developed for the students to collect data were, (a) Scale to measure the attitude of students towards Mathematics. (b) Academic achievement of students towards Mathematics. The reliability of the questionnaire was calculated through Cronbach's Alpha. The reliability of the questionnaire was found to be 0 .727.

RESULTS

This chapter deals with analyses and interpretation of data collected by researcher from the respondents. The main objectives were to find out difference between the attitude and academic achievement of students towards mathematic. The data is presented in the form of tables in this chapter.

Table No. 1 Gender difference in Enjoyment and Motivation for mathematics.

Gender	*N*	*M*	*SD*	*t*	*p*
Male	100	39.38	2.473	0.706	0.481
Female	100	39.22	2.622	0.706	0.482

Above table depict that there is non-significant difference ($p > 0.05$) between motivation of male and female students regarding enjoyment in learning mathematics.

Table No. 2 Gender difference in Anxiety and Fear of mathematics.

Gender	*N*	*M*	*SD*	*t*	*P*
Male	100	13.80	3.886	-8.8	.000
Female	100	23.36	6.647	-8.77	.000

There is a significance difference ($p < 0.05$) between anxiety of male and female students regarding fear of mathematics. As mean score of male students (13.80) is lesser than female students (23.36), male students were inferior to female students regarding anxiety as factor of fear.

Table No. 3 Gender difference in Confidence and Self-concept of mathematics.

Gender	*N*	*M*	*SD*	*t*	*p*
Male	100	30.44	2.572	5.76	.000
Female	100	25.34	4.335	7.15	. 000

There is a significance difference ($p < 0.05$) between confidence of female and male students regarding self-concept of mathematics. As mean score of male students (30.44) is greater than female students (25.34), male students were superior to female students regarding confidence as a factor of self-concept.

Table No. 4 Gender difference in Value and Utility of mathematics

Gender	*N*	*M*	*SD*	*t*	*p*
Male	100	26.26	1.871	4.66	.000
Female	100	21.94	4.181	6.66	. 000

There is a significance difference ($p < 0.05$) between utility of male and female regarding to value of mathematics. As mean score of male students (26.26) is greater than female students (21.94), male students were superior to female students regarding value as a factor of utility.

Table No. 5 Gender difference in Expectations of parents and teachers

Gender	*N*	*M*	*SD*	*t*	*p*
Male	100	30.46	2.573	3.671	.000
Female	100	25.50	5.614	5.679	. 000

Significance difference ($p < 0.05$) was found between views of male and female students regarding expectations of parents and teachers. As mean score of male students (30.46) is greater than female students (25.50), male students were superior to female students regarding Expectations' of ''Parents'' and' Teachers''.

Table No. 6 Gender Difference in Attitude

Gender	*N*	*M*	*SD*	*t*	*p*
Male	100	1.403	5.505	1.057	.002
Female	100	1.351	10.60	3.065	. 003

Significance difference ($p < 0.05$) was found between overall attitude of male and female scale. As mean score of overall attitudes of male students (1.403) is greater than female students (1.351), male students were superior to female students in overall attitude.

Table No. 7 Matrices and Determinants

Gender	*N*	*M*	*SD*	*T*	*p*
Male	100	4.540	1.728	-3.67	0.47
Female	100	5.160	1.330	-2.01	0.68

A non-significance difference ($p > 0.05$) between male and female regarding to matrices and determinants of academic achievements in mathematics was found.

Table No. 8 Real and complex Numbers

Gender	*N*	*M*	*SD*	*t*	*p*
Male	100	1.540	.9082	-746	.460
Female	100	1.680	. 9781	-742	.457

No significance difference ($p > 0.05$) between male and female regarding to real and complex numbers of academic achievement in mathematics was found.

Table No. 9. Algebraic Expression and Algebraic Formulas

Gender	*N*	*M*	*SD*	*T*	*p*
Male	1-00	7.480	1.593	-787	.475
Female	100	7.700	1.474	-717	.440

Non-significance difference ($p > 0.05$) between male and female students regarding to Algebraic expression and Algebraic Formulas in academic achievements was found.

Table No. 10 Factorization

Gender	*N*	*M*	*SD*	*t*	*P*
Male	100	2.500	.909	.000	1.00
Female	100	2.500	.931	.000	1.02

No significant difference ($p > 0.05$) between male and female students regarding to Factorization of academic achievement in mathematics was found.

Table No. 11 Algebraic Manipulation

Gender	*N*	*M*	*SD*	*t*	*p*
Male	100	3.700	1.07381	-1.984	.150
Female	100	4.140	1.14304		
				-1.968	.250

Non-significant difference ($p > 0.05$) between male and female students regarding to Algebraic Manipulation of academic achievement in mathematics was found.

Table No. 12 Linear Equations and Inequalities

Gender	*N*	*M*	*SD*	*T*	*p*
Male	100	4.740	1.626	-2.57	0.19
Female	100	5.500	1.568		
				-2.37	0.18

Non-significant difference between ($p > 0.05$) between male and female students regarding to Linear Equation and Inequalities of academic achievement in mathematics was found.

Table No. 13 Linear Graphs and Their Applications

Gender	*N*	*M*	*SD*	*t*	*p*
Male	100	3.660	1.22	.057	.939
Female	100	3.640	1.39		.876
				.076	

No significant difference ($p > 0.05$) between male and female students regarding to Linear Graphs and their applications of academic achievements in mathematics was found.

Table. 14. Introduction to Coordinate Geometry

Gender	*N*	*M*	*SD*	*t*	*P*
Male	100	3.120	1.171	-.651	.587
Female	100	3.220	1.055	-.448	.655

No significance difference ($p > 0.05$) between male and female students regarding to Introduction to coordinate Geometry of academic achievements in mathematics was found.

Table No. 15 Parallelograms and Triangles

Gender	*N*	*M*	*SD*	*T*	*P*
Male	100	4.36	1.870	-3.56	.095
Female	100	4.90	1.281	-1.684	.096

No significant difference ($p > 0.05$) between male and female students regarding to Parallelograms and Triangles of academic achievements in mathematics was found.

Table No. 16 Total Academic achievement

Gender	*N*	*M*	*SD*	*t*	*P*
Male	100	39.98	7.760	-3.45	0.54
Female	100	42.58	5.372	-1.948	0.55

No significant difference ($p > 0.05$) between male and female in overall academic achievement in mathematics was found.

DISCUSSION AND CONCLUSION

The current study examined that differences of gender in student's attitude towards math and their academic achievement at secondary level. It hypothesized that attitude scale coded into five strategies like, Gender difference in Enjoyment & Motivation of Mathematics, Gender difference in Anxiety, Gender difference in Confidence & Self- concept of Mathematics, Gender difference in Value & Utility of Mathematics, Gender difference in Expectations of Parents & Teachers.

Second scale was a test for academic achievements of secondary school students, which was created from the book of 9th class and 10th class. The test questions were also categorized into nine factors that were Matrices and Determinants, Linear Equations and Inequalities, Linear Graphs and their Applications, Introduction to Coordinate Geometry and Parallelograms & Triangles, Real and Complex numbers, Algebraic Expression & Algebraic Formulas, Factorization, Algebraic Manipulation.

There is evidence from the present study that students of both genders have enjoyment and motivation for math equally. According to the Boaler (2008) when boys and girls can work together to learn math, overall they are all more successful. Girls and boys both have equal level of motivation for learning the math, academic achievement was equal in both genders. Devine and his colleagues showed that there is no gender difference in mathematic performance, despite girl exhibit more mental anxiety than boys. Thus, by comparing girls and boys, arithmetic performance there is not a gender related mathematics attainment and motivation gap (Devine, 2012).

The study found that girls are less confident, they are afraid and anxious of math while boys are confident about math. The result is consistent with the previous research findings that, despite of the success of the overall similarity, boys feel more confidence in their math abilities feel less anxiety, more extrinsic and intrinsic motivation. They have more skills of value and utility to do good in mathematics than girls. Boys scored higher than girls in mathematics, self-concept, and self-efficacy (Else et al., 2010). The study of Rodriguez et al. (2020) identified that girls have less positive attitude towards math, anxiety level is found in girls than boys. Despite girls reporting higher level of anxiety and fear that might have negative impact on their result. Results from the study of Mozahem et al.

(2021) indicated that girls are more likely to receive negative information, thus leading them to have lower levels of self-efficacy and confidence in math.

Study revealed that value and utility of math is more in males then females. According to literature, in comparison with boys, girls expect less for success in math. They have low value and utility to perform well in math as compared to male. This difference indicates the reason of increased enrollment rate in these courses for boys (Watt et al., 2012). Hulleman and colleagues (2008) found that students' consideration of utility value predicted achievement in every field. Students who have more utility value for math, persist more and perform better than those who had low level.

According to study parents and teachers expect more from boys for good achievement in math. Petr (2012) said that gender differences in math scores are because of parents and teachers' wrong ideas and the stereotype of same age girls. Gender differences in expectancies for success can be influenced especially by parents and teachers. Parents have over expectancies for success in science and math from boys and least expectations of success from girls. This causes the demotivation for girls (Rozek et al., 2014).

Study found that attitude of male students was higher than female students. Findings from literature support this finding as Ladot and Cabahug (2005) mentioned in the study conducted at the university of the Philippines about the largest failure in mathematics due to the students' attitude towards math. Learning of mathematics is related to the motivation and self-decision of students and boys have more positive attitude towards math.

Research study found that there as non-significant difference in overall academic achievement of students in math. The result from study of Oluwatelure et al. (2015) revealed a significant gender difference in the performance and attitude of students for math. Therefore, significant difference was found in academic achievement of both males and females.

The attitude scale developed to measure the attitude towards mathematics was found reliable and valid. In concluded, there was non-significant difference between motivation of male and female regarding enjoyment in learning math. It was found that there was a significant difference between fear, confidence, utility and expectation of parents and teachers towards mathematics. Furthermore, significant difference in overall attitude in mathematics was found whereas, no significant difference in overall academic achievement in mathematics was found.

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