COMPARATIVE ANALYSIS OF ACADEMIC ACHIEVEMENTS OF MALE AND FEMALE STUDENTS IN MATHEMATICS AT GOVERNMENT HIGH SCHOOLS OF PUNJAB

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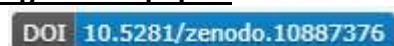
Abstract

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Investigating whether gender-based differences in high school students' mathematics accomplishment exist is crucial given the importance of mathematics proficiency for future academic and career success. The purpose of this research is to provide empirical evidence to the body of literature by demonstrating that male and female students in government high schools possess equivalent mathematical abilities. To this end, a rigorous sampling procedure and quantitative methods for data analysis are employed. The objective of this research was to determine the difference between the mathematics achievement of male and female students in high school. For this research, the researcher used a random sampling technique to choose five government high schools existing in Lahore out of a total of 46. To achieve the target sample size of 400 participants, the study included the complete student population of each selected school and class. Since the research adopted a quantitative approach, and after gathering data through a questionnaire, the data relating to students' mathematics achievement was entered into SPSS16 software for analysis. The researcher employed statistical methods such as the skewness, kurtosis metrics, Levene's test and independent-sample t-value at a 0.05 level of significance to evaluate and interpret. According to the findings of this study, there is no significant difference in mathematics achievement between male and female students at government high schools. According to the statistics, their mathematical talents are equivalent and there is no substantial difference.

Keywords: Mathematic, Punjab public schools, Male, female, achievement

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Introduction

It is worldwide admitted that mathematics is the mother of all sciences. Any logical inquiry without mathematics is absurd to consider. Reading, writing, and math are the three R's that make up mathematics (Unity & Igbudu, 2015). Every student has to accomplish definite, dynamic aims and objectives in his or her daily life. To accomplish these goals, mathematics is a crucial component. Everybody's daily life depends heavily on mathematics, but prior studies have revealed that student achievement in this subject is not up to par. Another factor is that math proficiency among female pupils is acknowledged as a national issue. There is a gender gap in arithmetic achievement, according to worldwide data (Ashim & Ahmed, 2018). The success of a human in every area of life in the twenty-first century is now largely dependent on mathematics. Achievement is defined as knowledge or competence that a student has acquired generally in the academic areas dignified by exam marks and grades provided by the teacher, institution, or both. By way of completing all of science, mathematics has frolicked a central character in the framework of modern advancement. Achievement in mathematics is a crucial component of educational success in the current era. In a lot of vocations, it is essential for success. Mathematical achievement is the capacity in mathematics that the learner displays. It is the product of acquired data or knowledge, careful consideration, abilities, and procedures created in the field of mathematics at a specific stage. Government high schools are simply government-run institutions that students attend after middle or primary school and typically include grades 9 through 12. (Pedro Rosario.al, 2020)

Mathematics, being a foundational subject, is extremely important in the field of education. A certain amount of mathematical skill is required at all stages of life (Singh & Mahajan, 2021). Even though this is crucial, many students struggle in math classes and fail as a result of their math-related nervousness (Goetz et al., 2013). Although mathematics plays a momentous role in nature, the majority of studies looking at kids' math proficiency in Pakistan have been carried out by a variety of organizations and researchers (Ashim & Ahmed, 2018). These studies have demonstrated that kids' overall math performance is subpar and that their math performance is poorer than in other disciplines (Ashim & Ahmed, 2018). Previous studies have demonstrated that pupils' inferior arithmetic proficiency levels are typically brought on by their worry about the topic. Math anxiety refers to the feeling of worry and tension that any person experiences when engaging with calculation, and it has extended as a foundation of apprehension in the arena of schooling (Roos et al., 2015). Numerous Studies have been accomplished in the most recent years that focus on pupils' math achievement. The majority of earlier studies focused on how anxiety, gender, and other factors affected students' math ability, but it is also important to determine the kids' current arithmetic accomplishment status. Through this study, the mathematics proficiency of both male and female students in government high schools is compared at the matric level.

Statement of the Problem

To learn mathematics in government high schools, boosting students to acquire knowledge. While some of their accomplishments have been partially or fully accepted in the form of accepted grades or marks, the learning atmosphere, parental guidance, and teaching materials have all helped to improve them. Education in mathematics can give a solid foundation to the learners, through this process, people can develop their own distinctive and skilful approaches for an accurate and comprehensive assessment. Pakistan is one of those countries where students attend government, private, and madrassa schools.

The curriculum development centre has made this subject required for students in grades I through X. Additionally, private schools have taught arithmetic using the English language. Even a few government schools have adopted English as their primary language. Despite all of the government's efforts to date, the problem has not been fixed. Students' desire for mathematics, class size, extracurricular math activities, time management, and the utilization of instructional materials in the classroom, periodic tests, unit tests, and regular homework assignments are all variables that can have a substantial impact on learning mathematics. Mathematics is equally important for students despite their gender differences, so this research intends to find out the mathematical achievement of Male and Female students of Government high schools in Punjab.

Objectives of the Study

1. To identify the mathematics achievement of male and female students in government high schools in Punjab.
2. To identify the difference between the mathematics achievement of male and female students in high school.

Hypotheses

Null Hypothesis (H0):

There is no significant difference in mathematics achievement between male and female high school students.

Alternate Hypothesis (H1):

There is a significant difference in mathematics achievement between male and female high school students.

Research Questions

1. How much do male and female students in Punjab's government high schools achieve on average in mathematics?
2. Is there any difference between the mathematics achievement of male and female students of high school?

Significance of the Study

This research tries to discover out the dissimilarity in the achievement of the government high school for both male & female students. The results of this research might be beneficial, frequently for the individuals functioning in the domain of schooling such as educators, syllabus designers, schoolchild specialists, representatives, textbook authors etc.

I. Educators

Understanding potential gender-based disparities in academic achievement can help develop instructional strategies that successfully meet the requirements of both male and female students. To guarantee that every student has equal access to learning opportunities, educators can better address any gaps by implementing customized interventions and support systems.

II. Syllabus designers

The research's conclusions can direct the creation of a gender-sensitive curriculum, guaranteeing that instructional materials are inclusive and supportive of both genders' learning needs. Recognizing areas in which one gender may perform worse than the other can help in rewriting curricula to make them more accessible and equitable.

III. Schoolchild Specialists

It gives the experts useful information on the elements affecting both male and female students' academic performance, allowing them to provide specialized support services like mentorship, counselling, or remedial instruction. It helps create a more equal learning environment by assisting in the development of solutions to address any gender-based discrepancies in educational attainment.

IV. Government Representative

The implementation of activities aimed at fostering gender equality and inclusivity in schools might be influenced by data-driven evidence on gender-based variations in academic attainment. Contributes to the overall development of education in the area by assisting in the allocation of resources and

the creation of measures to close any gender gaps in educational attainment.

V. Textbook Authors

Authors can create textbooks and supplemental materials that accommodate a variety of learning styles and preferences by taking into account the differences in performance between male and female students.

They make sure that instructional materials are created in a way that promotes equal involvement and participation from both sexes, which eventually improves the efficiency of instruction.

Literature Review

Everybody's daily life depends heavily on mathematics, but prior studies have revealed that student achievement in this subject is not up to par (Smith & Johnson, 2018), (Garcia & Lee, 2019), (Chen & Wang, 2020), (Jones & Patel, 2017). The other factor is that math achievement among female pupils is acknowledged as a national concern. According to international research, arithmetic achievement varies by gender as well (Unity & Igbudu, 2015). In today's modern world, having a firm understanding of mathematical ideas and abilities is becoming increasingly important for scholastic and financial success. According to Tamayo's (2021) research, high school students' mathematical aptitude has a considerable influence on their likelihood of enrolling and graduating from college, as well as their earnings potential in the early stages of their career and beyond. In 2008, the National Mathematics Advisory Panel emphasized the significance of mathematics in preparing individuals for success in a constantly changing world). The strong point of these associations seems to have augmented in modern times, possibly as a result of an increase in the number of lucrative positions demanding mathematical skills (Letsoalo, 2022). On the other hand, many students lack even the most fundamental mathematical skills needed to

succeed in everyday employment within a modern budget. Children who grow up in poverty and slum environments are mostly at risk for poor math performance (Roos et al., 2015). Merely when children begin their school and are exposed to a gasping set of approaches, they believe they will have to receive and recall, the delight and curiosity that fresh students have with arithmetic are swiftly substituted by trepidation and hatred. In Finland, one of the top-performing nations worldwide on the PISA (Program for International Student Assessment) exams, formal mathematical methods are not introduced to children while waiting until they become 7 years old. In the US, schoolchildren begin far previous, and by the time they are seven, they have previously well-educated about the algorithms for addition, subtraction, multiplication, and division of different numbers as well as being forced to memorize the multiplication facts (Singh & Mahajan, 2021). Much research has been conducted to study the possible link between students' attitudes toward mathematics and their academic achievement. Many of these researchers have discovered a link between favourable attitudes towards mathematics and academic achievement. A majority of previous research examined how children's math skills were influenced by anxiety, gender, and other variables, but it's also crucial to know where the students stand right now in terms of their math proficiency. This study compared male and female pupils' matric-level math performance in government high schools.

Research Methodology

The quantitative research design was used in this study. The study's target population included all pupils currently enrolled in grade X (having finished grade IX) at various government schools in Punjab. There were around 300 high schools in the chosen region according to their website. For this research, the researcher used a random sampling technique to choose five government high

Gender of high school		Statistic	Std. Error
Mathematics Score			
Male	Mean	40.28	1.899
	Skewness	.173	.241
	Kurtosis	-.775	.478
Female	Mean	36.72	1.574
	95% Confidence Interval for Mean	Lower Bound	33.60
		Upper Bound	39.84
	Std. Deviation	15.738	
	Minimum	5	
	Maximum	74	
	Range		

schools out of a total of 46. To achieve the target sample size of 400 participants, the study included the complete student population of each selected school and class.

Data collection

After obtaining ethical permission for this research, the investigation began with the identification of schools using a sample approach. Following that, the researcher visited the selected institutions in Lahore on several days and at different times to gather data on the mathematical achievement of grade IX pupils. Data was gathered directly from students through questionnaires as well as from administrative records. The data gathered was then divided into separate groups based on the gender of the pupils enrolled in the sampled schools.

Data Analysis & Finding

Since the research adopted a quantitative approach, the data relating to students' mathematics achievement was entered into SPSS16 software for analysis. The researcher employed statistical methods such as mean, standard deviation, and t-value at a 0.05 level of significance to evaluate and interpret.

Table 1:

Descriptive to test the normality of data of government high school students

In Table 1 our concern is the skewness and kurtosis of the male students and female students. In SPSS software, the skewness and kurtosis metrics should be as near to zero as feasible. To get the male's z value, divide the skewness metric by its standard error. 173/.241=0.717, this value is neither below -1.96 nor above +1.96. Then the value of kurtosis measures divided by its standard error -.775/.478 = -1.62 and this value is also neither below the -1.96 nor above +1.96. Now to find out the z value of female data we calculate the skewness and kurtosis of females. The value of skewness is -.024/.241=0.99which is neither below the -1.96 nor above +1.96 and the kurtosis value is -.713/.478=-149 which is neither below the -1.96 nor above +1.96. All the four z values are within+_/1.96, hence we will conclude that according to the test for skewness and kurtosis for both male and female high school pupils, this data is somewhat skewed and kurtotic. As a result, we may infer that our data is roughly normally distributed in terms of skewness and kurtosis.

Table 2:

Group statistics of between male and female students' mathematics achievement

Gender of students	N	Mean	Std Deviation	Std. Error Mean
Male	200	38.38	16.977	1.200
Female	200	42.23	15.697	1.110

Table No 2 shows the total number of male & female students and their mean and standard deviation concerning their gender and also expresses the standard error of the mean.

Table 3:

Independent sample T, test between male and female student's mathematics achievement *(On next page)*

The Levene test has confirmed that the mean math achievement of males and females is the same, p>0.05. So, the data accepted the null hypothesis such as, there is no significant

difference in mathematics achievement between male and female high school students. The independent sample t-test has shown that the mean math achievement of

	Sig.	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Mathematics score Equal variances assumed	.286	-2.358	398	.019	-3.855	1.635	-7.069	-.641
Equal variances not assumed		-2.358	395.580	.019	-3.855	1.635	-7.069	-.641

males and females is the same, t (398) =-2.358, p>0.05. According to this data, there is no significant difference in mathematics achievement between male and female high school students in Punjab.

Discussion

According to this research, the previous researches only talk about the mathematics achievement of the schoolboys of government high schools and private schools and their achievement differences. They also talk about the factors affecting students' mathematics achievement but the researcher did not find any research about the mathematics achievement of the students of government high schools.

According to data obtained from many sources, including academic records and examinations, pupils in government high schools had lower levels of mathematical ability than their peers in madrassas. Students at government high schools performed considerably below the expected norms for their grade level, with poorer math scores and marks compared to other disciplines.

The research question sought to evaluate any variations in mathematics achievement between male and female students in Lahore government high schools. The data analysis revealed that the mean mathematics scores of male and female students in government high schools were similar. According to the findings of this study, there is no obvious difference in mathematics achievement between male and female students at government high schools. According to the statistics, their mathematical talents are equivalent and there is no substantial difference.

Conclusion

The results of this study shed important light on how well male and female students in government high schools do in mathematics. After doing a thorough study of the data, it was found that there is no discernible difference in the mean mathematics scores of male and female students in this educational setting. This implies that, in opposition to preconceived notions, gender does not seem to be a decisive factor in pupils' ability in mathematics at government high schools.

These findings go against popular belief and emphasize the value of evaluating academic achievement based on personal qualities rather than just gender stereotypes. This study emphasizes the necessity for educational policies and procedures that promote equal chances and encourage the growth of all students, regardless of gender, by establishing the equivalency of mathematical talents between male and female students.

Moreover, the lack of a significant gender difference in math achievement in government high schools highlights the importance of other influencing factors, including curriculum design, teaching strategies, socioeconomic backgrounds, and student motivation. Subsequent investigations ought to probe these variables more thoroughly to gain a deeper comprehension of

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their influence on pupils' mathematics achievement and to guide focused interventions meant to improve general academic results.

Finally, by presenting concrete data that refutes stereotypes regarding gender disparities in mathematical ability, this study adds to the continuing conversation about gender equality in education. Policymakers and educators can work toward fostering an inclusive learning environment that empowers all students to reach their full potential in mathematics and beyond by recognizing and acknowledging the equivalency of mathematical talents among male and female students in government high schools.

Recommendations

The government may focus on the male & female students of government high school's mathematics achievement. The researchers may attempt to research the qualifications of the teachers of the new curriculum of mathematics. A case study may be conducted by the researchers to figure out the factors behind the difference in mathematics achievement between government high schools and private schools

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