Mathematics Learning Outcomes of Secondary School Students in Relation to Gender and Social Support

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ABSTRACT

Mathematics is a foundational subject that significantly influences student's academic success and future career opportunities. Students are the important segment of the society and their well-being, learning outcomes and success are the pillars of successful education system. For achieving this, students require a strong foundation and adequate support to effectively navigate and conquer the academic challenges they encounter. Social-support plays a significant role in education and nurturing students learning outcomes. In this context, the Present study an attempt has been made to investigate the Impact of gender and social support on mathematics learning outcomes of secondary school students. To achieve the objective of present study a sample of 460 secondary school students of class 9th selected randomly by using simple random technique (odd-even method) from different government schools situated in five districts of Himachal Pradesh. The requisite data is collected from the selected subjects by using the achievement test constructed and standardized by the researcher herself and Social support scale by Dull and Godhara (2019). For analysis of the data, the statistical technique Analysis of Variance (ANOVA) was applied. The findings of the study revealed that gender and social support significantly affects the mathematics learning outcomes of secondary school students. The present study further contributes to promoting equity in mathematics education and highlights the suggestions for promoting social support as well as interventions that enhance mathematics learning outcomes in high school teachers.

Keywords: Gender, Mathematics Learning Outcomes, Social Support, Secondary School Students.

THEORETICAL FRAMEWORK

Mathematics is a foundational subject that plays a crucial role in the cognitive and analytical development of students. However, learning outcomes in mathematics are often influenced by a combination of personal, social and environment factors. Among these, gender differences and the level of social support received from family, peers and teachers can significantly impact a student's performance. Gender based disparities in mathematics achievement have been widely studied. While some research shows that boys perform better in mathematics, others suggest no significant difference, attributing variations to socialization pattern and support system rather than inherent abilities.

Social support is equally crucial in shaping academic success. It provides emotional encouragement, academic assistance, and a sense of belonging. The influence of supportive parents, peers, and teachers is particularly significant during adolescence a time when students face multiple academic and personal challenges.

Mathematics is widely regarded as a critical subject in the school curriculum due to its role in development logical reasoning, problem-solving abilities, and quantitative thinking. Mastery in mathematics not only enhance academic success but also contributes significantly to career readiness and higher education opportunities in science, technology, engineering, and mathematics (STEM) fields. Despite its universal importance, learning outcomes in mathematics vary significantly among students. These differences can be

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attributed to a complex interplay of cognitive, emotional, social and environmental factors. Among these, gender and social support are two key variables that have gained substantial attention in educational research.

In the Indian educational context, and particularly in states like Himachal Pradesh, government schools often cater to diverse groups of students from varied socio-economic background. These schools may face challenges such as limited resources, teacher shortages, and varying levels of parental involvement. Understanding how gender and social support operate in this context can help educators and policymaker design more equitable and effective interventions to improve mathematics learning outcomes.

The old method of teaching is teacher-centered method which is replaced by now with new approach that is student-centered approach. Which is emphasizes that what students able to perform by the end of module. This strategy is called outcome-based strategy.

In the words of Battersby (1999) "Learning outcomes are the statements which describe the knowledge or skills that students must acquire at the end of a particular task, class, course, or program, and assist students in understanding how this knowledge and skills are useful to them".

According to Kilpatrick et al. (2001) "Mathematical learning outcomes are clearly defined statements that describe what students should know and be able to do in mathematics after a period of instruction. These outcomes focus on conceptual understanding, procedural fluency, strategic competence, and mathematical reasoning, guiding curriculum, teaching, and assessment."

1.1 Gender and Mathematics Learning Outcomes

The impact of gender on academic achievement, particularly in mathematics, has been the subject of intense debate and study for decades. Historically, it was believed that boys outperformed girl in mathematics, due to their perceived superiority in logical reasoning and spatial skills. However, contemporary studies suggest that the gender gap in mathematics is narrowing and often varies by context, cultural expectations, teacher bias and access to learning opportunities rather than biological differences.

In many traditional societies, including parts of India, social and cultural expectations may limit girl's engagement with mathematics. These constraints may stem from stereotypes such as such as "mathematics is a male dominated field" or belief that boys are naturally better at problem solving and computational skills. Such attitudes can influence teacher's expectations, classroom interactions, parental support, and ultimately, student's confidence and achievements. Girls may internalize these beliefs, learning to reduced participation, increased math anxiety, and lower performance. On the other hand, boys may be encouraged to take risks and embrace challenges in math, which could enhance their outcomes.

1.2 Social Support and Learning Outcomes

Social support means everyday behavior that directly or indirectly communicates to an individual that she or he is valued and cared for by others. Social support is essential for someone's mental health. Social support given by parents' teachers and peer groups can help the students to fulfill their basic need of competency learning as well as achieving good marks in academics. It is well said that humans are social animals and the relationship they built in society positively impacts their psychological and emotional wellbeing. A strong social support can help the student to deal with stress and create a favorable environment.

Thoits (1982) stated that "Social Support is the degree to which a person's basic needs are gratified through interaction with others".

According to Hupcey (1998) "Social support is a multi-faceted concept that has been difficult to conceptualize, define and measure."

Social support refers to the emotional, informational, and practical assistance provided by individuals in a student's life especially parents, teachers, peers and community members. It plays a crucial role in the overall

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development of students and their academic success. Social support can manifest in several forms:

1. Parental support, such as helping with homework, providing educational materials, encouraging high aspiration.
2. Peer support, such as collaborative learning, mutual motivation, and emotional companionship.
3. Teacher support, including positive reinforcement, individualized attention, and belief in the student's potential.

A supportive social environment can help reduce academic stress, boost self-confidence, foster a sense of belonging, and motivate students to engage more effectively in learning. Particularly in mathematics a subject often associated with difficulty and anxiety a strong support system can make a significant difference in performance. Conversely, lack of support or presence of negative influences may result in low motivate, poor academic self-concept, and avoidance of mathematical tasks. Thus, social support not only impacts cognitive processes like problem solving and concept formation but also shapes emotional and motivational aspects of learning.

1.3 Why Study Gender and Social Support Together?

Studying gender and social support together is essential because these two variables often interact in shaping educational outcomes. For instance, the kind and amount of support received may differ based on a student's gender. In many households and classrooms, boys and girls may receive different types of encouragement, expectations, and reinforcement. Teachers may unconsciously call on boys more in math classes or offer more detailed feedback to one gender over the other. Parents might assume that boys are naturally inclined toward technical subject, while girls are better at language and humanities. Such differential treatment can create unequal opportunities and effect student's beliefs about their abilities. However, if effective and equal social support is provided to all students, regardless of gender, it can serve as a compensating factor and reduce the gender gap in mathematics learning outcomes. The highlights the importance of investigating how these two factors-gender and social support independently and jointly influence academic success in mathematics.

REVIEW OF RELATED LITERATURE

Greenlee et al. (2012) examine the role of social support in students' perceived abilities and attitudes toward Math and Science and reported that students who perceive greater social support for math and science from parents, teachers, and friends have more positive attitudes toward math and science and a higher sense of their own competence in these subjects. Soe (2020) see the relationship of social support with academic achievement and career aspiration of Grade- 8 Students in Myanmar and found that social support and students' academic achievement were significantly correlated with each other. Erawati (2020) studied Mathematics Learning Outcomes Based on Gender in the Inquiry Learning Model and found that female students got higher learning outcomes in mathematics than male students

Singh and Singh (2022) studied the role of student's engagement and gender along with their interaction on learning outcomes in social studies of secondary school students of Punjab. The results revealed that students with high student's engagement had better level of learning outcome in social studies than students with low student's engagement. Male students had higher learning outcomes in social studies than female secondary school students. Joseph and Sudesh (2023) conducted a study and found that significant relationship was existed between academic stress academic lifestyle, academic achievement and social support. Sonia and Sharma (2023) examined the social support and to establish its effectiveness relationship with academic achievement and well-being among adolescents. Finding of study revealed that social support acts as a significant predictor of academic achievement among learners; it can positively and significantly predict academic achievement. Saeed, et al. (2023) studied How social support predicts academic achievement among secondary students with special needs: the mediating role of self-esteem and found that the students who perceived high social support from family and friends tend to outperform in their academic achievement in comparison to lower counterparts. Xiang et al. (2025) Exploring the mediating role of social support and learning engagement in the relationship between physical activity and academic achievement in secondary

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school students and reported that social support significantly predicted learning engagement and academic achievement.

Objectives Of the Study

1. To study the mathematics learning outcomes among secondary school students with respect to their gender.
2. To study mathematics learning outcomes among secondary school students in relation to their level of social-support i.e. high, moderate and low.
3. To study the interactional effect of gender and social-support on mathematics learning outcomes of secondary school students.

Hypotheses Of the Study

1. Male and female secondary school students differ significantly in their mathematics learning outcomes.
2. Students having different levels of social-support differ significantly from each other on mathematics learning outcomes.
3. Gender and social-support do not have significant interactional effects on mathematics learning outcomes of secondary school students.

METHODOLOGY

This section presents the research methodology that was adopted in this study. It includes the research design, research respondents, sampling technique and procedure, research instruments, validity and reliability of the instruments, data gathering procedure, and the statistical treatment.

Research Design

In present study quantitative research design was followed. Quantitative approach seeks correlation, relationships, and causality and focuses on gathering numerical data and generalizing it across groups of people or explaining a particular phenomenon. Descriptive survey method was adopted. In descriptive research, the researcher has been studying the phenomenon of interest as it exists naturally, no chance to manipulate the individuals, conditions, or events.

Research Respondents

The population for the current research included secondary school students studying in 9^{th} grade. The sample consisted of 460 students of both genders (210 male and 210 female) was taken from different Govt. Secondary schools from four districts namely; Hamirpur, Mandi, Kullu and Bilaspur of Himachal Pradesh, India. The respondent's age group ranged from 12 to 14 years.

Sampling Techniques

In the present study, multi-stage Random sampling technique was used. In first stage four districts has been selected randomly by making use of lottery method. Further in second stage Government secondary school has been taken from the sampled districts. In final stage, secondary school students were selected from each sampled schools by making use of random numbers table.

Research Instruments

For the collection of requisite data in the present study, the investigator used two standardized tools namely; Social-support Scale by Dhull and Godara (2016) and Mathematics Achievement Test developed and standardized by investigator herself are used. Social Support scale comprises 40 items out of which 35 are positive and 05 are negative items. Each item was rated on a three point Likert scale ranging from 'Always' ,

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'Often 'to 'Never' The items of the scale are divided into four dimensions viz: family support, teacher support, friends/peer support, and Online support. The split-half reliability of the tool was 0.861, test-retest reliability was 0.751 The possible minimum and maximum score on the scale is 40 and 120 respectively. The mathematics Achievement test consisted of 40 items. Test is consisted of multiple-choice items. Each correct answer carry 1 marks. The scores range from minimum 0 to maximum 40 marks.

Data Gathering Procedure

The data for this study was collected from the month of September to January 2024. After taking the necessary permission from the principals of each sampled Government schools, the investigator interacted with the subjects of the study. The purpose of the study was made clear to them and they were ensured that the information provided by them would be used for research purpose only. After this, the booklets of the Mathematics achievement test and social support scale were distributed to students one by one and instructions were read out to them. Then students were asked to start responding to the items of the tools. Enough time was given to students to respond to all the items. The filled up booklets were collected and the students were thanked for the cooperation extended in the collection of the data.

Statistical Treatment

The data were analyzed by using the Statistical Package for the Social Sciences (SPSS). The mean and standard deviation were computed to determine the level of Mathematics learning outcomes the respondents and social support. In order to study the independent and interactional effect of gender and level of social support on mathematics learning outcomes of secondary school students, 2X3 analysis of variance (Two-way ANOVA) involving two types of gender i.e. male and female and three level of social support i.e. high, moderate and low) was applied.

RESULTS AND DISCUSSION

This section comprises the analysis, interpretation of the data and discussion of the findings of the study. In order to study the main effects of gender and social support on mathematics learning outcomes of secondary school students along with their interactional effects, analysis of variance (2X3 factorial design involving two types of gender and three levels of social support i.e. high, moderate and low) was applied on mean scores of mathematics learning outcomes.

The mean mathematics learning outcomes scores at different levels of gender and social support are given in table-1 and figure-1 as under:

Table 1. Mean Scores of Mathematics Learning Outcomes of Secondary School Students at Different Levels of Social support

Sr. No.	**Gender**		**Levels of Social Support**			
			High	**Moderate**	**Low**	**Total**
1.	**Male**	Mean	29.11	27.44	25.79	27.45
		S.D.	5.79	6.42	6.64	6.41
		N	**70**	**70**	**70**	**210**
2.	**Female**	Mean	31.18	28.67	28.57	29.47
		S.D.	5.67	6.52	6.11	6.29
		N	**70**	**70**	**70**	**210**
3.		Mean	30.15	28.05	27.18	28.46

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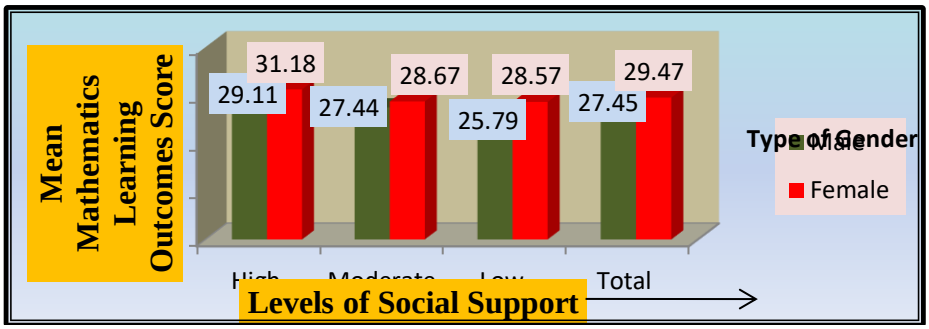
	Total	S.D.	5.77	6.45	6.50	6.38
		N	**140**	**140**	**140**	**420**

Table-1 indicates the mean scores of male (27.45) and female (29.47) secondary school students on mathematics learning outcomes. Further table depicts the mean scores of high social support (30.15), Moderate (28.05) and low social support (27.18) secondary school students with respect to their mathematics learning outcomes.

The pictorial representation of mean mathematics learning outcomes scores of male and female secondary students at different levels of social support is given below in Figure-1. as under:

Figure-1. Bar Diagram Showing the Mean Scores of Male and Female secondary school Students at different Levels of Social support with regard to mathematics Leaning outcomes



The complete summary of the 2X3 analysis of variance is given in Table-2 as following:

Table- 2.The Complete Summary of the 2X3 Analysis of Variance for Mathematics Learning Outcomes Scores of Secondary School Students

Sr. No.	Source of Variation	Sum of Squares	df	Mean Squares of Variance	'F'-value
1.	Gender (A)	432.086 1	1	432.086	10.453**
2	Social support (B)	652.462	2	326.231	7.892**
3	Interaction (AXB)	42.529	2	21.264	0.514NS
4	Error Variance	17113.314	414	41.337	
5	Total Sum	18240.390	419		

**Indicates significant at 0.01 level of significance
NS indicates Not significant
Table value for df 1/414=3.86 and 2/414= 3.01 at 0.05 level of significance
Table value for df 1/414=6.69 and 2/414= 4.65 at 0.01 level of significance

Mathematics Learning Outcomes Of Secondary School Students In Relation To Their Gender

From the Table-2 it was observed that 'F' Ratio for main effect of gender on mathematics learning outcomes of secondary school students irrespective of social support for *df* 1/414 came out to be 10.453 which is much higher than the table value (6.69) at 0.01 level of significance. Hence, the Hypothesis-1 that, "Male and female secondary school students differ significantly with regard to their mathematics learning outcomes." was accepted. It may be inferred that there is a significant differences in mathematics learning outcomes of male and female secondary school students. Further table-1 indicates that Mean scores of female secondary school

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students (29.47) is significantly higher than the male students (27.45) on mathematics learning outcomes. Thus, from the analysis it may be concluded that female secondary school students outperformed in mathematics learning outcomes than male counterparts. The findings of the present study was supported by Erawati (2020) also found that female students got higher learning outcomes in mathematics than male students

Mathematics Learning Outcomes Of Secondary School Students In Relation To Their Level Of Social Support

Table-2 indicates that the 'F' value for main effect of social support on mathematics learning outcomes of secondary school students irrespective of gender for df2/414 came out to be 7.892 which is significantly higher than the table value (4.65) at 0.01 level of significance. Hence, the Hypothesis-2 that, "Students having different levels of social support differ significantly from each other on mathematics learning outcomes" was accepted. Therefore, it may be inferred that social support has significant effect on mathematics learning outcomes of secondary school students. Further, from the mean scores it can be interpreted that the students with high social support has exhibited significantly higher level of mathematics learning outcomes (mean =30.15) followed by moderate (mean =28.05) and low level of social support (mean=27.18). The findings of the present study supported by Greenlee et al. (2012), Soe (2020) , Singh and Singh (2022), Saeed, et al.(2023) Xiang et al. (2025) who also found that students possessed high social support have outperform in mathematics learning outcomes in comparison to the students who possess moderate and low social support.

Interactional Effect Of Gender And Social Support On Mathematics Learning Outcomes Of Secondary School Students

It is evident from the Table-2 that calculated 'f' value for interactional effect of gender and social support on mathematics learning outcomes of secondary school students for d_f 2/414 came out to be 0.514 which is less than table value (3.01) even at 0.05 level of significance. Hence, hypothesis no.3 that, "Gender and social support do not have significant interactional effects on mathematics learning outcomes of secondary school students " was accepted. So, it may be inferred that gender and social support (in combination with each other) did not influence mathematics learning outcomes of secondary school students in significant manner. It is evident from the figure-2 as given below that there are approximately the same differences in the mean mathematics learning outcomes scores of male and female secondary school students regardless of their level of social support i.e. high, moderate and low. The non-significant interactional effect of gender and parental involvement on self-regulated learning is given in figure -2

Figure-2. Non-Significant Interactional Effect of Gender and Social support on mathematics Learning outcomes of secondary school Students.

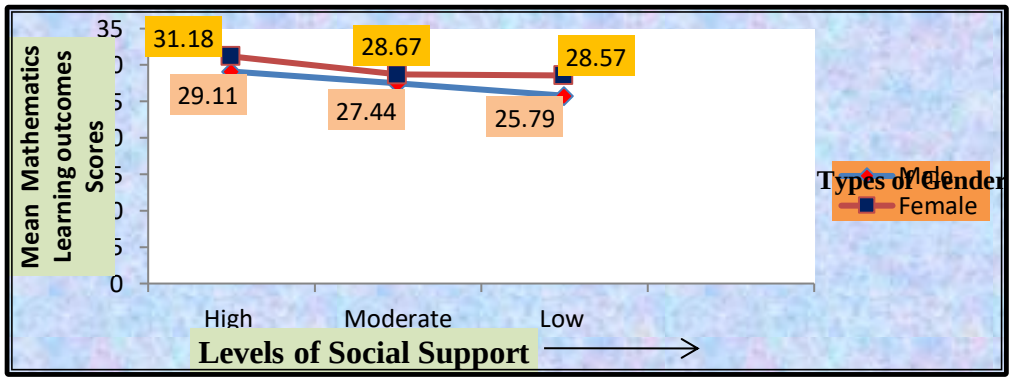

Figure-2 shows that the mean scores of female and male secondary school students with high social support i.e. 31.18 and 29.11, followed by moderate 28.67 and 27.44 and low social support 28.57 and 25.79 respectively. These differences are approximately same. From the above analysis it may be said that gender and social support (in combination with each other) did not influence mathematics learning outcomes of secondary school students in significant manner.

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RECOMMENDATION

The current study explores the main and interactional effects of gender and social support on mathematics learning outcomes of secondary school students. Finding of the present study revealed that social support plays a significant role in enhancing the mathematics learning outcomes of secondary school students. On the basis of the findings following recommendations has been made for all the stakeholders parents, teachers, Teacher educators, community members as well administrations to promote the social support among students. Social support systems including family, school peers and community are crucial in shaping students learning outcomes. Active involvement of parents and educators can ensure that both genders receive equal support and motivation to excel in mathematics and other subjects. For this, family relationships should be strengthened in such a manner that ensure the feelings of security and belongingness among the child which helps them to boosts self-esteem and academic confidence, which leads to greater effort and persistence in learning. A positive peer networks should be built that fosters a sense of identity and shared experience especially during academic stress. Supportive relationships help students to develop a positive mind-set towards school learning it fosters interest, curiosity and enjoyment in academic tasks. There should be established strong mentor – mentee relationship which leads to boosts student's self-confidence and motivation. Students who receive academic help and guidance from parents or peers often perform better in subjects like mathematics, science and language. Furthermore, Teacher must shift from teacher centred to learner centred approach for enhancing core skills like reasoning, problem solving skills etc. A learner centred approach emphasizes students engagement, critical thinking and application based learning. It ensures that each student, regardless of gender, is given individual attention, which is especially helpful in larger or diverse classroom. Social support comes into play when teachers create inclusive environment that support learners emotional and cognitive needs equally for boys and girls. Teacher should be connect the mathematics in real life situations that improves relevance, motivation, and retention of knowledge. Applying mathematics to real-life context increases student's motivation and shows the subjects practical value. Teacher should be used of formative assessment devices viz; quizzes, oral questioning exit slips, peer reviews and diagnostic tests etc. in regular practices which helps to identify learning gaps early and provide timely feedback to supports tailored interventions for improvement. Teachers must be trained in modern, inclusive and gender-sensitive pedagogies that respect the learning style of all students Training should include awareness about how social support influences learning for instance understanding how positive reinforcement helps boys stay focused and how emotional support boosts girl's confidence. Teacher should be trained to use updated teaching method like collaborative learning, flipped classroom, and differentiated instruction to cater the diverse learning needs. Educational Institutions should be conduct workshop, seminars, or meetings, discussions symposiums, awareness programs for all stakeholders that emphasizes the positive effects of social support on student's achievement.

CONCLUSION

Mathematics learning outcomes and social support are two important variables for the student's academic success. The findings underscore the social support play a significant role in improving mathematics learning among secondary school students. Teacher should be creating stress free supportive learning environment where mistakes are seen as learning opportunities. By understanding the influence of gender and social support, educators and policymakers may be implement more personalized and effective interventions that contribute to students overall mathematics learning outcomes.

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