

GENDER FACTORS AFFECTING PREFERENCE FOR MATHEMATICS AMONG SENIOR SECONDARY SCHOOL STUDENTS

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ABSTRACT

The Gender role in mathematics is complex. Gender is referring to social or environmental causation of behaviours that differ the females and males. Gender is the state of being male and female. The term gender is typically used with social and cultural differences rather than biological ones. Gender refers to socially constructed roles, behaviours, activities and attributes that a given society considers appropriate for men and women. Mathematics is the study of numbers, equations, functions geometric shapes and their relationships. Mathematics is a science dealing with study of quantities and their relationships expressed in numbers and other special symbols. The view by a cross-section of people that mathematics is a male dominated subject is devastating especially on parts of women folk. At secondary school level, experience shows that girls deliberately or erroneously shy away from mathematics on the flimsy excuse that their "brains" are not made for mathematics. The topic of this study is premised on the current world trend and research emphasis on gender issues in mathematics and the promotion of gender equity in maths, the empowerment of women and the elimination of gender inequality at all levels of education.

INTRODUCTION

Gender factor affecting Mathematics preference in senior secondary schools is an issue today. After visiting mathematics classrooms the question raised every time in our mind that why so few women in mathematics classrooms and why they did not prefer to choose maths in senior secondary schools? Why mathematics classrooms are dominated by boys always? Where are girls when it comes to mathematics? Despite various bold attempts, gender inequality in education in general and in mathematics in particular has remained a perennial global phenomenon. Many studies apparently confirms the reality of male superiority in mathematics virtually at all levels of education. Gender gap in mathematics is still very prevalent although findings on this issue are equivocal.

Globally, the issue of gender gap in mathematics has produced inconclusive results. Throughout the senior high school years, male superiority in mathematics is well pronounced and more males than females are frequently reported as doing better on problem-solving tasks and applications, exceptions to these

results are studies in which substantial differences favouring females are the rule or no differences at all. It is apparent that possession of robust mathematical knowledge remains the gateway to virtually all occupations band more males than females possess it. Without mathematical knowledge "women can never achieve true occupational equality with men."

There are two reasons for gender differences in mathematics as biological, cognitive and affective factors. The external factors are defined in terms of significant others and classroom interaction that directly influence learning. The significant others can be regarded as the peers, parents etc. of the individual while the classroom factors may relate to the teacher with whom the individual interacts in the learning environment. Participation gave a range of such programmes to include 'anxiety clinics' designed to combat math phobia; remedial programme to fill the gap in knowledge of mathematical content; programmes designed to enhance spatial skills, and programmes designed to keep gifted women in mathematics have several ideas of how to

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promote equity in mathematics classes. One suggestion is to offer opportunities to look at how students view mathematicians and encourage discussion of women mathematicians and students. This provides girls with the opportunity to have female role models in mathematics and lessen the stereotype of mathematicians as being old men.

This study tackles this puzzling question and presents a picture of what we know - and what is still to be understood - about gender factors affecting women in choosing mathematics. It focuses on practical ways that families, schools, and communities can create an environment of encouragement that can disrupt negative stereotypes about women's capacity in these demanding fields. By supporting the development of girls' confidence in their ability to learn math. The literature studies demonstrates the effects of societal beliefs and the learning environment on girls' achievements and interest in mathematics. One finding shows that when teachers and parents tell girls that their intelligence can expand with experience and learning, girls do better on math tests and are more likely to say they want to continue to study math in the future. That is, believing in the potential for intellectual growth, in and of itself, improves outcomes. This is true for all students, but it is particularly helpful for girls in mathematics, where negative stereotypes persist about their abilities. By creating a "growth mind-set" environment, teachers and parents can encourage girls' achievement and interest in mathematics.

OPERATIONAL DEFINITIONS

1. Gender: A person's gender is the fact that they are male or female. Gender is the relations between men and women, both perceptual and material.
2. Mathematics: Mathematics is the study of numbers, equations, functions and geometric shapes and their relationships. Mathematics is a science dealing with study of quantities and their relationships expressed in numbers and other special

symbols.

3. Senior Secondary School: The students belonging to standard XI and XII are considered as the senior secondary school students.

NEED AND SIGNIFICANCE

The authors observe that, generally in Kashmir society female students do not prefer mathematics as their first option at senior secondary level. Researchers felt that gender and maths are still working hand in hand when it comes to education. The study of mathematics is making the life easy to live, every subject require maths to develop the theories and in every stage of life we need to go through maths. While preferring mathematics means making men's life easy with developing the logical thinking. The study of maths can satisfy a wide range of interests and abilities, it develops the imaginations. It trains in clear and logical thought. To use advanced concepts it is essential to prefer maths in senior secondary level, And with a mathematics degree you should be able to turn your hand to finance, statistics, engineering, computers with a success not possible to other graduates. In several countries science and mathematics are given first class attention due to numerous benefits derived from them. (Ekeh, 2003).

It is often argued that girls are far behind in mathematics and they are, the authors agree with, when it comes to top ranking institutions girls are very low are and its believed that girls cannot do it as boys can. Psychologists, Researchers, Educators are constantly searching for parsimonious set of variables and the difference of gender in mathematical aptitude. According to Alonge (1985) studies ranged from how sex affects the selection of science courses in school to rating of attitude scale and to cognitive and non - cognitive performance. Mathematics is constantly being rejuvenated. And it is very much alive as it heads into 21st century. This study examined the gender factor that affects the mathematics preference among female students at senior secondary level.

OBJECTIVES

This research was directed and guided by the following objectives:

1. To find out the most favoured subject(s) among senior secondary school students.
2. To investigate the role of gender in affecting the preference for Mathematics among senior secondary school students.
3. To investigate the role of Mathematical aptitude in affecting the preference for Mathematics among senior secondary school students.

HYPOTHESIS

The following hypothesis were formulated for the present study. Hypothesis is presented in directional form. The hypothesis is that; "Girl students are not preferring Mathematics subject at their Higher Secondary Education level".

The present study was conducted on the following variables.

Independent Variables : Gender

Dependent Variables : The subject Mathematics

METHODOLOGY AND SAMPLING

To find out the most favoured subject(s) among senior secondary school students and to investigate the role of gender in affecting the preference for Mathematics among senior secondary school students, the investigator used face to face interview technique with the help of a researcher made interview schedule. When a research project is conducting qualitative interviews there is a reason for it. One of these reasons might be because it provides a new insight into a social phenomenon. So when the investigator want to explore the Gender factors affecting preference for mathematics in senior secondary school students, conducting qualitative interviews with higher secondary students therefore been seen as one option within many that gives insight into this phenomenon. Interviews allow the respondents to reflect and reason on a variety of subjects in a different way. Sixty Maths and humanities

students of Higher Secondary schools was the sample of this study. Stratified random sampling method is used to choose the sample. The sample is distributed as below;

Table 1: Sampling Distribution of the Study Based on Various Sub Samples

Gender		Locality		Type of Institution	
Boys	Girls	Rural	Urban	Government	Private
30	30	30	30	30	30
60		60		60	

TOOLS USED

To achieve the objectives of the study and for testing the formulated hypothesis, the data were collected using the following tools.

1. Interview Schedule was developed by the investigators. The schedule was developed to find out the most favoured subject(s) among senior secondary school students and to investigate the role of gender in affecting the preference for Mathematics in senior secondary school students. A few number of items are prepared by the investigator according to the aims and objectives of the study. These items are prepared by collecting information from various sources, i.e. books, other standardized tests, discussion with experts, professional journals etc. A thorough comparison is made between the prepared items and corresponding items collected from various sources. Thus the final form of the items is prepared. There are 10 items and these items are included under various dimensions of the study. These 10 items are supplemented by a careful study of related literature and informal meetings with experienced teachers, and academicians. Thus the items are finalized, listed and rearranged. This list is examined by experts for item-relevance and usefulness. Then the items are examined by language experts for grammatical soundness.

2. Mathematics Aptitude Test was developed by the investigators. This tool was developed to investigate the role of Mathematical aptitude in affecting the preference for Mathematics in senior secondary school students.

ANALYSIS, INTERPRETATION AND DISCUSSION

The data found through Mathematics aptitude test was analysed using appropriate statistical techniques such as mean, standard deviation, critical ratio etc. The present study is confined to the students of higher secondary schools only. Though there are a number of other variables which directly or indirectly affect the preference for mathematics in senior secondary school students, this analysis considers gender factors affecting preference for mathematics in senior secondary school students only.

The first objective of this study is "To find out the most favoured subject(s) in senior secondary school students." In order to identify the most favoured subject among the senior secondary school students, the investigators conducted face to face interview with 60 students. The researchers started this present study with the hypothesis that; "Girls students are not preferring mathematics at senior secondary level". Through the interview the investigators tried to address various issues, viz. why only few girls chooses mathematics in senior secondary schools. Enrolment has increased but the condition is still deteriorating and girl enrolment is very low as compared to boys, the problem is across the third world and is prevailing in our society also. Girl students think we are not made for mathematics, some mental difference is there and girls cannot go far with maths. Girls have no confidence in maths. There are hundreds of factors that affect students to choose maths at senior secondary level. Gender is prevailing factor in maths from centuries and it exists still in every corner of the world. Numerous gender factors have been found from present study that affect math preference at senior secondary school students. As per the formulated hypotheses a qualitative analysis have been done and results are shown below. The favoured subjects at senior secondary school students are; (1) in Humanities stream it is History, Sociology, Education, Political Science, Psychology, Geography and (2) in Science it is Biology, Chemistry, Physics and Maths (most favoured to least favoured).

The second objective of this study was "To investigate the role of gender in affecting the preference for Mathematics in senior secondary school students." To find out about this second objective the investigators conducted interview among sixty senior secondary school students. Major observations are follows. Gender differences in learning mathematics are complex; the multiplicity of forces and environments that operate within our Society to influence that learning are complex; it is complex to design effective intervention programs; the role that biological factors might or might not play are complex; it is certainly complex to conduct research about gender and mathematics; it is even more complex to interpret research for practitioners.

The critical, beliefs about the usefulness of, and confidence in learning mathematics, with males providing evidence that they were more confident about learning mathematics and believed that mathematics was, and would be, more useful to them than did females. There was evidence that while young men did not strongly stereotype mathematics as a male domain, they did believe much more strongly than did young women that mathematics was more appropriate for males than for females. The importance of these variables (confidence, usefulness and male stereotyping), their long-term influence, and their differential impact on females and males was re-confirmed by many other studies. Because of societal influences (of which teachers and classrooms were the main components) and personal belief systems (lowered confidence, attribution style, belief in usefulness), females did not participate in learning activities that enabled them to become independent learners of mathematics.

Parental involvement in subject preference is another issue concerned. As maximum parents think boys need to go with mathematics and they need to make career in Mathematics and their duty is to contribute towards society and girls have to go along with household chores, even girls also think that whatever we will do, lastly we have to work at home and need not to go so far after opting Math subjects and it is considered that girls are good in

memorisation and weak in reasoning logic power, and without these skills it is difficult to choose mathematics at senior secondary level. Students interest matter a lot to choose the subjects in senior secondary level, girls interest is not to choose mathematics, as the reason is they themselves think it is difficult, and we cannot handle it in future and it is made for boys.

Students confidence is another factor that influenced girls to not choose mathematics at senior secondary level. Girls are not enough confident to choose mathematics at senior secondary level. Subject value is an important factor that influence students in choosing subjects, and boys prefer to choose mathematics even with no deep knowledge of maths, but they are enough confident to choose mathematics at senior secondary level, because society, parents and they themselves think they are made for it and can do it better than girls.

Societal or parental force affect the choice of the subject, sometimes parents choose and students have to accept silently and sometimes society decides what to choose and what not. Parents involvement to choose maths, parents are not supportive in maximum cases to choose mathematics for girls, in some cases it is not students that are choosing subjects in senior secondary level it is parents who choose subjects for their children. Stereotype society the belief that girls lack the ability of problem solving and it is not possible to choose mathematics without this ability it is not possible to go far with success as problem solving is considered the basic thing in maths. Girls did not prefer maths because their minds are prepared for academics. From childhood girls were told that they cannot study maths, they are made for academics and they cannot do it as boys can. Girls are good in memorization and maths need logic and reasoning, the belief that girls lack these things. Students think there is a mental difference between men and women; i.e., women are good in memorization and men are good in thinking. Girls' lack of confidence in them as mathematics learners, their perception of mathematics as difficult, and their view that mathematics is a male activity, all had impact on girls' attitudes, achievement, and participation in

advanced courses. Teacher behaviour combined with the organisation of instruction, made up a pattern of classroom organisation that appeared to favour males. Based on all the above said analysis, the investigators conclude that gender is affecting the preference for Mathematics in senior secondary school students.

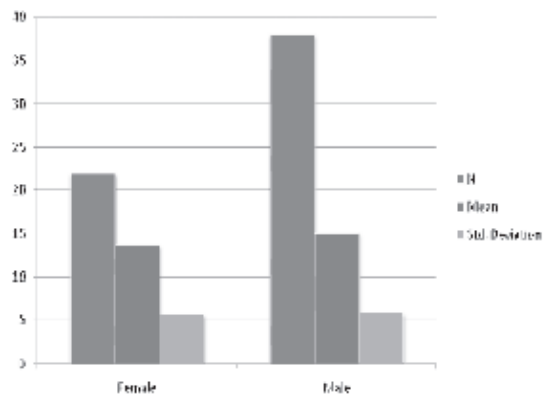
The third objective of this present study is "To investigate the role of Mathematical aptitude in affecting the preference for Mathematics in senior secondary school students". In order to found the same the investigator administered mathematical aptitude test. The responses of the test analysed using various statistical techniques viz. Mean, Standard Deviation and T test. Table 2 shows the results of the same.

Table 2: Mean, Standard Deviation and Standard Error Mean of Mathematical Aptitude Test
Group Statistics

Score	Gender	N	Mean	Std. Deviation	Std. Error Mean
	Female	22	13.7273	5.68358	1.21174
	Male	38	15.1316	5.85025	0.94904

The above table 2 shows the mean of males and females in mathematical aptitude test.

Figure 1: Mean, Standard Deviation of Mathematical Aptitude Test



The below table 3 shows the mean of males and females in mathematical aptitude test.

Table 3: t value of Mathematical Aptitude Test

Score	Groups	Number	Mean	Df	t. value	Significance
60	Male	38	15.1316	58	-.905	0.369
	Female	22	13.7273			

The perusal of the above table 2, 3 and figure 1 shows the Mathematical aptitude Test of males and females of senior secondary school students. The above table 1 reveals that there is only 1.14% difference, and this is considered insignificant difference. And the formulated hypothesis got accepted, i.e., "Girl students are not preferring Mathematics subject at their Higher Secondary Education level".

SUGGESTIONS

The present study shows that boys used to take substantially more math courses in higher secondary classes than girls. Girls are not preferring mathematics at senior secondary level as girls think they are incapable for pursuing mathematics. Gap on math tests remains, but it is only 1.14 % as the present study has shown. There was no significant difference in the means scores of boys and girls. It was seen gender of the student did not affect the combined score of the students for the sample under investigation. Though previous research has revealed the existence of gender disparities in mathematics, it is also a fact that these gaps are being diminished over time. Research that further explores the connections between gender and mathematics is needed. Findings confirm there is only 1.14% difference between mathematical aptitude of boys and girls. The findings provide an evidence that it is not aptitude which affect girl students to choose mathematics as a course subject. The study shows that there are other factors that affect girl students for preference of mathematics.

Because of societal influences (of which teachers and classrooms were the main components) and personal belief systems (lowered confidence, attribution style, belief in usefulness), females did not participate in

learning activities that enabled them to become independent learners of mathematics. The present study demonstrates the effect of school environment on mathematics. Stereotype society, the belief that girls lack the ability of problem solving and it's not possible to choose mathematics without this ability as problem solving is considered the basic thing in maths. Girls' lack of confidence in them as mathematics learners, their perception of mathematics as difficult, and their view that mathematics is a male activity, all had impact on girls' attitudes, achievement, and participation in advanced courses. Girls can do maths as boys can, the society needs to change its perception about girls in maths.

Teacher behaviour combined with the organisation of instruction, made up a pattern of classroom organisation that appeared to favour males. The critical, beliefs about the usefulness of, and confidence in learning mathematics, with males providing evidence that they were more confident about learning mathematics and believed that mathematics was, and would be, more useful to them than did females. The present study shows the most favoured subjects of senior secondary students as in humanities History, Sociology, Political science, Geography, Education etc. and in sciences it is Biology, Chemistry, Physics and Maths. The study of maths can satisfy a wide range of interests and abilities, it develops the imaginations. It trains the clear and logical thought. To use advanced concepts it is essential to prefer maths in senior secondary level, And with a mathematics degree the student should be able to turn your hand to finance, statistics, engineering, computers with a success not possible through other subjects.

CONCLUSION

Analysing the resources and the factors of education is very essential as it allows for the determination of progress in the field in the years to come. The findings of this study could be of great help to all those associated with educational reforms which include parents, teachers, educationists, psychologists and the government. It is believed that the work performed in this study is of benefit to existing

system ideas in the research of theory of mathematics education. It may be base for exploration of further issues related to mathematics education. The condition of government schools needs to be improved, as there are hardly any teachers to guide students in course subjects, due to this students are suffering badly. Schools in Kashmir are functioning without sufficient library, laboratory and proper monitoring facilities. Thus imparting quality math education uniformly in all schools is the need of the hour.

Research on senior secondary education is given top priority in developed countries. In India also it is a widely studied area. Secondary school level maths is considered as the foundation for success in any career. The researchers propose maths should be a compulsory subject up to 12th class as it is essential to have the knowledge of math basics in every field. In today's technology driven society, greater demands have been placed on mathematics learning and its adaptation to real life situations. Hence the importance of mathematics cannot be undermined. The present research study interrelate various factors that affect preference of mathematics at senior secondary level. In general, mathematics was seen to consist of achievement of certain techniques with examples to be mastered and exercises to be carried out. Emphasis should be given on teaching students to develop a conceptual understanding of mathematics which would help them to relate school mathematics with the mathematics applied in real life. This requires restructuring the examination process accordingly.

The method of teaching maths has to be more effective. An annual in-service teacher training programme is essential. It should be by a certified group of trainers of high quality and competence who regularly professionally update themselves. Guidance and counselling programmes should be organised every year for students subject preference. In these guidance and counselling the need and importance of subjects should be shown. In the contemporary knowledge driven society, more technology oriented courses need to be launched. It will help

to remove the societal myths of gender and education. The interaction with female mathematicians need to be organized in schools.

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