

# Gender Difference in Mathematics Achievement and its Relation with Reading Comprehension of Children at Upper Primary Stage.

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## Abstract:

The progress and prosperity of a country depends on the quality of mathematics taught in its school system. For people to survive and improve the quality of life, basic learning skills, reading, writing, arithmetic and life skills, are necessary and mathematics education is intended to develop these skills. The importance of mathematics transcends all definitions and no matter how much you ran away from the subject in school, mathematics, in daily life, chases you like a monster. No matter how hard you try, it is impossible to escape it. This study was done to see the relationship between mathematics achievement and reading comprehension and gender difference in mathematics achievement of children at upper primary stage. A sample of 307 upper primary children, 160 girls and 147 boys was taken through purposive convenient sampling method. Mathematics achievement test by N.C.E.R.T and reading comprehension test by Promila pathak was used to collect the data. Mean, SD and t-test were used for the analysis of the data. Research findings revealed that Significant difference was found between mathematics achievement of girls and boys at upper primary school stage. Significant difference was found between reading comprehension of girls and boys at upper primary school stage. Significant positive correlation was found between mathematics achievement and reading comprehension of children at upper primary school stage

**Key words:** Mathematics Achievement, Reading comprehension, upper primary school stage.

## Introduction

The progress and prosperity of a country depends on the quality of mathematics taught in its school system. For people to survive and improve the quality of life, basic learning skills, reading, writing, arithmetic and life skills, are necessary and mathematics education is intended to develop these skills. The importance of mathematics transcends all definitions and no matter how much you ran away from the subject in school, mathematics, in daily life, chases you like a monster. No matter how hard you try, it is impossible to escape it.

*"If people do not believe that mathematics is simple, it is only because they do not realize how complicated life is."*  
- John Von Neuman

When we wake up in the morning we start our day by using mathematics unconsciously, like we thank the almighty if we get 10 minutes extra sleep. Had there been no clocks or watches in the world, some words would have lost their existence forever and one of them is the word 'discipline'. We use mathematics and do calculations when we pay our bills, when we cook our food, when we go to office, when we refuel our cars and bikes, when we wait for the weekdays to get over so that we can party on the weekend, in getting our salaries, watching sports matches, and most importantly, for information technology. When we plan to go out for dinner, when we choose a shampoo, or plan a holiday all have one thing in common i.e. mathematics. Even when we are looking to spend some time in the sun, mathematics is all around us because planning a holiday is all about optimization. Deciding where to visit? When's the best time of year to go? How do I get to the airport on time? Can I fit all these clothes in my suitcase? Answering these questions involves working with numbers. Hotel prices, flight timetables, suitcase volumes all require what is called basic mathematics. Mathematical knowledge is required by many of our daily jobs to be done effectively. For example, if a person wants to decorate a house he needs to work out the amount of materials required in order to decorate the house nicely. The required amount of material will be purchased only when one is aware of the measurement, space and shape of the area he is working on. This helps in ensuring that you do not run out of essential materials before the job is finished or you do not have too much left over. Jobs which do not use mathematics every day still require some basic knowledge of mathematics to complete certain tasks. Some people might be against this, but it is advisable for everyone to learn basic mathematic skills.

Graeber and Weisman (1995) agree that mathematics helps the individual to understand his/her environment and to give accurate account of the physical phenomenon around him/her. Mathematics exhibits the power to think consistently and logically. It helps in our quest for knowledge, truth and beauty, desire to interpret and control our environment. Our culture is on the move through mathematization. As a member of the modern society we all should have mathematical thinking as a habit of mind for its use in the workplace, business and finance; and

for personal decision-making. For a nation to prosper, mathematics is fundamental in providing tools for understanding science, engineering, technology and economics. It is important in public decision-making and for participation in the knowledge economy. Children of today are equipped with uniquely powerful ways to describe, analyze and change the world because of mathematics only. Modern mathematics has become greatly advanced thanks to technological advancements. Mathematics is a way of thinking and teachers should teach this way to their pupils. Mathematics stresses thinking in terms of relationships that exist between facts. The technique of thinking which it uses is the same as that employed in the experiences and relations involved in the social and economic problems encountered by adults in everyday life. It continually exhibits the processes of thinking in correct simple form, and frowns upon hit-or-miss methods. Therefore, studying mathematics makes life little bit easier and provides you with the tools to make sense of it all. Numerical and logical thinking play a part in each of these everyday activities, and in many others. Hence, we can say a good understanding of mathematics is essential for making sense of all the numbers and in solving the complex problems life throws at us.

### **Girls and Mathematics**

It has become a general feeling or stigma that mathematics is boys domain. A study through a meta-analysis reveals that males tend to do better on mathematics tests that involve problem-solving (Hyde, Fennema, and Eamon 1990). Females tend to do better in computation, and there is no significant gender difference in understanding math concepts. Another study shows that females tend to earn better grades than males in mathematics (Kimball, 1989). Fennema and Sherman (1978) identified as 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. Females were found to be strongly not believing in stereotype that mathematics was not their subject while their male counterparts did not strongly stereotype mathematics as a male domain. 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 (Hyde *et al.*, 1990; Tartre and Fennema, 1991; Leder, 1992. Another study, which was conducted to analyze factors that affect math achievement of 11th-graders in math classes with an identified gender gap, also showed that males scored higher than females on 11th grade math achievement test, but this difference decreased from 10th grade (Campbell & Beaudry, 1998). It has been revealed by some recent studies that line of gender differences in mathematics education in many countries seems to be narrowing. However, studies show that as students reach higher grades, males tend to show elevated levels of mathematics achievement (Campbell, Goldberg, & Stemler, 2000). For instance, the results from the TIMSS showed that mathematics achievement scores of each gender group were close to each other at the primary and middle school years (Beaton *et al.*, 1996; Mullis *et al.*, 1997). Hall *et al* (1999) examined gender differences of 5<sup>th</sup>-8<sup>th</sup> grade American students in mathematics. They found that, there were no substantial differences found in terms of gender however, in the final year of secondary school, evidence was found for gender differences in mathematics achievement.

### **Reading comprehension and Mathematics achievement**

The research base shows that reading is a "transaction" in which the reader brings purposes and life experiences to bear to converse with the text. This meeting of the reader and the text results in the meaning that is comprehension. Comprehension always attends to what is coded or written in the text, but it also depends upon the reader's background experiences, purposes, feelings, and needs of the moment. That's why two people reading the same book or story interpret it in different ways also reading same story twice will have very different meanings for us. According to Spencer and Russell (1960) difficulties in reading of arithmetic are due to the facts that-

- ❖ Names of certain numerals are confusing.
- ❖ Number of languages patterned differently from the decimal system are used.
- ❖ The language for expressing fractions and ratios is complex.
- ❖ The reading of computational procedures requires specialized skills.

Recently the link between language skills and mathematics has found a place in early developmental where language (pre-reading vocabulary skills) is thought to shape the development of number concepts and is seen as having a causal influence on at least some aspects of numeracy (Carey, 2004) although this link is complicated by the complexity of both language and mathematics. The notion that reading skills are a precursor in the learning of mathematics or will improve mathematics achievement is an idea that has gained empirical support, but to different degrees across studies. Cummins, Kintsch, Ruesser, and Weimer (1988) found that correct responses to algebraic word problems were associated with an accurate recall of the problem structure upon completion of the problem. Cummins and colleagues stressed that when students solve mathematics word problems, comprehension should be emphasized because miscomprehension leads to errors in mathematics. Gilmary (1967) utilized a quasi-experimental design to study the effectiveness of teaching reading. In this study, the experimental group was given instruction in reading and arithmetic, while the control group was only given

instruction in arithmetic during a six-week session of summer school. On the metropolitan achievement test arithmetic, group 1. gained  $1/3^{\text{rd}}$  of a grade more than group 2. Furthermore, when differences in I.Q. were statistically controlled (covariance analysis), group 1 gained  $1/2$  of a grade more than group. The students who had received reading and mathematics instruction scored higher on an arithmetic test at the end of summer school. However, Muscio (1962) believed that high mathematics achievement depended on high verbal ability in addition to high general intelligence. Henney (1969) employed a similar design but with negative results. Fourth grade children who were given special instruction in reading verbal problem did no better on a verbal problems post test than a control group of children who were permitted to solve the problems in any way that they desired. In an experiment with older students, Call and Wiggin (1966) investigated the effects of two different methods on the teaching of second year algebra. Group 1 (experimental) was taught by an English teacher who had some training in the teaching of reading but none in the teaching of mathematics. Group 2 (control) was taught by an experienced mathematics teacher. The main difference between the two methods of instruction was the emphasis in group 1st on understanding the meaning of the words in mathematics problems and translating the English statements into mathematical symbols. The general finding was that group 1st achieved more in the course than group 2nd even when initial group differences in reading and mathematics scores were statistically controlled. Based on the above comprehensive review we can conclude that there is a close relationship between achievement in mathematics and reading comprehension. But, this relationship has attracted the attention of very less researchers. Therefore, a study of this relationship will surely add to the future prospects of the country by providing valuable information to the policy makers.

### **Objectives**

The study aimed at achieving the following objectives:

1. To study the gender difference in mathematics achievement of students of western U.P.
2. To study the gender difference in reading comprehension of students of western U.P.
3. To study the relationship between mathematics achievement and reading comprehension of students of western U.P.

### **Hypothesis**

Following hypothesis were formulated in null form:

1. There is no significant difference between mathematics achievement of students of western U.P. on the basis of gender.
2. There is no significant difference between reading comprehension of students of western U.P. on the basis of gender.
3. There is no significant relationship between reading comprehension and mathematics achievement of students of U.P.

### **Methodology**

This study falls in the category of descriptive research. Thus, survey method was employed to carry out the present research.

### **Population**

In the present study the students of western U.P. studying in upper primary school stage constituted the target population.

### **Sampling**

For the present study the investigator chose students from four cities Bulandshahr, Aligarh, khurja and Jahangirabad of western U.P. the subjects were 307 students with 147 boys and 160 girls.

### **Research tools**

1. For mathematics achievement, Achievement test in mathematics for class VIII developed by NCERT, New Delhi (2007) was used.
2. Reading comprehension test developed by Pramila Ahuja and G.C.Ahuja (2012) was used to measure the reading comprehension.

**Mathematics achievement test developed by NCERT** In the present study, the learning achievement in maths was assessed by test developed by the National Council of Educational Research and Training (2007) for Class VIII children as a part of their nationwide survey conducted recently in 2012. The test consisted of 60 multiple choice questions covering all three branches of mathematics namely arithmetic, geometry and algebra. The time required to complete the test was one hour.

### **Reliability**

The investigator computed internal consistency reliability of the test using KR-21 formula. KR-21 formula is used to find the reliability of dichotomously scored items which are of about the same difficulty. The reliability of the test was found to be 0.85

**Reading Comprehension Test** Dr. Pramila Ahuja and Dr. G.C. Ahuja's Reading Comprehension test (2012) was used in the present study. The test has nine test passages on things we use in our daily life like books, salt, character, radium, newspapers, heat, vitamins, friendship and postman. The items were fill in the blanks type and the students had to fill the above item names in those blanks. The number of deletions in each test passage were 5, 6, 6, 7, 6, 6, 5, 3 and 6 respectively. The total number of deletions being 50. The time limit was 30 minutes excluding the time for writing name etc. and giving instructions.

**Reliability**

The reliability of the test was calculated by two methods. The test-retest reliability co-efficient was found to be  $0.956 \pm 0.013$  significant at .01 level of significance. The co-efficient of correlation between the two sets of scores after applying spearman brown formula was found to be  $0.943 \pm 0.005$ , significant at 0.01 level of significance.

**Collection of data**

As per the requirement of the present study the investigator collected the data from the students belonging to upper primary school stage (classes VI-VIII) of western Uttar Pradesh. To seek the co-operation of the principals and teachers of the schools of different districts, the investigator obtained letter of recommendation from the chairman, Department of Education, Aligarh Muslim University, seeking permission and co-operation with her from the principals and administrators of schools to collect valid and reliable data. Before administering the research tools, the investigator established rapport with the students and then distributed the test booklets to the students and assured the students that the information sought was only for research purpose and would be kept confidential.

**Data analysis techniques**

The data were analysed using different statistical technique to reach the objectives of the study. The investigator employed mean, S.D, t-test and correlation in order to make inference and generalizations about the population. SPSS version 20 was used to analyse the data.

**Table 1**  
**Gender difference in Mathematics Achievement**

Mathematics achievement	Mean	Standard deviation	SE difference between means	t-value
Boys(N=147)	11.60	12.638	1.252	3.291*
Girls(N=160)	17.84	15.709		

Significant at .05 level

Table 1 shows that the mean of boys is 11.60 and the mean of girls is 17.84 and the t-value is 3.291 which is significant at 0.05 level . Therefore the hypothesis that there is no significant difference between mathematics achievement of children at upper primary school stage is rejected. This difference indicates that girls and boys differ in mathematics achievement with girls outperforming boys on this variable. This finding is contradictory to the findings of Fennema and Eamon (1990), Mullis et. al (1997), NCERT (2012) who found no significant difference between girls and boys on this variable.

**Table 2**  
**Gender difference in Reading Comprehension**

Reading comprehension	Mean	Standard deviation	SE difference between means	t-value
Boys(N=147)	12.70	13.738	1.343	3.282*
Girls(N=160)	16.94	14.809		

Significant at .05 level

Table 2 shows that the mean of boys is 12.70 and the mean of girls is 16.94 and the t-value is 3.282 which is significant at 0.05 level. Therefore the hypothesis that there is no significant difference between reading comprehension of children at upper primary school stage is rejected. This difference indicates that girls and boys differ in reading comprehension with girls outperforming boys on this variable also.

**Table 3**  
**Correlation between Mathematics Achievement and Reading Comprehension**

Variables	Mathematics achievement	Reading comprehension
Mathematics achievement	1	0.473**
Reading comprehension	0.473**	1

Sig. at 0.05 level

Table 3 shows that the Pearson product moment correlation co-efficient between mathematics achievement and reading comprehension of students at upper primary school stage was 0.473 which is significant at 0.05 level. Therefore, the hypothesis that there is no significant relation ship between mathematics achievement and reading comprehension is rejected.

### **Findings**

1. Significant difference was found between mathematics achievement of girls and boys at upper primary school stage.
2. Significant difference was found between reading comprehension of girls and boys at upper primary school stage.
3. Significant positive correlation was found between mathematics achievement and reading comprehension of children at upper primary school stage

**Conclusion** It has been found in the present study that girls at upper primary school stage outperform boys in mathematics achievement and reading comprehension. This finding is consistent with the findings of NCERT (2014), (Linnakyla et al., 2004), OECD (2001), Ogle et. al. (2003), Spearrit (1977), NAEP (1973), Brown (1991) & Breakley et. al. (1988). These differences may be due socio-cultural aspect that society thinks mathematics is boys domain and reading is more of girls' domain than boys (Johnson 1974, p.82). Girls showing more interest in reading, and having female teachers are some of the factors that contribute better performance of girls in reading than boys. Bank et. al (1980) hypothesized the reasons for this may be physical maturation and expectation of their reading performance. To improve reading comprehension of boys, parents should encourage their children to read magazines, novels etc. and teachers should encourage assisted reading. Additional factors that can help improve reading skills include: appropriate grouping practices, instructional strategy, extended practice opportunities with feedback, and breaking down tasks into smaller components (Calhoon, 2005). The stigma that mathematics is boys domain has been broken by the present study. Moreover, Mathematics achievement was reported to have high correlation with cognitive factor reading comprehension mathematics teachers should give greater emphasis to teaching of mathematics thorough understanding of the technical terms involved because the vocabulary constitutes not only the means of communication but it is also very largely the medium of thinking and of problem solving in this area. (Olander & Ehmer, 1971) In mathematics classes problems are usually presented to students in the form of sentences. Efforts should be made to have the problems arise out of situations more real and more vital to the pupils, but even then the data would in most cases appear first in sentence form.

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