



## Effect of Gender, Attitude towards Mathematics, and T.V.Watching on Mathematics Achievement of Secondary School Students

### KEYWORDS

Mathematics Achievement, Gender, Attitude towards Mathematics.

### Dr. Ali Imam

Associate Professor, Department of Education, Integral University, Lucknow (India)

### Ruchi Srivastav

Research Scholar, Department of Education, Integral University, Lucknow (India)

### ABSTRACT

*This study examined the influence of gender, attitude towards mathematics, and T.V. watching on mathematics achievement. The population of this study consists of 793 males and 334 females from 14 secondary schools of Central Uttar Pradesh (India). The Mathematics Attitude Scale, Mathematics Achievement Test and A Personal and Familial Background assessment Questionnaire were used for data collection, while t-test used for statistical analysis. The results of the analysis showed that the male students as well as female students were equally good in mathematics achievement. Attitude of the students was the main determinant of achievement in mathematics. There was positive co-relation between attitude towards math and achievement in mathematics. Amount of time student on T.V. watching was negatively associated with math achievement of students.*

### Introduction:

Education is universally recognized as the most effective tool of bringing desirable change towards the social and economic betterment & cultural transformation of a society in the status of human being and the country as a whole. It broadens the mental horizon of the human being. In one hand, education develops the total personality of the individual and on the other hand education contributes to the growth and development of society. It is only through education that the moral ideas, spiritual values, the aspiration of the nation and its cultural heritage are transformed from one generation to another for preservation, purification and sublimation into higher culture. Humphrys, Traxler and North (1960) have very correctly remarked "our future material and cultural welfare and progress, even our survival as a nation depends upon the wise use of abilities and energies of our people."

Mathematical thinking is important for all members of a modern society as a habit of mind for its use in the work place, business and finance; and for personal decisions making. Mathematics is fundamental to national prosperity in providing tools for understanding science, engineering technology and economics. It is essential in public decision making and for participation in the knowledge economy.

Mathematics equips pupils with uniquely powerful ways to describe, analyze and change the world. It can stimulate moments of pleasure and wonder for all pupils when they solve a problem for the first time, discover a more elegant solution or notice hidden connections. Pupils who are functional in math and financially capable are able to think independently in applied and abstract ways and can reason, solve problem and assess risk.

Mathematics is a creative discipline; the language of Mathematics is international. The subject transcends cultural boundaries and its importance is universally recognized. Mathematics has developed over time as a means of solving problems and also for its own sake.

In the present social set-up, mathematics is more important for the common man. In this age of taxes, insurance premium savings and interests, rents and propaganda a person only with good mathematical

background can be reasonably sure that he is getting his due.

### Conceptual Frame Work

Reviewing research prior to the 1970's, Maccoby and Jacklin (1974) concluded that gender difference favoring boys in mathematics ability and girls in verbal ability were well established. By comparison, gender differences in achievement, especially mathematics, have not been consistent and continue to be a much debated topic (Leder, 1992). In an examination of 98 mathematics achievement studies, Frideman (1989) noted that until age 10 either no differences between genders or differences favoring girls are observed (e.g. Callahan & Clements, 1984; Dossey et al., 1988; Hawn, Elliot, & Des Jardines 1981). For the middle school years, some research favored girls (Tsai & Walberg, 1983), and some favored boys (Hilton & Berglund, 1974); other research showed no difference (Circicelli, 1967; Fennema & Sherman, 1978). In her meta-analysis, Feridman (1989) observed that in five of seven studies 12th-grade boys out performed 12th-grade girls, with the remaining two studies showing no difference. Finally, with regards to standardized tests, boys tend to score higher than do girls (Halperen & LaMay, 2000); the difference is more prevalent in the extremes of ability distribution (Willingham & Cole, 1997). The research has consistently shown that at the end of high school boys perform better than girls on mathematics achievement tests whereas girls typically perform as well as boys in elementary school and perhaps, in middle school (Ewers & Wood, 1992; Marsh, 1989; Skaalvik 1990). Also, there is some evidence that girls achieve better than boys on verbal tests (Halpern, 1992; Reuterberg, Emanuelsson & Svensson, 1993).

The increasing gender differences in math achievement in the high school years are most frequently explained in terms of sex stereotypes and differential sex role socialization patterns (e.g. Eccles, 1987; Fennema & Peterson, 1985; Meece, Parsons, Kaczala, Goff & Futterman 1982). When it is sex typed math is viewed as a male domain (Eccles, Adler, Futterman, Goff, Kaczala, Meece & Midgley, 1983; Fennema & Sherman, 1978), Where as reading and language are stereotyped as female domains (Kaczala, 1981 Stein & Smithells, 1969). Sex stereotypes also suggest that boys have better math abilities than girls and

that math is more important for boys (Jacobs & Eccles 1985). According to Jacobs & Eccles sex stereotypes also suggest that girls have better verbal abilities than boys.

Every research study deals with the solution of some problems of human interest. That is why the researcher has a definite purpose he has certain specific aims and goals to achieve through his research work. The present study was aimed at achieving the following objectives.

- To compare the mathematics achievement of secondary school students on gender basis.
- To study the attitude of students and math achievements.
- To study the impact of television watching on achievement in math of students.

**Method:** The current work is a descriptive study investigating if students' mathematics achievement differed significantly to a group of variables such as gender, attitude towards mathematics, and T.V. watching.. The sample consisted of 1127 secondary school students, selected from 14 schools of central U.P., of India, in which 793 (70.36%) were male and 334 (34.96%) were female students. In this study, schools are categorized on the basis of their management. For instance, CBSE schools are prestigious English medium co-education schools managed by private management having high reputations in society. That is the reason that pupils in these schools belong to well-to-do families with high socio-economic status (SES). KVS Schools fully controlled financed supported and administered by central government are English Medium coeducational schools, where pupils in IX and X are from all socio-economic strata and are admitted through all India based competitions. Generally Government and Government Aided schools are Hindi medium single sex schools run by Government directly or indirectly through aids, and are widely known among general public for their poor management by Government machineries. The schools run by minority trusts through minority managements are termed as minority managed schools respectively. These schools can be seen as somewhere in between Christian missionaries and Muslim minority schools on one hand and Government and Government Aided schools on other hand.

**Tools Used:**

**Attitude towards Mathematics**

This attitude scale consists of 22 statements of likert type representing attitudes towards various aspects of math such as enjoyment of math, value of math, math anxiety, success in math, math as male domain, usefulness of math, confidence to learn & evaluation. The reliability of coefficient of the attitude scale is 0.90 as reported by the investigator and as calculated by split-half method. It is found to discriminate sufficiently between students of high attitude and those of low attitude. This scale appears to have high content validity and the method of selecting items supports this position. The range of scores on this tool extends from 22 to 110 with the mean of 66. The summation of score earned by a student on all statements was taken as his attitude score. The total scores indicate favorableness or unfavourableness of the attitude of students towards math. The higher is the score the more favourable is the attitude towards math and lower is the score the more unfavourable is the attitude towards math of the students.

**Mathematics Achievement Test**

The achievement test in mathematics for class IX students that is used in the present study was constructed by the investigator. This is a very comprehensive test based on 14 chapters of class VIII math text book (NCERT). The test consists of 60 items of multiple choice type representing achievement at various areas of math such as 21 items in arithmetic, 19 items in algebra and 06 items in geometry, 11 items in menstruation and 4 item in statistics. The total score on the test as a whole was used as a measure of achievement in math. All the items in the test were the easy items in the test were arranged in order of difficulty, the easy items being placed in the beginning and this was done to motivate the students. The difficulty values of items in the test between the range of .25 to .85 similarly, each item had a discriminating power greater than 0.30. The test was based on the latest syllabus prescribed by the directorate of education, U.P. & NCERT. This test had a fairly high content validity and its reliability is found to be 0.94.

**A Personal and Familial Background Assessment Questionnaire**

The personal information sheet was prepared by the investigator. This sheet contains such questions requiring the subjects to give information on their parental educational and occupational background as well as on some economic facilities available at home, family size, parental involvement in tutoring their children, students' involvement in extracurricular activities and time spent on watching T.V. etc.

**Results and Analysis :**

Data analysis is performed on computer with SPSS 14 software package. When data was analyzed to make a comparative study of the achievement in mathematics of male and female students (Table 1) the result shows a significant difference between achievement in mathematics of males and females (df=1125, t=0.26).

**Table 1: Comparison of mean math achievement scores of male and female students**

Gender	N	Mean score	SD	T	Df	Sig./Not sig.
Male	793	20.24	8.94	0.26	1125	Not
Female	334	20.42	10.70			

The total numbers of male and female students were 793 & 334 respectively as indicated by the table 5.1. Out of 60 scores, the mean achievement scores in math of male student is 20.24 and SD=8.94. In case of female students, the mean math achievement score is 20.42 and SD=10.70. The statistically calculated t-value is 0.26 which is not significant at 0.05 level with 1125 df. The result clearly indicates that there is no significant difference between mean math achievement score of male and female secondary school students. Both are equally good.

**Table 2: Comparison of mean achievement score on the basis of students having more positive, average and negative attitude towards mathematics**

Math attitude	N	Mean ach. Score	SD	t-value		
				P	A	N
Positive(P)	280	25.58	10.64	X		
Average(A)	580	16.60	8.46	8.23*	X	
Negative(N)	267	16.26	7.77	11.74*	5.65*	X

\*Sig. at p<0.01 levels

The mean of the math achievement score of students having positive attitude is 25.58,  $SD=10.64$ , while the means of math achievement score of student having average attitude is 16.60,  $SD=8.46$ , while the mean of math achievement score of students having negative attitude is 16.26,  $SD=7.77$  respectively. The statistical method used in testing the major hypothesis was the t test for the difference between the means of three groups. The t-values obtained by comprising each group mean achievement score with that of every other group show that all the 3 t's were found to be significant at .01 levels with df 859, 545 & 856 respectively. Thus math achievement scores of positive attitude, differ from those of average and unfavourable groups. It becomes clear that the students have positive attitude have more achievement in math than the average & negative attitude groups. Student having average attitude have more achievement in math than the negative group.

**Table3: t-value obtained from comparison of mean achievement score of four groups of students formed on the basis of T.V. watching**

Group	T.V. watching	N	Mean ach. score	SD	t-value			
					A	B	C	D
A	Zero hour	321	17.77	7.66	X			
B	Less than 1 hour	341	21.77	9.65	5.44*	x		
C	1 to 2 hours	458	20.68	10.03	4.18*	1.54	X	
D	more than 2 hours	107	19.19	9.02	1.40	2.53**	1.51	x

\*\*Sig. at  $p<0.05$ level, \*Sig. at  $p<0.01$  levels

The total sample was categorized into four groups of students on the basis of time spent on T.V. watching i.e. zero hour, less than one hour, 1 to 2 hours and more than 2 hours. The mean math scores of these groups were 17.77, 21.77, 20.68 and 19.19 respectively. t test was applied to compare each means with every other mean significant difference obtained between the means group A and B, A and C, B and D ( $t=5.44$ ;  $P<0.01$ ,  $df=660$ ,  $t=4.18$ ;  $P<0.01$ ,  $df=777$  and  $t=2.53$ ;  $P<0.05$ ,  $df=446$  respectively).

#### Discussion:

The purpose of the present research was to determine the effects of gender, attitude towards Mathematics, and T.V.Watching on achievement in math. These two variables were chosen for analysis because they are manipulable variables that have been identified as important influences on achievement in previous research. Data from a large contemporary sample of high schools students were analyzed. t-test were used to determine the effects of these variables on academic achievement, while controlling for other relevant background influences.

The results of the analysis of data shows that the personal factors indices, gender, attitude, T.V. watching, all had significant effect on math achievement scores in expected direction except gender.

There were no significant differences in math achievement scores between boys and girls in the present study. The finding of this study is supported by Branholt, Goodraw & Conney (1999), Ewers & Wood 1992; Skaalvik, 1990; Hilton & Berglund (1974). Awartani and Gray (1989) reported no significant differences between male and female students in math achievement. Ma (1995) studied a sample of high school seniors, based on algebra and geometry achievement. He found no gender differences in algebra

but males significantly outperformed females in geometry. Gender differences in achievement, especially math, have not been consistent and continue to be a much debated topic (Leder, 1992). Gender differences and the findings on gender differences in math achievement are not newly emerged fact. Long research history in this area has demonstrated that male advantage in math achievement is a universal phenomenon (Beaton et al, 1996; Mullis et al., 2000). Researchers have shown that boys tend to score higher than girls on problems that include spatial representation, measurement, proportions as well as complex problems; whereas girls tend to score higher on computations, simple problems and graph reading (Beaton et al. 1999) According to some research findings, the gender gap in math achievement increases during middle school and becomes more disturbing at the upper secondary level (Fennema et al. 1998; Fennema, 1985).

It is generally believed that student attitude towards a subject determines their success in that subject. In other words, favourable attitude result to good achievement in a subject. A student's constant failure in a school subject and math in particular can make him to believe that he can never do well on the subject thus accepting defeat. On the other hand, his successful experience can make him to develop a positive attitude towards learning the subject. This suggests that student's attitude towards math could be enhanced through effective teaching strategies. It has in fact been confirmed that effective teaching strategies can create positive attitude on the students towards school subjects (Bekee, 1987; Belogun and Olarewaju, 1992; Akin-sola (1994); Akale (1997), Alowojaiye 2000).

In general 24.84 percent students have favourable attitude towards math with 23.69 percent of students have negative attitude and rest being termed as average. Generally one fourth of the total sample have favourable attitude towards math. When the male and female students were further categorized into positive, average and negative attitude, the trend of percentages in both the cases were found same as the total sample, Thus, it is evident from this analysis that the percentages of negative students though only 23 percent cannot be considered as flattering. The result of analysis also makes it clear that male and female students both have same trend as the total sample has.

The results presented support the idea that T.V. watching brings some benefits for students. The result shows that watching brings some benefits for students. The result shows that watching T.V. for less than 1 hr to 2 hrs per day has increasingly positive effects on achievement of students. The student have no TV in their homes and not watching TV and also students who have TV in their homes and viewing more the 2 hrs per day have increasingly negative effects on achievement. Our results suggest that more time and no time spent watching TV has negative effects on the math achievement of high schools students. In general the academic performance of both, the more TV students and no TV students was found worse. Hence amount of time spent on viewing TV is the important criteria for performance of the students. This study is supported by Williams et al (1982) who have seen a positive effect for up to 10 hr of viewing TV per week and with more viewing having increasingly negative effects on achievement. Using a national sample from the high school and beyond longitudinal survey, Kith, et al (1986) found a small negative relationship between achievement and amount of TV watching. However, the negative effect

of TV watching is not found consistently (Gortmker, Salter, Walker & Dietz, 1990); suggesting the relationship may be weak and therefore sensitive to methodological variations. Indeed, Comstock (1991) concluded that the evidence indicates a modest causal contribution by television to lesser achievement. The findings of this study, along with findings of other researches (Lemish & Rice, 1986) suggest that students benefit from TV viewing. Nevertheless, even for young children, viewing should be probably be limited to the existing estimates of optional viewing time such as up to 2hrs a day. Television viewing has traditionally been assumed to lesser achievement (Comstock, 1991, Keith, Reimers, Fehrman, Pottebaum & Aubey, 1986). Simply, television viewing displaces academic activities and reduces the amount of time available for completing homework and other academic activities, thereby reducing achievement. Cooper et al (1999) observed a significant negative association between achievement and television viewing (mean viewing was 1-2 hr per night).

## REFERENCE

- Anick, C.M.; Carpenter, T.P., & Smith (1981). Minorities and mathematics : Results from the national assessment of educational press. *Mathematics Teacher*, 74, 560-566.
- Awartani, M., & Gray, M.W. (1989). Cultural influences on sex differentials in mathematics aptitude and achievement. *International Journal of Mathematical Journal in science and Technology*, 20(2), 317-320.
- Callahan, L.G., & Clements, D.H. (1984). Sex differences in rote counting ability on entry to first grade : some observations. *Journal for Research in Mathematics Education*, 15, 378-382.
- Comstock, G. (1991). Television and the American child. New York : Academic Press.
- Ewers, C.A. & Wood, N.L. (1992). Sex and ability differences in children's math self-efficacy and prediction accuracy. Paper presented at the annual meeting of the American Educational Research Association in San Francisco, April.
- Fennema, E., (1989). The study of affect and mathematics: A proposed generic model for research. In D.B. McLeod & V.M. Adams (Eds.), *Affect and mathematical problem solving: A new perspective* (pp. 205-219). New York: Springer-Verlag.
- Friedman, L. (1989). Mathematics and the gender gap : A meta analysis of recent studies on sex differences in mathematics tasks. *Review of Educational Research*, 59(2), 185-213.
- Gortmker, S.L Salter C.A. Walker D.K. & Diets. W.H. (1990) the impact of television viewing on mental aptitude and achievement: A longitudinal study *Public opinion Quarterly*, 54 594-604.
- Haller, E.J. (1992). High school size and student indiscipline: Another aspect of the school consolidation issue? *Educational Evaluation and Policy Analysis*, 14(2) 145-156.
- Jacobs, J. E. & Eccles, E. (1985). Gender differences in math ability : the impact of media reports on parents. *Educational Researcher*, 14, 21-25.
- Leder, G.C. (1992). Mathematics and gender: Changing perspectives. In D.A. Grows (Ed.) *Handbook of research on mathematics teaching and learning* pp. 597-622 New York, Macmillan.
- Madigan, T. (1994) Parent involvement and school achievement, Paper presented at the meeting of the American Education Research Association New Orleans.
- Ma, X (1995). Gender differences in mathematics achievement between Canadian and Asian education systems. *The Journal of Educational Research*, 89, 118-127.
- Ma, X. (1997). Reciprocal relationship between attitude towards math and achievement in math. *The Journal Of Educational Research*, 90(4), 221-229.
- Mullis I.V.S martin M.O. Beton A.E. Gonzalez E.J. Kelly D.L. & Smith T.A. (1998) Mathematics and science achievement in the final year of secondary school. IEAS third international mathematics and Science study (TIMSS) chestnut Hill, MA Boston College.
- Reyes, L.H. ( 1984). Affective variables and mathematics education, *Elementary school Journal* 84, 558-581.
- Williams, P.A. Haertel, E.H., Haertel, G.D., & Walberg, H.J. (1982). The impact of leisure-time television on school learning. *American Educational Research Journal*, 19(1), 19-50.
- Wilkins, J.L.M., & MA, X (2002). Predicting students growth in Mathematical content knowledge. *Journal of Educational Research* 95(5), 288-298.