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Mathematics achievement in relation to mental ability among higher secondary school students

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Abstract
Mathematics is an important branch of cognition and the increase of mathematical thinking is a fundamental pillar in the orientation of educational development within a new, advanced educational system. It is in the nature of a person or student to think, and thinking promoted across a range of disciplines is practised in our schools through education. Therefore, day by day, a sense of the significance of thinking in the educational field usually and more particularly in specific disciplines has developed among educators. Learning how to think mathematically is an extremely important issue in mathematics education. This study is examined towards the mathematics achievement and mental ability among higher secondary school students. It was administered to 768 higher secondary first year students. Differences were compared for type of family and parental education. Results indicated that students from nuclear family scored more than the student from the joint family regarding mathematics achievement and mental ability. But in the case of parental education student of college education as parental education scored more than the other secondary and higher secondary regarding mathematics achievement and Mental Ability do not have significant difference towards higher secondary first year higher than others.

Keywords: education, quality, research, internationalization

Introduction
Education is a process of acquiring knowledge, developing the powers of reasoning and judgement and generally of preparing oneself or others intellectually for mature life. In other way education means the complete experience gained by an individual from origin to death. Mathematics is as old as the human evolution for that only mathematics is called as the queen of all sciences. Mathematics has always been a central part of any school curriculum. The study of this subject is a continuous process. It does not stay confined to itself but also plays a purpose in the progress of other disciplines. It is an essential building block that helps in structuring views in a logical order. A lot of weightage has been given to the mathematics subject from time immemorial, and it has acquired even greater value today with its linkage to diverse fields of physical and social science. From the very beginning, the children's education starts with both language and numerical skills.

Mathematics relies on logic and creativity; and it is pursued both for a mixture of practical purposes and for its inherent interest. The real meaning of mathematics lies in its beauty and its intellectual challenge. Learning to know our creativity, mental ability is one of the most chief aspects of our life for the whole thing we do is affected by our thinking abilities.

Significance of the study
The study of mathematics equips student's knowledge, skills and habits of mind that are essential for successful and rewarding participation in a society. To learn mathematics in a way that to serve them well throughout their lives, students need classroom experiences that help them to develop mathematical understanding, learn important facts, skills and procedures, develop the ability to apply the process of mathematics and acquire a positive attitude towards mathematics. Mathematics is an important branch of cognition and the increase of mathematical thinking is a fundamental pillar in the orientation of educational development within a new, advanced educational system. Basic mathematical calculations help train and develop a child's mind. This study will be of much more helpful to solve the problem questions to achieve remarkable high level Mathematics achievement.

Objectives of the study
1. To find out the level of Mathematics achievement and mental ability towards higher secondary school students.
2. To find out the relationship between Mathematics achievement and mental ability towards higher secondary school students.
3. To find out the significant difference between Mathematics achievement and mental ability towards higher secondary school students.
4. To find out the significant difference between Mathematics achievement with respect to the type of family towards higher secondary school students.
5. To find out the significant difference between Mathematics achievement with respect to the secondary and higher secondary education as parental education towards higher secondary school students.
6. To find out the significant difference between Mathematics achievement with respect to the secondary and college education as parental education towards higher secondary school students.
7. To find out the significant difference between Mathematics achievement with respect to the higher secondary and college education as parental education towards higher secondary school students.
8. To find out the significant difference between Mental

Ability with respect to the type of family towards higher secondary school students.
9. To find out the significant difference between Mental Ability with respect to the secondary and higher secondary education as parental education towards higher secondary school students.
10. To find out the significant difference between Mental Ability with respect to the secondary and college education as parental education towards higher secondary school students.
11. To find out the significant difference between Mental Ability with respect to the higher secondary and college education as parental education towards higher secondary school students.

Hypotheses of the study

1. The level of Mathematics achievement and Mental Ability of higher secondary school students is low.
2. The relationship between Mathematics achievement and Mental Ability is do not differ significantly towards higher secondary school students.
3. There is no significant difference between Mathematics achievement and Mental Ability towards higher secondary school students.
4. There is no significant difference between Achievements in Mathematics with respect to type of family towards higher secondary school students.
5. There is no significant difference between Achievements in Mathematics with respect to secondary and higher secondary education as parental education towards higher secondary school students.
6. There is no significant difference between Achievements in Mathematics with respect to secondary and college education as parental education towards higher secondary school students.
7. There is no significant difference between Achievements in Mathematics with respect to higher secondary and college education as parental education towards higher secondary school students.
8. There is no significant difference between mental ability with respect to type of family towards higher secondary school students.
9. There is no significant difference between Mental ability with respect to secondary and higher secondary education as parental education towards higher secondary school students.
10. There is no significant difference between mental ability with respect to secondary and college education as parental education towards higher secondary school students.
11. There is no significant difference between mental ability with respect to higher secondary and college education as parental education towards higher secondary school students.

Operational definition of the terms

- Mathematics achievement refers to the score obtained in the mathematics achievement test constructed and standardized specially for the present study.
- Mental ability is a term used to describe the level at which an individual learns, understands the instructions, and solves problems. Student's having the capacity to do rational problems mentally fast as well as their academic mathematics problems.

Demographic variables

- Type of family: joint / nuclear
- Parental education: secondary / higher secondary / college

Tools used in the study

- Achievement test in mathematics of higher secondary first year students standardized and validated by the investigator
- Mental Ability test has constructed and validated by the investigator (2016)

Sample of the study

Stratified random sampling technique was used for the present study of 768 higher secondary first year students.

Statistical techniques

Mean and standard deviation for the entire sample and the demographic variables were computed for Mathematics achievement and Mental Ability. The test of significance 't'-test was used to find out the significance difference between the means. The correlation coefficient has been found out to determine the relationship between the Mathematics achievement and Mental Ability.

Scoring procedure of the tools

- Maximum score of Mathematics achievement = 100
- Maximum scored score of Mental Ability by higher secondary first year students = 62.6

Analysis of Data

Hypothesis 1

The level of Mathematics achievement and Mental Ability of higher secondary school students is low

Table 1: Mean and Standard deviation of the scores of Achievement in mathematics and Mental Ability

Variables	N	Mean	SD
Mathematics achievement	768	76.4	11.2
Mental Ability	768	58.6	9.5

From the table 1, conclude that the higher secondary students and Mental Ability shows average level. The framed null hypothesis is rejected and alternate hypothesis is accepted. Therefore, it is found that both Mathematics achievement and Mental Ability of higher secondary school students shows average level.

Hypothesis 2

The relationship between Mathematics achievement and Mental Ability do not differ significantly towards higher secondary school students.

Table 2: Relationship between mathematics achievement and mental ability

Variables	Correlation value	Level of significance at 0.05 level
Mathematics achievement and Mental Ability	0.348	Positive High significance

The Pearson's product-moment correlation was computed to find the relation between the Mathematics achievement and Mental Ability. It is found to be, the obtained correlation

value is higher than the table value at 0.05 level. Hence the null hypothesis is rejected, and it is concluded that there is positive high significant relation between the Mathematics achievement and Mental Ability of higher secondary school students.

Hypothesis 3

There is no significant difference between Mathematics achievement and Mental Ability towards higher secondary school students.

Table 3: Mean difference between mathematics achievement and mental ability

Variables	N	Mean	Standard deviation	t- value	Significant at 0.05 level
Mathematics achievement	768	76.4	11.2	1.36	NS
Mental Ability	768	58.6	9.5		

In order to find out the significant difference between Mathematics achievement and Mental Ability, mean, standard deviation and 't' scores were computed. The obtained value of mean and standard deviation of Mathematics achievement is 76.4 & 11.2 and Mental Ability is 58.6 &9.5. The obtained 't' value is 1.36 and can be concluded that there is no significant difference between Mathematics achievement and Mental Ability of higher secondary first year students, so null hypothesis is accepted. Because, the calculated value is less than the table value 't' at 0.05 level.

Hypothesis 4

There is no significant difference between Achievements in Mathematics with respect to type of family towards higher secondary school students.

Table 4: Mean difference between mathematics achievement in type of family

Variable	Type of family	N	Mean	Standard deviation	t- value	Significant at 0.05 level
Mathematics achievement	Joint	217	58.6	11.3	2.57	S
	Nuclear	551	86.7	18.2		

In order to find out the significant difference between students from joint and nuclear family of Mathematics achievement, mean, standard deviation and 't' scores were computed. The obtained value of mean and standard deviation of joint family regarding Mathematics achievement is 58.6 & 11.3 and nuclear family regarding Mathematics achievement is 86.7 & 18.2. The obtained 't' value is 2.57. From the table it can be concluded that there is significant difference between Mathematics achievement with respect to joint and nuclear family of higher secondary first year students, so null hypothesis is rejected. Because the calculated value is more than the table value 't' at 0.05 level

Hypothesis 5

There is no significant difference between Mathematics achievement with respect to secondary and higher secondary as parental education

Table 5: Mean difference between mathematics achievement and parental education (secondary & higher secondary)

Variable	Parental education	N	Mean	Standard deviation	t- value	Significant at 0.05 level
Mathematics achievement	Secondary	214	49.8	14.9	2.15	S
	Higher secondary	382	66.8	17.4		

In order to find out the significant difference between students of secondary education and higher secondary education as parental education of Mathematics achievement, mean, standard deviation and 't' scores were computed. The obtained value of mean and standard deviation of students of secondary education scored, regarding Mathematics achievement is 49.8 & 14.9 and students as higher secondary education scored, regarding Mathematics achievement is 66.8 & 17.4. The obtained 't' value is 2.15. From the table it can be concluded that there is significant difference between Mathematics achievement with respect to students of secondary education and higher secondary education as parental education of higher secondary first year, so null hypothesis is rejected. Because the calculated value is more than the table value 't' at 0.05 level

Hypothesis 6

There is no significant difference between Mathematics achievement with respect to secondary and college as parental education

Table 6: Mean difference between mathematics achievement and parental education (secondary & college)

Variable	Parental education	N	Mean	Standard deviation	t- value	Significant at 0.05 level
Mathematics achievement	Secondary education	214	49.8	14.9	2.45	S
	College education	172	82.4	14.6		

In order to find out the significant difference between students of secondary education and college education as parental education of Mathematics achievement, mean, standard deviation and 't' scores were computed. The obtained value of mean and standard deviation of students of secondary education scored, regarding Mathematics achievement is 49.8 & 14.9 and students of college education scored, regarding Mathematics achievement is 82.4 & 14.6. The obtained 't' value is 2.45. From the table it can be concluded that there is significant difference between Mathematics achievement with respect to students of secondary education and college education as parental education of higher secondary first year, so null hypothesis is rejected. Because the calculated value is more than the table value 't' at 0.05 level

Hypothesis 7

There is no significant difference between Mathematics achievement with respect to higher secondary and college as parental education

Table 7: mean difference between mathematics achievement and parental education (higher secondary & college)

Variable	Parental education	N	Mean	Standard deviation	t- value	Significant at 0.05 level
Mathematics achievement	Higher secondary	382	66.8	17.4	3.6	S
	College education	172	82.4	14.6		

In order to find out the significant difference between students of higher secondary education and college education as parental education of Mathematics achievement, mean, standard deviation and 't' scores were computed. The obtained value of mean and standard deviation of students of higher secondary education scored, regarding Mathematics achievement is 66.8 & 17.4 and students of college education scored, regarding Mathematics achievement is 82.4 & 14.6. The obtained 't' value is 3.6. From the table it can be concluded that there is significant difference between Mathematics achievement with respect to students of higher secondary education and college education as parental education of higher secondary first year, so null hypothesis is rejected. Because the calculated value is more than the table value 't' at 0.05 level

Hypothesis 8

There is no significant difference between Mental Ability with respect to type of family

Table 8: Mean difference between mental ability along with type of family (joint / nuclear)

Variable	Type of family	N	Mean	Standard deviation	t- value	Significant at 0.05 level
Mental Ability	Joint	217	50.3	9.5	2.58	S
	Nuclear	551	66.4	6.7		

In order to find out the significant difference between students from joint family and students from nuclear family of higher secondary first year students, Mental Ability; mean, standard deviation and 't' scores were computed. The obtained value of mean and standard deviation of students from joint family scored, regarding Mental Ability is 50.3, 9.5 respectively, and students from nuclear family scored, regarding Mental Ability is 66.4, 6.7 respectively. The obtained 't' value is 2.58. From the table it can be concluded that there is significant difference between students from joint family and students from nuclear family, with respect to Mental Ability of higher secondary first year, so null hypothesis is rejected. Because the calculated value is more than the table value 't' at 0.05 level.

Hypothesis 9

There is no significant difference between Mental Ability with respect to secondary and higher secondary as parental education

Table 9: Mean difference between mental ability along with parental education (secondary / higher secondary)

Variable	Parental education	N	Mean	Standard deviation	t-value	Significant at 0.05 level
Mental Ability	Secondary	214	37.6	5.4	1.53	NS
	Higher secondary	382	41.3	9.6		

In order to find out the significant difference between students parental education as secondary and students parental education as higher secondary of higher secondary first year students, Mental Ability; mean, standard deviation and 't' scores were computed. The obtained value of mean and standard deviation of students parental education as secondary scored, regarding Mental Ability is 37.6, 5.4 respectively, and students parental education as higher secondary scored, regarding Mental Ability is 41.3, 9.6 respectively. The obtained 't' value is 1.53. From the table it can be concluded that there is no significant difference between student's parental education as secondary and students parental education as higher secondary, with respect to Mental Ability of higher secondary first year, so null hypothesis is accepted. Because the calculated value is less than the table value 't' at 0.05 level.

Hypothesis 10

There is no significant difference between Mental Ability with respect to secondary and college as parental education

Table 10: Mean difference between mental ability along with parental education (secondary / college)

Variable	Parental education	N	Mean	Standard deviation	t- value	Significant at 0.05 level
Mental Ability	Secondary education	214	37.6	5.4	1.60	NS
	College education	172	56.7	6.8		

In order to find out the significant difference between students parental education as secondary and students parental education as college of higher secondary first year students, Mental Ability; mean, standard deviation and 't' scores were computed. The obtained value of mean and standard deviation of students parental education as secondary scored, regarding Mental Ability is 37.6, 5.4 respectively, and students parental education as college scored, regarding Mental Ability is 56.7, 6.8 respectively. The obtained 't' value is 1.60. From the table it can be concluded that there is no significant difference between students parental education as secondary and students parental education as college, with respect to Mental Ability of higher secondary first year, so null hypothesis is accepted. Because the calculated value is less than the table value 't' at 0.05 level.

Hypothesis 11

There is no significant difference between Mental Ability with respect to secondary and college as parental education

Table 11: Mean difference between mental ability along with parental education (secondary / college)

Variable	Parental education	N	Mean	Standard deviation	t- value	Significant at 0.05 level
Mental Ability	Higher secondary	382	41.3	9.6	1.41	NS
	College education	172	56.7	6.8		

In order to find out the significant difference between students parental education as higher secondary and students parental education as college of higher secondary first year students, Mental Ability; mean, standard deviation and 't' scores were computed. The obtained value of mean and standard deviation of students parental education as higher secondary scored, regarding Mental Ability is 41.3, 9.6 respectively, and students parental education as college scored, regarding Mental Ability is 56.7, 6.8 respectively. The obtained 't' value is 1.41. From the table it can be concluded that there is no significant difference between students parental education as higher secondary and students parental education as college, with respect to Mental Ability of higher secondary first year, so null hypothesis is accepted. Because the calculated value is less than the table value 't' at 0.05 level.

Major findings of the study

1) It is found that both Mathematics achievement and Mental Ability of higher secondary school students shows average level.
2) It is found that there is positive high significant relation between the Mathematics achievement and Mental Ability of higher secondary school students.
3) It is found that there is no significant difference between Mathematics achievement and Mental Ability of higher secondary first year students,
4) It is found there is significant difference between Mathematics achievement with respect to joint and nuclear family of higher secondary first year students
5) It is found there is significant difference between Mathematics achievement with respect to students of secondary education and higher secondary education as parental education of higher secondary first year
6) It is found there is significant difference between Mathematics achievement with respect to students of secondary education and college education as parental education of higher secondary first year
7) It is found there is significant difference between Mathematics achievement with respect to students of higher secondary education and college education as parental education of higher secondary first year
8) It is found there is significant difference between students from joint family and students from nuclear family, with respect to Mental Ability of higher secondary first year
9) It is found there is no significant difference between students parental education as secondary and students parental education as higher secondary, with respect to Mental Ability of higher secondary first year
10) It is found there is no significant difference between students parental education as secondary and students parental education as college, with respect to Mental Ability of higher secondary first year
11) It is found there is no significant difference between students parental education as higher secondary and students parental education as college, with respect to Mental Ability of higher secondary first year

Conclusion

The national policy of education (1986) has also measured the importance of mathematics in universal education and suggested that, mathematics should be visualized as the means of expression to train a child to think, reason, analyze and to express logically. The ability of do a little is the quality acquired skill or talent. Students' mathematics achievement is often related with the future financial power and competitiveness of a country. Therefore, the necessary to understand and identify factors that may have significant and steady relationships with mathematics achievement has been shared among national policy makers and educators around the world.

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