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Achievement in Mathematics in Relation to Intelligence and Socio-Economic Status of Secondary School Students in Tripura: A Critical Study

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Abstract

The study reveals about the achievement on mathematics in relation to intelligence and socio economic status of the secondary level students of West-Tripura district of Tripura. It is found out that most of the students of secondary level have good achievement in relation to intelligence Socio-economically poor students have poor performance is in Mathematics.

Keywords: Achievement, mathematics, intelligence, West-Tripura and socio economic status

Introduction

The Strength of a nation lies in its commitment and capacity to prepare its people for needs, aspiration and requirements of a progressive technological society. This implies the new creation of opportunities and facilities for training large number of youth in imbibing as much new knowledge as possible. This being generally true of all developing countries, it is more so for India, especially Tripura for accelerating the pace of economic growth and social development. Therefore, it is necessary to prepare the child for this era of technology with a strong base at mathematics to face the challenges of 21st century.

Tripura is a small state of India which is situated at North-Eastern Region of India. Educationally Tripura is a growing state of country. But growth rate is not up to the mark as it is desired. Development in education of a state or a country depends on its basic education. First step of basic education in the sense of public examination is secondary examination (Madhyamik Examination) conducted by stat education board (in Tripura, Tripura Board of Secondary Education).

The subject mathematics occupies a very important place in the school curriculum at secondary level. Kothari commission remarked that science and mathematics should be taught on a compulsory basis to all the pupils as a part of general education during the first ten years of schooling. In addition, there should be provision of special courses in these subjects at the secondary stage, for students of more than average ability.

Thus it clear that mathematics has a great importance but student's achievement in mathematics at secondary level is very poor. So it is very important to study the student's performance in mathematics at secondary examination conducted by TBSE so as it's conditioned can be improved.

Rational of the study

Mathematics has a great importance in our everyday life. In the era of science and technology, we cannot proceeds a single step without mathematics. The development of a country depend mathematical knowledge of the people.

In our education system, mathematics has a great importance. It is considered as a basic and compulsory subject upto the secondary level. Kothari commission has given opinion to introduce mathematics as a compulsory subject upto secondary level. But it is found that students' achievement in mathematics at secondary level under Tripura Board of secondary Education is very poor. Students' performances in mathematics at secondary level also influence the board's results negatively.

From the source of Tripura Board of secondary education, it is followed that the performance of students in mathematics at secondary examination is very poor. Maximum numbers of students are getting poor marks in Mathematics. In the era of science and technology, mathematics has become an indispensable instrument in every walk of our life. It is unimaginable that what happens if mathematics disappears from our lives. From a normal house wife to a great scientist, from a rickshaw puller to a finances minister, every person must depend on mathematics to discharge their duties and functions. Not a single aspect of our life is free from its use. Any person ignorant of mathematics will be easily cheated. Counting, notation, addition, subtraction, multiplication, division, weighing, measuring, selling, buying and many other aspects are fundamental of mathematics which has immense practical value in life. It has wider application in agriculture, industry, defense, information technology, science and technology, music, economies, bio-engineering, physical and biological sciences, astronomy etc. Roger Bacon says," Mathematics is the gate and key of all sciences."

The subject mathematics is abstract to sum extend. To solve mathematical problems abstract thinking should be developed among the learner. Abstract thinking power will be high if a student intelligent enough. So achievement in mathematics may be related to intelligence.

Mental ability of a person depend on is socio-economic status. For solving mathematical problems a good social environment is important. Social environment depend on socio-economic status. So, socio-economic status may have an influence on achievement in mathematics.

Whether intelligence and socio-economic status are responsible for poor performance in mathematics? No work in this area have done earlier for the achievements of mathematics at secondary level students in relation to intelligence and socio-economic status. It will give an idea about students

problem and solution for achievement in mathematics if intelligence is more and poor performance in relation to socio-economic status.

Objectives

1. To find out the achievement of students in mathematics at secondary level
2. To find out the intelligence of students at secondary level.
3. To find out the socio-economic status of family of students at secondary level
4. To find out the relation between intelligence and achievement in mathematics of students at secondary level.
5. To find out the relation between socio-economic status of family and achievement in mathematics of students at secondary level.
6. To estimate the interrelationship between different levels of three selected parameters (intelligence, socio-economic status, achievement) of the students at secondary level.

Definition of Terms

Achievement: The term achievement is used to understood the pupils scores on a certain school subject. An achievement in education implies ones knowledge, understanding or skill in specified subject.

Secondary level: Secondary level means Class IX and Class X of our academic system

Intelligence

Intelligence has been defined in many different ways including as one's capacity for logic understanding, self-awareness, learning, emotional knowledge, planning, creativity and problem solving. It can be more generally described as the ability to percein information and to retain it as knowledge to be applied towards adaptive behaviours within an environment or context.

Some groups of psychologists have suggested the following definition:

"A very general mental capability that, among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience. It is not merely book learning, a narrow academic skill, or test taking smarts. Rather, it reflects a broader and deeper capability for comprehending our surroundings – catching on, making sense of things or figuring out what to do.

David Weehsler defined intelligence as "The aggregate or global capacity of the individuals to act purposefully, to think rationally and to deal effectively with his environment."

Lloyd Humphreys defined intelligence as "the resultant of the process of acquiring-storing in memory, retrieving, combining, comparing and using in new contexts information and conceptual skills."

Socio-economic Status (SES):

Socio-economic Status (SES) is an economic and sociological combined total measure of a person's work experience and of an individual's or family's economic and social position in relation to others, based on income, education and occupation.

Delimitation

1. The study has been confined within the former West Tripura district of Tripura.
2. The study has been confined on Class IX students.

Hypothesis

1. There is no significant difference in the achievement of mathematics of the students with different levels of intelligence.
2. There is no significant difference in the achievement of mathematics of the students with different levels of socio-economic status.
3. The interaction effects of intelligence and socio-economic status on the achievement of students do not differ significantly.

Review of Related Literature

Review of the related literature allows a researcher to acquaint him with a current knowledge in the field or area in which he is going to conduct the research. This helps to avoid unintentional duplication of well-established finding. Moreover, it helps to know the previous recommendations and research.

1. Asutosh Pal, 1989, had done a critical study of some affective outcomes of the students as predictors of their mathematical ability. The findings are :

i. Boys showed higher self-concept them girls.

ii.There existed significant correlation between mathematics and self-concept, between mathematics and anxiety, between mathematics and attitude, between mathematics and academic motivation.

2. Madan Mohan Chel, 1990, had done Diagnosis and remediation of underachievement in compulsory mathematics of Madhyamik examination in West Bengal. The major findings are :

i. The main difficulties faced by student included concept gaps, confusion in understanding mathematical language, stereotype way of presenting contents and lack of openness in teaching.

ii.The major mistakes found in the performance of student and teacher trainees in the areas include mathematisation of verbal problems, interpretations of mathematical result and learning new topics in mathematics.

iii. Underachievement was caused due to lack of understanding of the mathematical concept of the earlier stage and the abstract nature of mathematics.

iv. Errors were caused due to versatility and variability of contents, lack of time etc.

v. Noises in the channel at message were fear, anxiety, psychological imbalance, the faculty's arrangement of contents.

vi. Reinforces in the channel of learning were readiness, interest, active involvement, use of effective materials of instruction and learning efficiency.

3. Caroline Ngailiankim, 1991, done a study of selected variables associated with achievement in mathematics. The major findings are:

i. There was a significant association between

(a) Attitude towards mathematics,

(b) Educational aspiration,

(c) Numerical ability,

(d) Abstract reasoning,

(e) personality factor A and

(f) personality factor G an d achievement in mathematics

ii. None of the other variables studied showed association with achievement in mathematics.

4. N. Bandri, 1991 had done an investigation into the causes for low achievement in government high schools in Changlapattu Educational District, Tamil Nadu. The major findings are:

The causes of poor achievement were identified as low motivation, policy of liberal promotion to the next higher class, poor study habits, lack of parental involvement in education and poor teaching.

5. K.T. Rangappa, 1992 had done a study of self-concept, reading ability in relation to achievement in mathematics of students of standard VII. The major findings are:

i. There was a significant difference in the achievement in mathematics of student having different levels of reading ability.

ii. There was a significant difference in the performance of the student of standard VII in mathematics studying in rural and urban schools.

iii. There was a significant difference in the performance of the student of standard VII in mathematics studying in rural and urban schools.

iv. There was no significant difference between boys and girls of standard VII in their achievement in mathematics.

6. A. Rosaly, 1992, studied the relationship between attitude of students towards mathematics and achievement. The major findings are:

i. The attitude of high school students towards learning mathematics and their achievement in mathematics were related.

ii. Urban girls had a more positive attitude towards mathematics than rural girls.

iii. Urban boys had a more positive attitude towards mathematics than rural boys.

iv. Girls were higher than rural girls in mathematics

v. Urban girls were higher than rural girls in mathematics

Besides these there are several studies on achievement in mathematics. Some of these are mentioned here as follows:

i. Faerrda Khatoon, 1988 studied the mathematical aptitude among boys and girls and its relationship with interests and vocational preferences at the secondary school level.

ii. P.E. Doshi, 1989, done a study of achievement and cognitive preference styles in mathematics of class X students.

iii. S. Sarala, 1990 studied conceptual errors of secondary school pupils in learning select areas in modern mathematics.

iv. Rangappa, 1993; correlated mathematical achievement with the level of reading ability.

iv. Lalithabais (1993) studied the role of numerical ability with mathematical achievement.

v. Basavayya (1995) attempted to study perception as a correlates of mathematics

vi. Sumangal (1995), Srivastave (1993), Patel (1997) attempted to study level of intelligence with achievement in mathematics.

vii. Sumangal (1995), Srivastave (1993), Patel (1997) attempted to study level of intelligence with achievement in mathematics.

viii. Sood (1999) has attempted to study different personality factors as facilitators of mathematical achievement.

ix. Srinivasan (1999), Singh (1994), Sumangale (1995), Wangu and Thomas (1995), Thampuratly and Devi (1994), Panchalingappa (1995) attempted to study attitude as an important correlate of mathematical achievement.

x. There are seven studies, which have attempted to study sex as one of the correlates of mathematical achievement. These studies are done by Tota, 1995; Mukherjee, 1997; Paria, 1996; Pal and Natarajan, 1997; Wage and Thomas 1995; Chakraborty, 2000; Nagalakshmi, 1996.

Statement of the Problem

It has been found that a maximum number of student's performance in secondary mathematics examination is very poor. A very few number of students are getting high marks in mathematics and a minimum number of students are just pass in secondary mathematics which makes negative inference in the board's results. Due to poor performance in mathematics examination, the pass performance of secondary examination is low. It is important to find out the area for which student's achievement is poor. For this it is needed to study the student's achievement in mathematics so that it is possible to find out the defective areas and some remedial measures can be taken for student's betterment.

Many researchers have been done on academic achievement. But no research has been done on study of student's achievement in mathematics at secondary level of Tripura. So researcher has taken this area as an area of research. Title of the research is "**Achievement in Mathematics in Relation to Intelligence and Socio-economic Status of Secondary School students in Tripura : A Critical Study**."

Methodology of the Study

The selection of a method with a specific design depends upon the nature of the problem and upon the kind of data that the problem entails. However, the method selected should be in cohesion with specific principles and adequate enough to lead to a reliable generalization. Research method is indispensable for the study of the title by the researcher. Researchers have applied survey method for the study to collect data from the respondents.

Sample

Sample of data collection have been done from Class IX and total number of students are 390 (three hundred ninety) and collected randomly from former West Tripura district of secondary school of Tripura.

Tools

Tools used for data collection are questionnaire about achievements in mathematics, Raben intelligence test and socio-economic status scale.

Data Analysis

After collection of data, it was analysed by using SPSS package for t-test, ANOVA test, chi-square tested to find out the objectives of the study and interpretation have been done.

Analysis and Findings

Data analysis is performed on computer with SPSS software package.

Table 1:

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Academic achievement	390	0	30	19.33	6.593

The above table shows that mean mark of academic achievement is 19.33 out of 30 which is more than 50% and near about 64%. Standard deviation 6.593 indicates that the achievement scores are mostly varying between 19.33 + 6.593 i.e. 25.92 and 19.33 – 6.593 i.e. 12.737, in percentage most of the scores are varying between 42.4% and 86.4%. This indicates that academic achievement of the students are not bed. Students have got normal marks in mathematics not extraordinary good nor extraordinarily bed.

Table 2:

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Intelligence Score	390	0	18	10.89	5.324

The above table shows that mean score of intelligence is 10.89 and out of 18 which is more than 50% and near about 60%. Standard deviation 5.324 indicates that the intelligence scores are mostly varying between 10.89 + 5.324 i.e. 16.21 and 10.89 – 5.324 i.e. 5.56, in percentage most of the scores are varying between 30% and 90%. This means that intelligence level are good but it is varying a wide range i.e. some of the students are highly intelligence and some are less intelligent.

Table 3:

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
SES	390	27	83	55.91	11.38

The above table shows that mean score of SES of family of students is 55.91 which is more than 50% and near about 67%. Standard deviation 11.38 indicates that SES scores are varying between 55.91 + 11.38 i.e. 67.29 and 55.91. 11.38 i.e. 44.53, in percentage most of scores are varying between 53.65% and 81%. This indicates that SES condition of family members of the students are good. Most of them are as standard and above standard, some are of below standard.

Table 4: SES Category

	Frequency	**Percent**
Low SES	197	50.5
High SES	193	49.5

This table shows that 50.5% family belongs to low SES and 49.5% family belongs to high SES considering mean (55.91) as standard which indicate that there is parity in SES conditions.

Table 5: Correlation between Intelligence score and

Academic achievement score

Variables	**N**	**R**	**p**
Intelligence and Academic Achievement	390	0.58	0.000

$p < 0.001$

Pearson's correlation coefficient (r) is used as inferential statistics to examine association between intelligence and academic achievement score at the secondary level schools. The above table results depict a moderate significant positive relationship between intelligence and students academic achievement score, $r (390) = 0.58$, $p < 0.001$. Therefore, it is inferred from above information that intelligence influences on students' academic achievement score.

Table 6: Significance of the difference between the Means of Academic Achievement of Students of High and Low Socio Economic Status

	SES Category	N	Mean	Std. Deviation	Stad. Error of Mean	***t*-value**
Academic	High SES	193	21.70	6.101	0.439	7.499*

Achievement	Low SES	197	17.02	6.236	0.444	d.f.=388

**significant at 1% level*

In the above table there are 193 students of high socio-economic status and 197 students of low socio-economic status. The mean of the academic achievement of students of high socio-economic status is 21.70 and the mean of academic achievement of students of low socio-economic status is 17.02. The standard deviation of high socio-economic status is 6.101 and standard deviation of low socio-economic status is 6.236. The S.E.M. of high SES is 0.439 and S.E.M. of low SES is 0.444. The t-value is 7.499 at 388 degree of freedom which is significant at 1% level of significance. So the null hypothesis which states that there will be no significant difference between academic achievement of students of high SES and low SES shall be rejected. It interprets that socio-economic status of students affects their academic achievement.

Table 7: Chi-square test between SES and Academic Achievement score

Variables	Chi-square value	df	P
SES and Academic Achievement	28.065[a]	2	.000

a. 0 cells (0%) have expected count less than 5. The minimum expected count is 27.71.

This table shows that calculated value is more than tabulated value, so null hypothesis is rejected. It imparts that SES affects the academic achievement.

Table 8: Effects of Intelligence on Academic Achievement of Students (ANOVA)

		Sum of squares	df	Mean square	F	Sig.
Academic Achievement	Between Groups	2139.142	1	2139.42	56.204	.000
	Within Groups	14767.524	388	38.061		
	Total	16906.667	389			
Intelligence score	Between Groups	3341.840	1	3341.84	168.753	.000
	Within Groups	7683.637	388	19.803		
	Total	11025.477	389			

The above table shows that F value at $p < 0.001$ in both the cases is greater than 1. It depicts that null hypothesis is rejected. It interpret that both intelligence and academic achievement are interrelated.

Table 9: Intelligence category

	Frequency	%
High Intelligence (80% and above)	152	38.97
Moderate Intelligence (21% to 79%)	172	44.10
Low Intelligence (20% and below)	66	16.92

The above table shows that 38.97% of the students have secured 80% above in intelligence, 44.10% students have secured 21% to 79% in intelligence and 16.92% students have secured 20% and below in intelligence. It depicts that maximum number of students intelligence are in middle 60%.

The above analysis revealed that –

(i). Null hypothesis one is rejected as there is a significant relation in the achievement with different levels of intelligence. The students with high intelligence perform good in achievement and students with low intelligence perform bed in achievement.

(ii). Null hypothesis two is rejected as there is a significant relation in the achievement with SES conditions. The students with high SES conditions perform good in achievement and students with low SES conditions perform poor in achievement.

(iii). Null hypothesis three is also rejected as intelligence and SES both has effect on achievement. Both intelligence and SES effects directly in achievement.

Findings

On the basis of the above analysis the following are the findings:

1. The academic achievement of the student is in moderate range.
2. The intelligence level of the students is in moderate range.
3. The SES conditions are in average category.
4. Approximately fifty-fifty families are in high and low SES conditions.
5. Maximum numbers of students are belong to medium intelligence level.
6. Number of high intelligence level student is less than that of medium intelligence level students.
7. There is good relation between intelligence and academic achievement.
8. The students who are more intelligent perform good in academic achievement.
9. SES has a good influence on academic achievement.
10. The students whose SES conditions are high their academic performance are also good and whose SES conditions are low their academic performance are also poor.

11. The students whose SES and intelligence level are high their academic achievement also high.
12. The students whose SES and intelligence level are low their academic achievement also low.

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