

Numerical Aptitude Among 10th Grade Students of District Kulgam

¹Dr. Rahil Hassan Bhat, ²Bilal Ahmad Bhat

¹Lecturer at North campus, university of Kashmir, Department of Teacher Education, ²P.hd Research Scholar at Department of Education, University of Kashmir

Abstract: The purpose of this study was to analyse the numerical aptitude of boys and girls among 10th grade male and female students of District Kulgam J&K. The study involved 300 students from 11 Govt. institutes of district Kulgam in J&K, via stratified random sampling technique in which 150 boys and 150 girls were taken as sample. The researcher collected data by using Standardized tool called the “Numeral aptitude test” was used to collect data so as to test the hypothesis. Results showed that performance of both Boys and girls were poor in numerical aptitude. At the same time it was confirmed that there was no significant difference in numerical aptitude among boys and girls of 10th standard students. Therefore our hypotheses stands accepted.

Keywords: Numerical aptitude, 10th grade students

INTRODUCTION:

In the pursuit of education, the overarching goal is to foster an all-round development encompassing morality, social aptitude, spiritual insight, and physical aptitude within an individual. As we manoeuvre the 21st century, marked by an era of persistent competition, the spotlight is keenly focused on individual achievements across various facets of life. In this dynamic landscape, academic excellence holds particular significance, shaping the track of a student’s career and destiny. The contemporary student is compelled to not only succeed but to excel comprehensively, establishing a competitive edge in the chase of success. Academic accomplishment, traditionally measured through grades or marks, becomes a pivotal determinant influencing career orbits and life outcomes. Consequently, the current academic landscape places foremost importance on understanding the multifaceted nature of academic achievement, probing into variables such as intelligence quotient, memory, attention span, numerical aptitude, verbal aptitude, and the intricate interplay of structural and functional elements within the educational environment at home, school and college.

1.1.Numerical Aptitude

The term numerical aptitude deals with the ability to solve numerals, digits etc. in which an exceptional method towards interest in numerals helps to categorize the ability to solve different problems related to these digits which are generally included in mathematical problems.

The term numerical aptitude refers to the approach of having the ability to solve different problems related to diverse areas of calculations and forecasts. It is chiefly the mathematical level that humans have reached by virtue of the fact that they have developed the aptitudes for language and for figurative representation. With these, we have developed illustrations for large numbers and algorithms for exact calculations. So arithmetic and number theories are built for symbolic representation and for our nonverbal ability to represent and comprehend numerical quantities.

In the modern world, mathematics and numerical aptitude is being increasingly used in science, technology, education etc. even nature embraces mathematics completely. Mathematics and numerical aptitude runs in the veins of natural sciences like physics and astronomy and is inseparably incorporated in the natural phenomenon.

Siegfried (1991) suggested, mathematical aptitude and skills were useful to an undergraduate economics major.... Mathematics can simplify relationships and improve students understanding. Krishnamurthy (1990) while discussing the importance of mathematics form of today has more and more new applications for today life and the rapid growth of desired application helps to develop more new fields of mathematics. Many pupils perform poorly in mathematics and find the subject very difficult and uninteresting.

“The National Policy on Education (1986)” says, “Mathematics should be visualized as the vehicle to train a child to think, reason, analyze and articulate logically”. Thus the power of critical thinking, logical reasoning and process of induction and simplification of relationship between different components can be developed in today’s world students through mathematics and their numerical aptitude.

II. REVIEW OF RELATED LITERATURE

Research propels a man forward in search for the truth. The review of literature is conducted to determine the current knowledge of the topic and grasp the research methodology. In order to conduct survey of related literature, one must locate, examine and assess reports of relevant research, look through the relevant sections of encyclopedias and research abstracts and if any,

review manuscripts, allowing researcher to familiarize himself with the current knowledge in the field or area in which the researcher conducts the research, gratifies various purposes like:

- Assists the researcher to determine the limits of his field of study.
- Highlights the resemblance between the present study and the effort of other investigators.
- Provides a thematic discription which guides the origination of the topic and helps to make variables operational, present in the study.

The literature review about numerical aptitude has been divided into two sections.

2.1.1 Studies conducted in India

Adegoke (1991) observed the effect of test response mode, student's numerical ability and gender on cognitive achievement related to senior secondary schools Physics student. The study showed that the students with higher numerical ability performed better in physics test. Hence, Students with high numerical skill record higher performance in Physics achievement tests than with the ones who have low numerical ability.

Khatoon (1998) had studied the relationship of mathematical aptitude among boys and girls with interest and vocational preferences. During the study the investigator found that there is a significant difference in the aptitude for maths among boys and girls and found a significant difference in their academic achievements.

2.1.2 Studies conducted Abroad

Betty (1992) conducted a study on mathematics that mathematics terminology may be unduly large for average readers in grades one, two and three. Research concerning reading problem in mathematics had focused in the area of readability The study indicated that the technical vocabulary load may be the source of some major reading problems which in turn due to difficulty in reading will hamper the child's achievement in mathematics as well as in other subjects.

Erwin (1998) studied that the grade distributions in English, social sciences, foreign languages, mathematics, and natural sciences were compared with scores on tests given at the time of admission. Students with scores between the 85th and 95th percentiles earned superior grades in highly verbal courses. As a group, students above the 74th percentile performed no better than others in English, and, in general, earned lower grades in English than in their other courses. Foreign language grades were generally not predictable from the tests, though the sample may have been inadequate. Verbal aptitude was a strong predictor of success in social sciences.

Performance of students with high verbal test scores was disappointing, especially in areas which are most demanding of verbal skills. Differentials of fewer than 30 percentile points between high verbal and lower quantitative scores do not appear related to grades. Superior quantitative aptitude was indicative of only slightly better than average performance in mathematics and sciences.

Lewis (2000) conducted a study to find the relationship between student's self-concept and its effects on the academic achievement of some selected senior secondary schools in Southwestern Nigeria in the subject of mathematics. 1722 senior secondary school II students were randomly selected from two senatorial districts of Southwestern Nigeria. Validated investigation instrument (STSCP) was used in collecting data. The data was analyzed with simple descriptive statistics of frequencies and percentages. The result of the findings showed that students need to do well in mathematics as they have good self-concept of themselves in performing well in mathematics.

Mason (2001) investigated in the study in which students had given the math attitude scale; abstract reasoning tests, the DAT numerical ability, and verbal reasoning tests; the cooperative Mathematics Pretest for College Students; the Minnesota counseling inventory and an adaptation of the intensive personal data sheet. Grades in high school and college mathematics were also used. The correlations support to a modest extent the supposition that experiences with mathematics affect attitudes. Attitudes contribute to the prediction of achievement in mathematics for females, but not for males.

Yang (2005) Investigated performance of number sense and its relations with mathematics achievement of Taiwanese students who had completed 5th-grade mathematics curriculum, a computerized number sense scale were being developed. The main findings of this study were, the students performed best on identifying relative number size were as they performed worst on judging the reasonableness of approximations of compound results. This finding was consistent with previous studies. It displayed that the students in Taiwan seem poor on judging the reasonableness of approximations of computed results. Moreover achievements of the students in mathematics were significantly correlated with their number sense, as already measured by the average grade for the academic year of 5th grade students.

Objectives of the Study:

1. To investigate the numerical aptitude of 10th grade students.
2. To findout the group differences among boys and girls in relation to their numerical aptitude.

Hypothesis: “There is no significant difference between the 10th grade boys and girls in numerical aptitude”

Delimitations

The existing study is delimited to:

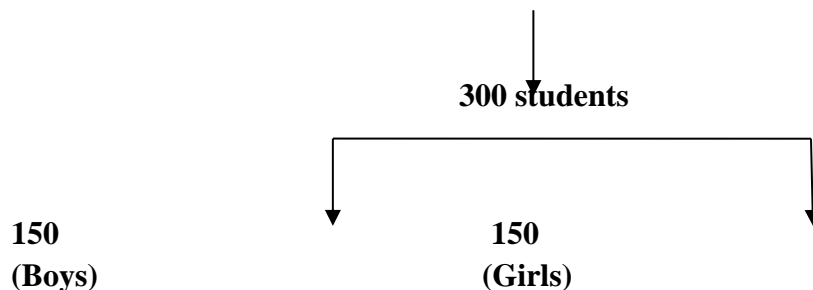
- The present study is limited to the Kulgam district of J&K only.
- The 10th grade students.

III. METHOD AND PROCEDURE

The method and procedure elucidates the doubts, if any, in the study carried out by the researcher. It paves the way for a good research to be examined. It also provides information to others about the means, methods and procedures, used in the research.

Sample

For the current study the researcher first collected the list of government schools in Kulgam district. Then the researcher randomly selected 11 government schools from which 300 students of 10th class were selected as a sample from the said schools using stratified random sampling technique in which 150 were boys and 150 were girls from Kulgam district of J&K. The following diagram gives a clear description about the representation of the sample.



Tools Used in the Study

1. A researcher goes for a particular type of tool after judging its criteria like validity, reliability, and usability. Keeping in mind these criteria, the researcher decided to use the following standardized tool namely: *Numerical Aptitude test*

Description of Numerical Aptitude Test

In the series of Differential Aptitude tests, Numerical Aptitude test was one of the tests which were used by the researcher. There was a rights key for the test for which the score is the number of right answers. In the separate booklet edition there is a rights key and a wrongs key for each test for which the score is the number of right answers minus the number of wrong answers, or some fraction of the wrong answers. When the scoring is done by hand, it is necessary to inspect the sheets to determine whether a student marked two or more choices where only one is permitted.

(a) Scoring procedure Numerical Aptitude test

It can be scored either by hand or by use of an IBM test scoring machine. The researcher here used the hand scoring technique for each test in which there is a rights key for each of two tests for which the score is the number of right answers. The scoring formula of the test is given as below:

Table 3.1(a)
Scoring Information

Test	Formula to be used	
Numerical ability	$R - 1/4W$	One mark for each item

(b) Norms for the numerical aptitude test

The norms tables for the differential aptitude tests have been devised to encourage realistic interpretation of the test scores. The procedure is to find the raw score for the particular test in the appropriate table for the desired form, grade and sex. At the side of the table, opposite that score, the percentile equivalent will be found. In the case of numerical aptitude the percentile tables for boys as well as girls are given separately in the following form.

Table 3.1(b)

Boys / Girls	Raw scores	
	Numerical ability(boys)	Numerical ability(girls)
99	35+	34+
97	32-34	31-33
95	30-31	29-30
90	27-29	26-28
85	25-26	24-25
80	23-24	23
75	22	21-22
70	21	20
65	19-20	19
60	18	18
55	17	17
50	16	16
45	15	15
40	14	14
35	12-13	12-13
30	11	11
25	10	10
20	9	9
15	7-8	7-8
10	5-6	5-6
5	3-4	3-4
3	1-2	1-2
1	0	0

Statistical Techniques used:

In the current study the following statistical techniques were used:

- Calculation of t- value

- Mean
- SD

IV. RESULTS AND DISCUSSION

Data relating to numerical aptitude of 10th grade students is shown which has further been divided into two parts. Presentation of the same is done as follows:

4.1(a) Status of 10th grade boys in numerical aptitude

4.1(b) Status of 10th grade girls in numerical aptitude

4.1 (a) Status of 10th grade boys in numerical aptitude

Table No. 4.1 (a)

Group	Total number of students	Mean
Boys	150	9.2

Table 4.1 (a) depicts the mean score of 10th grade boys in numerical aptitude. A look at the above table shows that the mean score of the group in numerical aptitude is 9.2 which fall on 20th percentile. This indicates that the boys of class 10th possess very low numerical aptitude. This can be interpreted that the boys are poor in mathematical conceptualization as well as in mathematical calculations. They feel difficulty in solving mathematical problems. They have less ability to solve the problems relating to numerals and digits etc.

4.1 (b) Status of 10th grade girls in Numerical aptitude

Table No. 4.1 (b)

Group	Total number of students	Mean

Girls	150	10
-------	-----	----

Table 4.1(b) depicts the mean score of 10th grade girls in numerical aptitude. A look at the above table shows that the mean score of the group in numerical aptitude is 10 which fall on 25th percentile. This indicates that the girls of the class 10th possess very low numerical aptitude. This can be interpreted that the girls are poor in mathematical calculation. They feel difficulty in solving mathematical problems. They have less ability of solving problems relating to numerals and digits etc. From the above findings it can be said that both 10th grade boys and girls possess low numerical ability and are poor in mathematical calculations

Group comparisons

This section shows comparison between boys and girls in different variables. Presentation of this section follows as:

Comparison between boys and girls in verbal ability

4.2a. Comparison between boys and girls in numerical aptitude

Table No. 4.2a

Group	Mean	S.D	Mean difference	T value	Level of significance	Interpretation
Boys	9.2	5.9	0.8	0.11	0.01	insignificant
Girls	10	6.01			0.05	

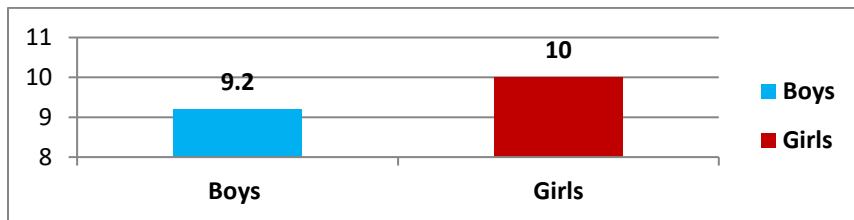
Table 4.2a shows the group comparison between boys and girls in numerical aptitude. The mean scores of the boys and girls in numerical aptitude are found to be 9.2 and 10 respectively. The mean difference between the two groups is 0.8. The calculated 't' value is 0.11. The table value at 0.01 and 0.05 level of significance with 149 df is 2.61 and 1.98. This indicates that both the

groups do not differ to each other on numerical aptitude. It can also be said that there exists no significant difference between 10th grade boys and girls in numerical aptitude.

It can be said that the Hypothesis. "There is no significant difference between 10th grade boys and girls in numerical aptitude," is thus, accepted. Below given graph shows the mean score of boys and girls in numerical aptitude.

Graph No. 4.2b

Bar Graph Showing Mean Scores of Boys and Girls in Numerical Aptitude



CONCLUSION:

Findings related to the numerical aptitude

- ◆ The 10th grade boy's students showed very low numerical aptitude. They are poor in solving mathematical problems. So, it can be stated that they have less ability to solve problems relating to digits and numerals. Thus it shows that 10th grade boys are poor in numerical approach as well as in mathematical calculations.
- ◆ The 10th grade girls also depicted very low numerical aptitude. So it can be said that they have less ability of solving problems pertaining to mathematical calculations. They possess low numerical aptitude that is why they feel difficulty in solving problems pertaining to numerals. Thus we can say that both 10th grade boys and girls possess low numerical aptitude and are poor in mathematical calculations.

Findings related to the group comparing different variables

- ◆ In numerical aptitude there is no significant difference between boys and girls of class 10th. None of the group is supercilious to each other in numerical aptitude. Both are having same ability to solve the mathematical problems and calculations.

Limitations:

Every study has some stumbling blocks and limitations. It may not be completed from all the aspects. The researcher tries his best to achieve the maximum reliable results but there might be some stumbling blocks or limitations in conducting the study. The current study suffers from the following limitations:

- The size of the sample is not enough.
- The said study is only restricted to district Kulgam of J&K.
- Only achievement in the school subjects has been taken into consideration while their performance in other activities could also have been taken into consideration.

Suggestions:

Following suggestions could be commenced for further research:

- Study should be carried out for students of senior secondary level also.
- The achievement tests must also be constructed in local language for the better results.
- The language of the questionnaire could be made more easy and simple.
- More studies should be conducted with different tools and different strategies on the same problem.

Recommendations:

The recommendations of the above study are given below:

- Teachers should allow students to clarify the doubts in mathematics subject and discuss the difficult topics of the syllabus. Relate it with real life problems. Use concrete materials and real – world situations for presentation of the lessons. The concept of telling time, fractions, geometry is more easily understood when concrete manipulative objects are used.
- The teachers should apply innovative techniques and appropriate pedagogy for teaching mathematics in sec. schools. They should give individual attention to the children which helps them to realize their hidden potentialities.

- The teachers need to be oriented in detail on child-centered approach in teaching.
- The teachers should try to involve the students by assigning them different home tasks relating to new mathematical concepts so that they are able to introduce new ideas towards their tasks and able to perform well in the different tasks. Drill work should be introduced by the teachers to increase the level of the students in numerical aptitude.
- Teachers should organize monthly parent teacher meetings so that parents would be aware about the numerical aptitude of their children.
- Systematic reforms need to be undertaken so that the learning without burden becomes feasible, simultaneously shifting of learning and testing methods away from rote learning should also be ensured.
- School programmers should foster the need for achievement among students.
- Programmes for teachers as well as for parents are to be planned and implemented in order to make the classroom as well as home environment appropriate for increasing numerical aptitude among students
- Government should also take measures to improve the educational level of the students by providing them more and more facilities.
- It is strongly recommended that every secondary school should have guidance and counseling Centre run by qualified and trained counselors to overcome the problems of the students.

References:

1. Assema&Gakhar, S.C. (2004) Social stress, locality and gender affecting academic achievement and reasoning ability, *Journal of Educational Research and Extension*, 41(4), 63- 69.
2. Betty, William (1971). Reading in the content area: A new mathematics terminology list for the primary grades, *Elementary of English*, 50, 274-289.
3. Cohan, A.D. (1974). The relation between high school study of foreign languages and ACT English and Mathematics performance, *ADFL Bulletin*, 23(3) from ERIC database.
4. Chitkara, M. (1985). To study the effectiveness of different strategies of teaching on achievement in mathematics in relation to intelligence, sex and personality, *Doctoral Thesis (Edu.)*, Punjab University, Nagpur.
5. Macleod, D. (1992). Research on affect in mathematics education: A reconceptualization, *Handbook of research on mathematics teaching and learning*, 576-596, New York.

6. Marjorie M. (2006). Teaching mathematics to middle school students with learning difficulties, Guilford Press.
7. Narula, N. (2007). A study of academic achievement in mathematics in relation to emotional intelligence, creativity and mathematical aptitude at high school stage, *Ph.D. (Edu) Thesis*, Punjab University, Chandigarh.
8. Olsen B. (1992). The relation between high school study of languages and ACT English and mathematics performance, *ADLF Bulletin*, 23(3) from ERIC database
9. Perfetti, C. (2003). Challenging myths about reading and solving number problems, *The British Journal of Educational Psychology*, Vol 23, 132-142.
10. David (2001). Psychology of meaningful learning and concept of numerical ability *Psychological Studies*, Vol 21, 340.
11. Kintsch W. (2002). Thinking and learning about mathematics, *Indian Journal of School Psychology*, Vol 26, 32-36.
12. Richard (1990). Gender differences in gifted and average ability students: comparing girls and boys achievement, self concept, interest and motivation in mathematics, *Gifted Child Quarterly* 52 (2), 146-159.
13. Ranagappa (1992). A study of self concept, reading ability in relation to achievement in mathematics of students of standard 12th, *Ph.D. (Edu.) thesis*, Bangalore University.
14. Smith R. (1984). The readability of experimental mathematics materials, *Arithmetic Teacher*, Vol 11, 391- 394.
15. Scott O. (1998). The relation between high school study of foreign languages and ACT english and mathematics performance, *Journal of Educational Psychology*, Vol 82 (3), 546-558.
16. Verma, B.P. and Swain, B.C. (2007). Academic motivation and mathematics achievement of more differentiated and less differentiated children, *Indian Psychological Review*, Vol 36, 32-41.
17. William (2004). Attitudes of Turkish high school students toward mathematics, *International Journal of Education*, 34, 287-296.
18. Yang (2005). The effect of attitudes on performance in mathematics, *Journal of Educational Psychology*, Vol 52(1), 19-24.