

Comparative Study of Higher Mental Ability In Science Among Boys And Girls Of Secondary Schools In Delhi

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I. Introduction

The world today is becoming more and more competitive. Academic achievement has become the KEY FACTOR for personal progress. Parents desire that their children climb the ladder to success as high as desire (the Parents) and not as high as possible. The desire for a higher level of achievement put a really-really high pressure on the students, the teachers, and most aptly said The Education System itself. Presently there is no tool to measure higher level of cognitive domain. Achievement of students in our Country is measured in terms of the performance of a particular student in his/her examinations. This is not at all a desirable permutation, but there cannot be any running away of this standard formula of achievement of school going boys or girls. He or she is simply bracketed good/poor, intelligent/weak. In fact, it appears as if the whole system of education revolves around the Academic Achievement of the Students.

In the field of school learning, aptitude of learning is significantly influential, different sex can have different mental ability towards learning. So, it is imperative that science education should develop the interest of pupils in such a way that no one is left and a complete mental ability is developed.

Personality: Personality is the total integration of the physical, the intellectual, the emotional, the social and, the character make up of an individual which includes extroversion and introversion. It is well known that no two individuals are alike, and they differ from each other in various aspects from birth till death. To fill this gap a tool for measuring the higher mental abilities in science has been developed.

Ability: Ability is the capacity to do certain skill(s) and abilities which are necessary for success in a particular area of work. It is asserted that ability is related to vocational success as intelligence is related to success in general.

Mental Ability: Mental Ability is the capacity to learn various skills and abilities which are necessary for achieving success.

Higher Mental Ability: Higher mental ability in science is defined as the product resulting from application, analysis, synthesis and evaluation of all information concerning science.

Quotations on Mental Ability:

1. "From each according to his ability, to each according to his need" :

From each according to his ability, to each according to his need (or needs) is a slogan popularized by Karl Marx in his "1875 Critique of the Gotha Program".

The phrase summarizes the principles that, under a communist system, every person should contribute to society to the best of his or her ability and consume from society in proportion to his or her needs, regardless of how much he or she has contributed.

In the Marxist view, such an arrangement will be made possible by the abundance of goods and services that a developed communist society will produce; the idea is that there will be enough to satisfy everyone's needs.

2. "The first requisite for success is the ability to apply your physical and mental energies to one problem incessantly *without* growing weary." -: Sir

Thomas Alva Edison quotes (Most famous American Inventor who, singly or jointly, held a world record 1.093 patents. In addition, he created the world's first industrial research laboratory, 1847-1931).

3. "It's really just the mental part. You can do the physical part. Not having anything to do after rehab. Finding something to do with your time that's constructive, not letting your mind wonder what's going to transpire next,

what the team is going to do with you, if you are going to lose your spot, if you are going heal right.... It's like 'Groundhog Day'. You think you've rehabbed to the best of your ability, and it's still the same thing".

: - **Sir Hollis Thomas quotes**

4. "Now intelligence seemed quantifiable. You could measure someone's actual or potential height, and now, it seemed, you could also measure someone's actual or potential intelligence. We had one dimension of mental ability along which we could array everyone... The whole concept has to be challenged; in fact, it has to be replaced".

: - **Sir Howard Gardner quotes**

Definitions on Higher Mental Ability

1. Higher Mental process as one of the more complex forms of mental activity involving highly organized process. Usually with an element of conscious control as in reasoning, memory, imagination, aspiration or voluntary attention. From the foregoing description it is evident that higher mental ability refers to the cognitive domain.

: - **GOOD (1973)**

2. Cognitive domain comprised of 6 major classes – mainly knowledge comprehension, application, analysis, synthesis and evaluation. He referred application, analysis, synthesis and evaluation as higher mental ability. Thus higher mental ability in science was defined as the product resulting from application, analysis, synthesis and evaluation of all information concerning science.

: - **BLOOM (1974)**

BLOOM'S TAXONOMY

Taxonomy means a set of classification principles or structure and domain simply means category. Bloom and his colleagues were academics, looking at learning as a behavioural science, and writing for other academics, which is why they never called it Bloom's Learning Structure' which would perhaps has made more sense to people in the business world.

BLOOM'S TAXONOMY further underpins the classical '**Knowledge, Attitude, Skills**' structure of learning method and evaluation and aside from the even simpler Kirkpatrick learning evaluation model, Bloom's Taxonomy of Learning Domains remains the most widely used system of its kind in education particularly ,and also industry and corporate training. It's easy to see why, because it is such a simple, clear and effective model, both for explanation and application of learning objectives, teaching and training methods, and measurement of learning outcomes.

This taxonomy provides an excellent structure for planning, designing, assessing and evaluating training and learning effectiveness. The model also serves as a sort of **checklist**, by which you can ensure that training is planned to deliver all the necessary development for students, trainees or learners, and a template by which you can assess the validity and coverage of any existing training, be it a course, a curriculum, or an entire training and development program for a large organization.

Model consists of three parts

1 **Cognitive Domain** (i.e. **Knowledge**)

2 **Affective Domain** (i.e. **Attitude**)

3 **Psychomotor Domain** (i.e. **Skills**)

Bloom (1974) said that cognitive domain comprised of six major classes-namely, knowledge, comprehension, application, analysis, synthesis and evaluation. He referred application, analysis, synthesis and evaluation as higher mental abilities. Thus Higher Mental Ability in science was defined as the product resulting from application, analysis, synthesis and evaluation of all information concerning science.

TABLE 1.1
Bloom's Taxonomy Cognitive Domain Table

Level	Cat Category	Behaviour Description	Examples of activity	Keywords (words which describe the activity)
1	Application	Use or apply knowledge, put theory into practice, use knowledge in response to real circumstances	Put a theory into practical effect, demonstrate, solve a problem and manage an activity.	Use, apply, discover, manage, execute, solve, produce, implement, construct, change, prepare, conduct, perform, react, respond, role-play.
2	Analysis	Interpret elements, organizational principles, structure, construction, internal relationships; quality, reliability of individual components.	Identify constituent part and functions of a process or a concept, or deconstruct a methodology or process, making qualitative assessment of elements, relationships, values and effects; measure requirement or needs.	Analyze, break down, catalogue, compare, quantify, measure, test, examine, experiment, relate, graph, diagram, plot, extrapolate, value, and divide.
3	Synthesis (create/ build)	Develop new unique structures, systems, models, approaches ,ideas, creative thinking and operations	Develop plans or procedures ,design solutions, integrate methods, resources ,ideas ,parts; create teams or new approaches, write protocols or contingencies	Develop, plan, build, create, design, organize, revise formulate, propose, establish, assemble, integrate, rearrange, modify
4	Evaluation	Assess effectiveness of whole concepts, in relation to values, outputs, efficacy ,viability; critical thinking, strategic comparison.	Review strategic options or plans in terms of efficacy, return on investment or cost effectiveness, practicability; assess sustainability	Review, justify, assess, present a case for defend, report on investigate, direct, appraise, argue, project manage

STATEMENT OF THE PROBLEM

“A comparative study of higher Mental Ability in science among boys and girls of secondary schools in Delhi”.

Operational definition

Comparative Study

Comparative Study deals with the comparison of two different things to find out the differences between them and to understand the concept of Comparison in a better way.

Mental Ability

Mental Ability is the ability or capacity to learn various skills which are necessary for achieving success.

Higher Mental Ability

Higher mental ability refers to the cognitive domain. Cognitive domain comprised of 6 major classes – mainly knowledge comprehension, application, analysis, synthesis and evaluation. He referred application, analysis, synthesis and evaluation as higher mental ability. Thus higher mental ability in science was defined as the product resulting from application, analysis, synthesis and evaluation of all information concerning science.

Secondary level

The level which is attained after the completion of middle level and lasts till the starting of university education is known as secondary level.

Objective

1. To compare the mental ability of boys and girls, in science, of Secondary Schools students.
2. To compare the Application mental ability of boys and girls, in science, of Secondary Schools students.
3. To compare the Analysis mental ability of boys and girls, in science, of Secondary Schools students.
4. To compare the Synthesis mental ability of boys and girls, in science, of Secondary Schools students.
5. To compare the Evaluation mental ability of boys and girls, in science, of Secondary Schools students.

Hypothesis of the study will be :-

1. There is no significant difference in the mental ability, in science among boys and girls of secondary school students.
2. There is no significant difference in the Application mental ability, in science among boys and girls of secondary school students.
3. There is no significant difference in the Analysis mental ability, in science among boys and girls of secondary school students.
4. There is no significant difference in the Synthesis mental ability, in science among boys and girls of secondary school students.
5. There is no significant difference in the Evaluation mental ability, in science among boys and girls of secondary school students.

Delimitations

Present study is confined to the boys and girls of Secondary school students.

Area

The above study was confined to north zone of Delhi, from which D.L.D.A.V. School, ND – Block, Pitampura, Delhi – 110034 is randomly chosen.

Grade

The sample was confined to secondary class 10th grade.

Sample

The sample consist of One Hundred (100) students only.

Sex

Both sexes were considered equally (50 boys and 50 girls).

Study

The study confined to tests in higher mental ability in science.

Tools

The study was confined to Higher Mental Ability by D.N.Sansanwal & Anuradha Joshi only.

SIGNIFICANCE OF THE STUDY:

Each and every problem has its own significance: The present problem is also of great importance. This problem is important administrators, teachers, and also for the students, for better results in science as compared to the past. It is also important for counselling purposes. The main purpose of the study is to compare mental ability among boys & girls at high level, so that the findings can be used for further educational implications to improve the mental ability among boys & and girls at high level.

At present times there is a great revolution in scientific technologies but in the case of less interest in students in Science there are no satisfactory results. Without having mental ability in science there will be no success at High School Level, ultimately affecting the future of the students. There is a great need of appropriate placements of students in streams according to their aptitude, so that they are in a position to explore and be better adjusted in future.

1. It will be able to improve the mental ability of the science students.
2. It will be helpful in molding their behavior in a positive direction.

It will also be of a great significance for teachers, to know the ability of boys and girls at high level.

II. REVIEW OF RELATED LITERATURE

INTRODUCTION

Review of Related Literature equips the researcher with adequate information regarding the field in general and the problems in particular. It provides the researcher up to date information in the concerned field. It provides as sources of problem of study.

If we want to do some new research in a subject, it is very necessary that we should know the past of that subject. Without knowing the past, we cannot do something new in that field.

The competent physician must keep abreast of the latest discoveries in the field of medicine obviously the careful student of education; the research worker and investigator should become familiar with location and use of sources of educational information.”

(Good, Barr and Scates)

Practically all human knowledge can be found in books and libraries. Unlike other animals that must start a new with each generation, man builds upon the accumulated and recorded generation man builds upon the accumulated and recorded knowledge of past.

(John .W. Best)

Reviewing the literature has two phases:-The first phase includes identifying all the relevant first phase includes identifying all the relevant published material in the problem area and develop the foundation of ideas and results on which our own study will be built. The Second phase of the review of the literature involves writing this foundation of ideas into a section of the research and readers. For the researcher, it establishes the background in the field. For the readers, it provides a summary of the thinking.

Studies in India

Darchingpui. Worked on **A Study Of Science Achievement, Science Attitude And Problem Solving Ability Among Secondary School Students In Aizawal.** This study examines the relationships among variables such as achievement in science, attitudes towards science and problem solving ability under certain condition such as location, socio economic status, parental education, occupation and typology of school among secondary school children.

Major findings:

1. The study indicated significant relationships between scores on scientific attitude and achievement in science.
2. Significant sex differences in achievement in science and problem solving existed. (3) High socio-economic statuses, family facility and type of school attended favoured achievement in sciences, scientific attitudes and problem solving ability.

Dubey worked on **A Study Of The Scientific Temper And Its Measurement.** Whereas the measurement of scientific temper is a real problem, its development is regarded as one of the most important goals of school science education. The present study attempts at the measurement of scientific temper.

Major Findings:

1. All the groups of students and teachers manifested scientific temper.
2. Significant differences in scientific temper were noticed between male science teachers & male, non-science teachers; female teachers and male teachers, rural girls and urban girls, urban boys and urban girls and finally, male science students and female science students.
3. No significant difference appeared between female science and non-science teachers as well as science students and non science students.
4. The mathematical structure of tools and tasks as used in this study showed the existence of two factors, namely, curiosity and aversion to superstitions.

Kumar, Udaya Sam worked on **The Teaching Of General Science And The Development Of Scientific Attitude In Secondary School Students In Relation To Achievement In General Science.** The study attempts to examine the teaching of general science and the development of scientific attitude of secondary school students in Cuddalore educational district in relation to achievement in general science.

Major Findings:

1. It was observed that there was a significant difference between the mean scores of boys in the average effective group in respect of perception of teaching of science.
2. The urban and rural pupils of average group differed in respect of perception of teaching of science.
3. There were no significant difference between the mean scores of scientific attitude of secondary school students of boys and girls in the high effective group in respect of perception of teaching science.
4. There were no significant differences between the mean scores of perception of teaching of pupils of urban and rural areas in the high group.
5. The scientific attitude test scores of boys and girls did not differ significantly and there were no significant difference between the mean scores of scientific attitude test scores of the pupils of urban and rural areas of the average group.
6. The mean scores of scientific attitude test of boys and girls did not differ significantly in the high group differed significantly.
7. There existed a relationship between urban boys and urban girls in scientific attitude test scores.
8. The science test scores of urban boys and urban girls were positively correlated.
9. The means of boys and girls in the low group did not differ significantly in respect of scientific attitudes.
10. There was a significant difference between the means of the boys and girls in the low group in respect of perception of teaching of science.
11. There was a significant difference between the means of the pupils of urban and rural areas in the low group in respect of perception of teaching of science.

Mohanty, S. Worked on **An Appraisal Of Teaching Science In The High Schools Of Cuttack City.** The present study addresses the problem of an appraisal of teaching science in the high schools of Cuttack City.

Major Findings:

1. The study revealed that after administering tests in two subsequent years, the performance of the students in the second tests was slightly inferior to the first test.
2. Though various factors like pupil ability, the teacher's teaching methods, laboratory facilities were almost the same from year to year.
3. According to the expert, the present syllabus was very tough and it was very difficult to grasp all the concepts in 10 years of schooling. They also opined that the Board of Secondary Education, Orissa should appoint more experts in science to improve science teaching in the state and also to revise the science syllabus keeping in view the teachers' position, laboratory facilities and the standard of the student.
4. As regard s the equipment and laboratory, all the schools were deficient. All the teachers followed the demonstration –cum-discussion method for teaching science which was suitable for their condition.
5. The schools were deficient in audio-visual aids like projectors, overhead projectors, television sets etc.
6. The outcomes of learning were not properly assessed by the schools. The questionnaire revealed that the outcomes of affective domain were not assessed at all.
7. The science funds available to the schools were very meager. So the schools could not do a lot for the development of science fairs and science exhibitions in the schools.

Mohapatra, worked on **Four Dimensions Of The Teaching – Learning Of Science: Characteristics And Implications.** The present study focuses on studying the pupils' popular preconceived concepts about scientific events related to their day-to-day life observations and the implications of the same for organising suitable teaching learning strategies through utilisation of their experiences.

Major Findings:

1. It was observed that children made a great deal of conceptualization on the basis of their observation of day-to-day happenings in the environment and in home situations. In this process they formulated alternative concepts about things, objects and events.
2. The science teacher had an important role in helping the child to develop proper concepts about objects and events by utilizing children's personal experiences with the rational thinking process.

N ELLIAPPAN, N.O. worked on **A Study Of Scientific Attitude And Interests Among Higher Secondary Biology Students In Relation To Their Learning Environment.** The kind of school setting, it is recognized, goes a long way towards the development of scientific attitude. The present study intends to know the relationship between learning environment, development of scientific attitude and interest of higher secondary biology students.

Major Findings:

1. There was a strong relationship between the high and low total learning environment of the higher secondary biology students and their scientific attitude and scientific interest.
2. The total learning environment and the scientific attitude and the scientific interest of the higher secondary biology students were significantly related in respect of the entire sample and of the various categories of sub-samples.
3. The high and the low total learning environment groups of the higher secondary biology students significantly differed in their scientific attitude and scientific interest and this was true in respect of the entire sample urban students and rural students, boys and girls. Significant difference was observed only between the high and low learning environment group combinations among the various combinations of sub-samples involving sex, locality and levels of learning environment in respect of the scientific attitude and scientific interests.

Ganguly, D., Ghosh, D., Chatterji, S. and Mukherji, M., worked on **An Investigation Into The Validity Of A Scientific Knowledge And Aptitude Test.** To find out the validity of a scientific knowledge and Aptitude Test which was suitable for the use at the higher secondary level, was selected. The test was already standardized on the basis of the data collected from the students who had just passed the higher secondary examination. Eight Bengali medium schools- four boys' and four girls '-were selected from a list of such schools after dividing them area-wise. The test was administered on 476 students studying in class XI in these schools. The test was validated against the school examination marks.

Major Findings:

1. The test was quite valid and the test scores were highly related with the academic success for girls' science group.
2. The scientific aptitude had no relation with the success in the commerce stream.

3. The relationship of the test scores with the total marks in the humanities groups was significantly positive, though the magnitude was quite low.
4. The correlation between the test scores and the total marks scored by the boys' science group was significant at 5percent level.
5. The correlation of the test scores with the marks obtained in general science by both the humanities groups was negative.
6. The correlation between the test scores and the higher secondary total marks varied from 0.12 to 0.56 in the case of four girls and one boy school.

Gilitwala, P.J., worked on **Standardization Of A Test Of Creativity For The High School Students Of South Gujarat.**

- To construct and standardize a test of creativity.
- Establish the reliability and validity and norms of the tests of creativity
- To study the relationship between creativity and sex , intelligence and achievement of the students,
- To study the relationship of creativity with educational, recreational, social and vocational aims of the students.

Major Findings:

1. The investigation resulted in a battery of tests of creativity consisting of two tasks – verbal and non verbal.
2. Factor- wise test re-test reliability coefficient of correlation ranged between 0.68 and 0.89.
3. The coefficient of correlation between test and Passi's test was found to be 0.77 and factor –wise coefficients ranged between 0.621 and 0.871.
4. Factor wise validity was also found out. The coefficient of the correlation was found to be ranging between 0.72 and 0.91 for the urban sample and between 0.69 and 0.82.

Arya, S.C., worked on **A study of growth of scientific concepts among Elementary School Children.**

- To develop concept –related criterion tasks on the concepts of weight, volume, classification and associative linking to study the growth and development of these concepts.
- To study the level of growth of conversation of mass and volume with regard to the variables of age and sex.
- To diagnose the nature of errors the students commit in responding to these tasks and to cluster them in a theoretical frame.

Major Findings: The study revealed

1. A sudden fall in the value of proportion of correct responses occurred from the age 8+ to 9+; however, errors indicated no definite points of confusion but only misconceptions in the development of the step of conservation of mass.
2. In the second stage, misconception of weight due to flattening or thinning came in, and further in the third stage of dissolving the ball the concept of conservation of mass shifted from the stage cohort 8+ to 10+.

Chatterjee,S., Mukherjee,M. and Mitra, S.K. Worked on **Higher Secondary Science Interest And Aptitude, ISI, Kolkata.** The investigation aimed at finding out the effect of scientific interest at different levels of potential ability with respect to science and to study the predictive values of interest in science and scientific aptitude in predicting success in higher secondary science.

Major findings:

1. There was a systematic positive relationship between science interest and probabilities of success in science at different aptitude levels except in the highest aptitude level.
2. The relationship between aptitude in science and probabilities of success in science and achievement in science was positive.
3. At the lower level of aptitude, interest played an important role in enhancing the probability of success in science.
4. The product movement coefficient of correlation between the scores of CNPR and SKA was found to be 0.14, that between CNPR and higher secondary examination marks was found to be 0.36 and that between SKA and higher secondary examination was 0.51.
5. The multiple correlation with marks in the higher secondary examination as the criterion was 0.59 by adding interest score to the aptitude scores.
6. The prediction of achievement in science was significantly improved by considering the scores in scientific scale in CNPR along with the scientific aptitude score.

III. RESARCH DESIGN

The present chapter has been divided into two parts which are being discussed below.

A. DESIGN OF THE STUDY

B. DESCRIPTION OF TOOLS

A. DESIGN OF THE STUDY:

Design of research is the planning stage of research which is made logically, visualizing its practicability.

METHODOLOGY

“Technique is to research what method is to teaching or in a sense what logic is to thinking.” **Descriptive survey method** was used in the present investigation.

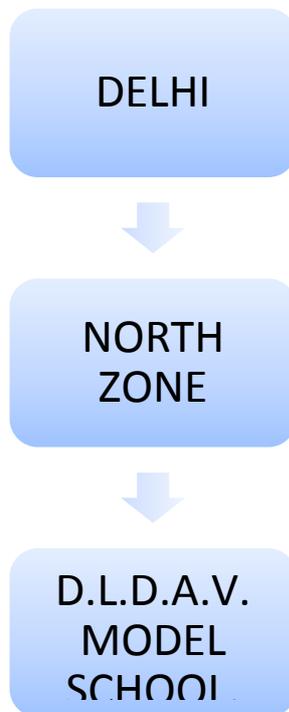
LAY OUT OF THE SAMPLE

Testing may be viewed as a systematic sampling of individual characteristics at a given time under specific conditions.

First of all the investigator randomly selected the school D.L.D.A.V.MODEL SCHOOL from the north zone of Delhi out of which 50 boys and 50 girls were randomly chosen.

In this way random sampling technique is used in the present investigation.

The layout of the sample is a follows :



STUDENTS OF GRADE 10TH
50 GIRLS
50 BOYS

From conducting a study of this type, a larger area could not be chosen due to the limited resources at the disposal of the investigator.

Procedure of the study and collection of data

After selecting the sample the investigator contacted the principal and staff for permission and in conducting the research work. Before administration of test investigator established the rapport with the students and ensured that test will not affect their awards in any way and the information will be strictly confidential.

Now, the investigator selected the following tool used for this problem and the sample of TEST OF HIGHER MENTAL ABILITY IN SCIENCE (THMAS) by D.N.Sansanwal & Anuradha Joshi.

After selecting the sample properly, the students were seated with proper arrangement and were told about the purpose of the test. The instructions were clearly given from the test booklet and then the responses were marked by the candidates themselves. The test administered on the students under, standard instructions given in the manual.

The scripts were scored, and the data thus obtained were analyzed and interpreted.

Descriptive Survey Method will be used in the Study to find out mental ability of 100 students (50 boys & 50 girls) considered into the Investigation.

STATISTICAL TECHNIQUES

To analyze the data the following statistical technique is used in the present study.

- MEAN
- STANDARD DEVIATION
- t – Test
- TESTING THE SIGNIFICANCE OF t-VALUE

B. DESCRIPTION OF TOOLS

The following tool was used for this problem and the sample.

TEST OF HIGHER MENTAL ABILITY IN SCIENCE constructed by D.N. Sansanwal and Anuradha Joshi. Higher Mental process as one of the more complex forms of mental activity involving highly organized process. Usually with an element of conscious control as in reasoning, memory, imagination, aspiration or voluntary attention. From the foregoing description it is evident that higher mental ability refers to the cognitive domain.

: - GOOD (1973)

Cognitive domain comprised of 6 major classes – mainly knowledge comprehension, application, analysis, synthesis and evaluation. He referred application, analysis, synthesis and evaluation as higher mental ability. Thus

higher mental ability in science was defined as the product resulting from application, analysis, synthesis and evaluation of all information concerning science.

: - BLOOM (1974)

For this test the four levels or classes of cognitive domain have been taken ,viz, application , analysis, synthesis and evaluation. Each of them has the same meaning as given by BLOOM (1974).Their definitions are described below.

1. **APPLICATION:** It refers to the use of abstractions in particular and concrete situation. The abstractions may be in the form of general ideas, rules of procedures or generalized methods. The abstractions may also be technical principles, ideas and theories which must be remembered and applied. It involves new or unfamiliar situations to apply a concept and includes the ability to predict the probable effect of a change In other words; application requires a further step beyond comprehension.

2. **ANALYSIS:** The breakdown of the communication into its constituents, elements or parts such that the relative hierarchy of ideas is made clear and/or the relation between the ideas expressed are made explicit. Such analyses are intended to clarify the communication, to indicate how the communication is organized, and the way in which it manages to convey its effects, as well as its basis and arrangements. Analysis as an objective may be divided in to three levels.

- (i) Classifying the elements
- (ii) Explicating the relationship
- (iii) Organizing principles

3. **SYNTHESIS:** The process of putting together the elements and parts so as to form a whole is termed as synthesis. This involves the process of working with pieces, parts, elements, etc., and arranging and combining them in such a way as to constitute a pattern or structure not clearly there before. It may be divided into following three levels:

- (i) Production of unique communication,
- (ii) Production of a plan , or proposed set of operation, and
- (iii) Derivation of a set of abstract relation.

4. EVALUATION: Judgments about the value of material and methods for given purpose .Quantitative and qualitative judgment about the extent to which material and method satisfy criteria. Use of a standard of appraisal. The criteria may be those determined by the students or those which are given to him. The criteria is of two types:

- (i) Judgments in terms of internal evidence
- (ii) Judgments in terms of external evidence

Sample

The preliminary draft of the test of Higher Mental Ability in Science (HMAS) consisted of thirty items . For item analysis it was administered to a randomly selected 150 students of class IX belonging to Government Girls Higher Secondary School, Sanyogitaganj, Indore and Government Boys Higher Secondary School, Sanyogitaganj, Indore. All the girls and boys were of the same age group and represented average socio-economic status.

Item Analysis

The scores were arranged in the descending order. From this upper 27 percent and lower 27 percent students are identified. Obtained scores of the two groups were used to computing the difficulty index and discriminating power. Discriminating power is also known as validity index, which was calculated by biserial coefficients by using Flanagan’s Table (1955).

Final Test

Final test was consisted of 20 items. The class-wise distribution of items included in final test below:

TABLE 3.1
Test consist of 20 questions of maximum marks 30

S.NO.	CLASS	NO. OF ITEMS	QUESTION NUMBERS
1	APPLICATION	6	3,7,9,13,14,16
2	ANALYSIS	6	2,5,8,16,17,18

3	SYNTHESIS	5	1,4,11,12,19
4	EVALUATION	3	6,10,20
Total		20	

IV. ANALYSIS AND INTERPRETATION OF DATA

Data collected from test Often have little meaning or significance until they have been classified or rearranged in a systematic manner. After administering and scoring research tools scripts, data collected and organized. The raw data are meaningless unless certain statistical treatment is given to them. The present chapter is devoted to analysis and interpretation of data.

The analysis and interpretation of data represent the application of deductive and inductive logic to the research process. The data are often classified by division into subgroups and are then analyzed and synthesized in such a way that hypothesis may be verified or rejected the final result may be a new principle or generalization.

Reliability

Reliability of test was established by test-retest method.

Validity

The concurrent validity was established against the performance of students in science and total academic achievement. The results are attached in Appendix –I and Appendix – II.

The raw scores of 50 boys are given in APPENDIX-I

**TABLE 4.1
MARKS OBTAINED BY 50 BOYS**

S.NO.	CLASS	NO. OF QUESTIONS	MARKS OBTAINED
1	APPLICATION	6	213
2	ANALYSIS	6	210
3	SYNTHESIS	5	154
4	EVALUATION	3	114
TOTAL		20	691

The raw scores of 50 girls are given in APPENDIX-II

**TABLE 4.2
MARKS OBTAINED BY 50 GIRLS**

S.NO.	CLASS	NO. OF QUESTIONS	MARKS OBTAINED
1	APPLICATION	6	223
2	ANALYSIS	6	235
3	SYNTHESIS	5	147
4	EVALUATION	3	117
TOTAL		20	722

**TABLE 4.3
SIGNIFICANCE OF MENTAL ABILITY AMONG BOYS AND GIRLS**

	MEAN	STANDARD DEVIATION	t-TEST	LEVEL OF SIGNIFICANCE
BOYS	17.42	4.716	0.785	N.S.
GIRLS	18.04	2.988		

The table 4.3 reveals that, the mean of boys and girls is 17.42 and 18.04 respectively. The ‘t-value’ is 0.785 which is not significant even at 0.05 level of significance. Therefore, the null hypothesis is accepted. It may be interpreted that there is no significant difference in mental ability among boys and girls.

Table 4.4
SIGNIFICANCE OF APPLICATION MENTAL ABILITY
AMONG BOYS AND GIRLS

	MEAN	STANDARD DEVIATION	t-TEST	LEVEL OF SIGNIFICANCE
BOYS	5.06	1.859	0.06	N.S.
GIRLS	5.08	1.477		

The table 4.4 reveals that, the mean of boys and girls is 5.06 and 5.08 respectively. The ‘t- value’ is 0.785 which is not significant even at 0.05 level of significance .Therefore, the null hypothesis is accepted . It may be interpreted that there is no significant difference in application mental ability among boys and girls. The difference is not real and may be due to chance factor.

Table 4.5
SIGNIFICANCE OF ANALYSIS MENTAL ABILITY
AMONG BOYS AND GIRLS

	MEAN	STANDARD DEVIATION	t-TEST	LEVEL OF SIGNIFICANCE
BOYS	5.46	2.570	1.630	N.S.
GIRLS	6.14	1.414		

The table 4.5 reveals that, the mean of boys and girls is 5.46 and 6.14 respectively. The ‘t- value’ is 0.785 which is not significant even at 0.05 level of significance .Therefore, the null hypothesis is accepted. It may be interpreted that there is no significant difference in analysis mental ability among boys and girls.

Table 4.6
SIGNIFICANCE OF SYNTHESIS MENTAL ABILITY
AMONG BOYS AND GIRLS

	MEAN	STANDARD DEVIATION	t-TEST	LEVEL OF SIGNIFICANCE
BOYS	4.60	1.28	0.353	N.S.
GIRLS	4.52	0.096		

The table 4.6 reveals that, the mean of boys and girls is 4.06 and 4.52 respectively. The ‘t- value’ is 0.785 which is not significant even at 0.05 level of significance. Therefore, the null hypothesis is accepted. It may be interpreted that there is no significant difference in synthesis mental ability among boys and girls. The difference is not real and may be due to chance factor.

Table 4.7
SIGNIFICANCE OF EVALUATION MENTAL ABILITY
AMONG BOYS AND GIRLS

	MEAN	STANDARD DEVIATION	t-TEST	LEVEL OF SIGNIFICANCE
BOYS	2.30	0.70	0.298	N.S.
GIRLS	2.34	0.64		

The table 4.7 reveals that, the mean of boys and girls is 2.30 and 2.34 respectively. The ‘t- value’ is 0.785 which is not significant even at 0.05 level of significance .Therefore, the null hypothesis is accepted . It may be interpreted that there is no significant difference in evaluation mental ability among boys and girls.

V. CONCLUSIONS AND SUGGESTIONS

DESIGN OF THE STUDY

Design of research is the planning stage of research which is made logically, visualizing its practicability.

METHODOLOGY

“Technique is to research what method is to teaching or in sense what logic is to thinking.” **Descriptive survey method** was used in the present investigation.

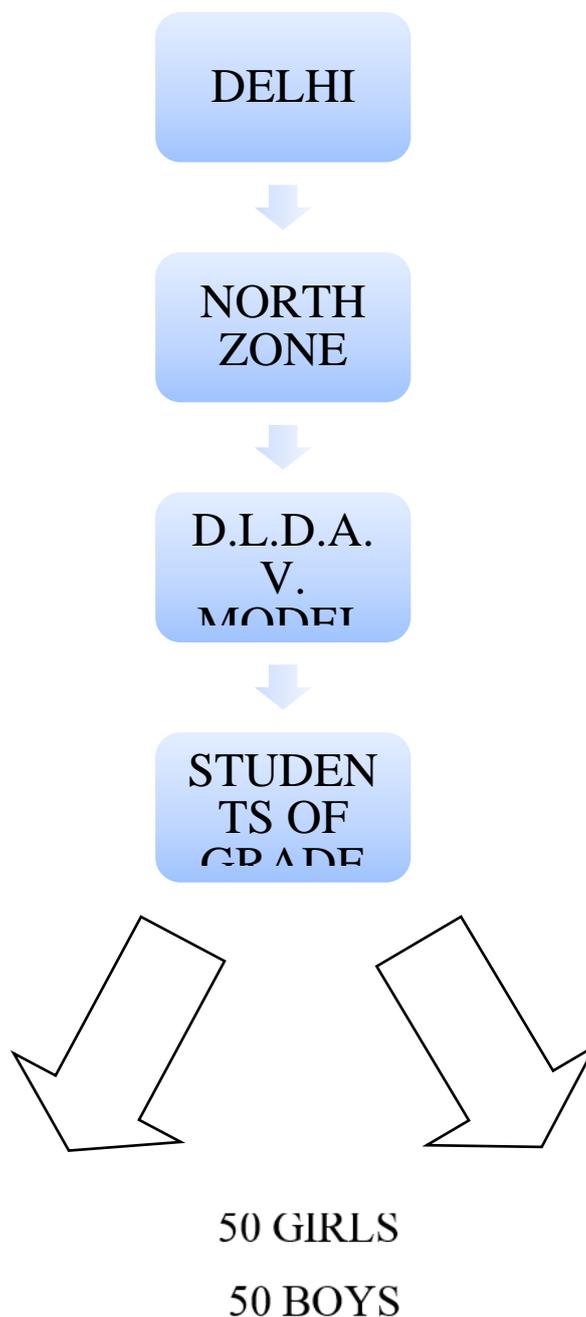
LAY OUT OF THE SAMPLE

Testing may be viewed as a systematic sampling of individual characteristics at a given time under specific conditions.

First of all the investigator randomly selected the school D.L.D.A.V.MODEL SCHOOL from the north zone of Delhi, out of which 50 boys and 50 girls were randomly chosen.

In this way random sampling technique is used in the present investigation.

The layout of the sample is as follows:



From conducting a study of this type, a larger area could not be chosen due to the limited resources at the disposal of the investigator.

CONCLUSIONS

With respect to higher mental ability there is no significant difference found among boys and girls of secondary schools in Delhi.

1. In case of Application mental ability no significant difference is found hence verified.
2. In case of Analysis mental ability no significant difference is found hence verified.
3. In case of Synthesis mental ability no significant difference is found hence verified.
4. In case of Evaluation mental ability no significant difference is found hence verified.

SUGGESTIONS FOR FURTHER STUDIES

1. The similar study may be done on college students.
2. The similar studies may be conducted in special groups of children such as handicapped, gifted and backward.
3. The present study was confined to 100 students of D.L.D.A.V. Model School of Delhi .A similar study can be conducted upon a large sample of students from other schools of Delhi.
4. The same study can be conducted on the same population using different tools.
5. Cross sectional study may be undertaken instead of longitudinal studies.
6. The same study can be conducted on the students of Hindi medium school as well as English medium school.
7. Problem can also be studied with the help of other mental ability tests.
8. Attempt may be made up to find out the relationship of mental ability and study habits with other variables like intelligence, creativity etc.
9. The same study can be conducted on boys and girls of middle schools of Delhi.
10. Correlation studies related to academic achievement, study habits, self concept and other variables can be undertaken.

EDUCATIONAL IMPLICATIONS OF THE STUDY

The most outstanding characteristics of any research are that it contributes something new to the development to the area concerned.

Nowadays society, the educational institutions, the schools, the colleges and families are so complex that the students are facing a number of problems in their daily life in relation to their academic achievement, mental ability. It is the responsibility of the researchers, teachers, parents that the problems should be identified very soon and the immediate remedial measures should be provided to the students for the betterment of their life. The present study has its implications for parents, teachers, guidance workers, educational administrators, councillors for further research.

The specialized guidance should be given to the students at different stages of their academics career so that they can have clear cut goals and develop confidence in them for achieving success in life.

VI. SUMMARY

Topic: Comparative study of higher mental ability in science among boys and girls of secondary schools in Delhi.

Introduction

The world today is becoming more and more competitive. Academic achievement has become the KEY FACTOR for personal progress. Parents desire that their children climb the ladder to success as high as desire (the Parents) and not as high as possible. The desire for a higher level of achievement put a really-really high pressure on the students, the teachers, and most aptly said The Education System itself. Presently there is no tool to measure higher level of cognitive domain. Achievement of students in our Country is measured in terms of the performance of a particular student in his/her examinations. This is not at all a desirable permutation, but there cannot be any running away of this standard formula of achievement of school going boys or girls. He or she is simply bracketed good/poor, intelligent/weak. In fact, it appears as if the whole system of education revolves around the Academic Achievement of the Students. In the field of school learning, aptitude of learning is significantly influential different sex can have different mental ability towards learning. So, it is imperative that science education should develop the interest of pupils in such a way that no one is left and a complete mental ability is developed.

Personality is the total integration of the physical, the intellectual, the emotional, the social and, the character make up of an individual which includes extroversion and introversion. It is well known that no two

individuals are alike, and they differ from each other in various aspects from birth till death. To fill this gap a tool for measuring the higher mental abilities in science has been developed.

Ability

Ability is the capacity to do certain skills and abilities which are necessary for success in a particular area of work. It is asserted that ability is related to vocational success as intelligence is related to success in general.

Mental Ability

Mental Ability is the capacity to learn various skills & abilities which are necessary for achieving success.

Quotations on Mental Ability

From each according to his ability, to each according to his need (or needs) is **a slogan popularized by Karl Marx** in his "1875 Critique of the Gotha Program".

The phrase summarizes the principles that, under a communist system, every person should contribute to society to the best of his or her ability and consume from society in proportion to his or her needs, regardless of how much he or she has contributed.

In the Marxist view, such an arrangement will be made possible by the abundance of goods and services that a developed communist society will produce; the idea is that there will be enough to satisfy everyone's needs.

1. "The first requisite for success is the ability to apply your physical and mental energies to one problem incessantly without growing weary."-**Thomas Alva Edison quotes** (the famous American Inventor who, singly or jointly, held a world record 1.093 patents. In addition, he created the world's first industrial research laboratory, 1847-1931).

2. It's really just the mental part. You can do the physical part. Not having anything to do after rehab. Finding something to do with your time that's constructive, not letting your mind wonder what's going to transpire next, what the team is going to do with you, if you are going to lose your spot, if you are going heal right.... It's like 'Groundhog Day'. You think you've rehabbed to the best of your ability, and it's still the same thing": -**Hollis Thomas quotes**

3. "Now intelligence seemed quantifiable. You could measure someone's actual or potential height, and now, it seemed, you could also measure someone's actual or potential intelligence. We had one dimension of mental ability along which we could array everyone... The whole concept has to be challenged; in fact, it has to be replaced". : -**Howard Gardner quotes**

Definitions On Higher Mental Ability

1. Higher Mental process as one of the more complex forms of mental activity involving highly organized process. Usually with an element of conscious control as in reasoning, memory, imagination, aspiration or voluntary attention. From the foregoing description it is evident that higher mental ability refers to the cognitive domain. : - GOOD (1973).

2. Cognitive domain comprised of 6 major classes – mainly knowledge comprehension, application, analysis, synthesis and evaluation. He referred application, analysis, synthesis and evaluation as higher mental ability. Thus higher mental ability in science was defined as the product resulting from application, analysis, synthesis and evaluation of all information concerning science.:-BLOOM (1974)

STATEMENT OF THE PROBLEM:

"A comparative study of higher Mental Ability in science among boys and girls of secondary schools in Delhi".

Operational definition

Comparative Study: Comparative Study deals with the comparison of two different things to find out the differences between them and to understand the concept of Comparison in a better way.

Mental Ability

Mental Ability is the ability or capacity to learn various skills which are necessary for achieving success.

Secondary level

The level which is attained after the completion of higher level and lasts till the starting of university education is known as secondary level.

Objective

- 1 .To compare the mental ability of boys and girls, in science, of Secondary Schools students.
- 2 To compare the Application mental ability of boys and girls, in science, of Secondary Schools students.
3. To compare the Analysis mental ability of boys and girls, in science, of Secondary Schools students.
4. To compare the Synthesis mental ability of boys and girls, in science, of Secondary Schools students.
5. To compare the Evaluation mental ability of boys and girls, in science, of Secondary Schools students.
6. To compare the Synthesis mental ability of boys and girls, in science, of Secondary Schools students.
7. To compare the Evaluation mental ability of boys and girls, in science, of Secondary Schools students.

HYPOTHESIS OF THE STUDY

1. There is no significant difference in the Mental ability, in science among boys and girls of secondary school students.
2. There is no significant difference in the Application mental ability, in science among boys and girls of secondary school students.
3. There is no significant difference in the Analysis mental ability, in science among boys and girls of secondary school students.
4. There is no significant difference in the Synthesis mental ability, in science among boys and girls of secondary school students.
5. There is no significant difference in the Evaluation mental ability, in science among boys and girls of secondary school students.

Delimitations

Present study will be confined to the boys and girls of Secondary school students.

AREA

The above study was confined to D.L.D.A.V. School, ND – Block, Pitampura, Delhi – 110034 only.

GRADE

The sample was confined to secondary class 10th grade.

Data collection will be confined only to the Schools of Delhi.

SAMPLE

The sample consisted of One Hundred (100) students only.

Both the sexes were considered equally.

Study confined to tests in higher mental ability in science by D N Sansanwal & Anuradha Joshi.

TOOLS

The study was confined to Higher Mental Ability by D.N.Sansanwal & Anuradha Joshi only.

DESIGN OF THE STUDY:

METHODOLOGY

Descriptive Survey Method is used in the Study to find out mental ability of 100 students (50 boys & 50 girls) considered into the Investigation.

TOOLS USED

Test of higher mental ability in science of D. N. Sansanwal and Anuradha Joshi.

SAMPLE

Random Sampling Technique will be used

The layout of the Sample is:

STUDENTS OF GRADE 10TH
50 GIRLS OF D.L.D.A.V. School Pitampura,
Delhi
50 BOYS OF D.L.D.A.V.School Pitampura,
Delhi

Procedure

After selecting the samples properly the Test will be administered on students under standard instructions given in the Manual. The Data obtained will be submitted for statistical analysis.

STATISTICAL TECHNIQUES:

- MEAN
- STANDARD DEVIATION
- t – Test.

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