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Correlation between study habits and achievement of higher secondary student in mathematics

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Abstract
The present study was conducted with the higher secondary school students of 200 plus one student from different higher secondary school in Cuddalore Educational District, were selected by adopting simple random sampling technique. The researcher after obtaining prior permission from the Head of the schools and personally administered the tools Study Habit and academic achievement of these students. The present observation that rural and urban schools plus one student differ significantly with respect to their achievement in Mathematics. Further, the Higher mean scores of urban area schools students are better than rural area schools students in terms of their achievement in Mathematics. There was a good rapport between the researcher and the respondents. The time taken to complete the tool was approximately 45 minutes, that the present investigation may contribute to enhance the achievement in Mathematics. It is hoped that appropriate instructional strategy may be formulated training given to increase their study habit and to develop their achievement in Mathematics among higher secondary students. Also, the various educational commission reports insist on the development of the knowledge among students at all levels.

Keywords: mathematics, cuddalore educational district, X-band frequency range

Introduction

Attitude towards interest or feeling to study Mathematics. It is the students' disposition towards 'like' or 'dislike' Mathematics while attitude in Mathematics means study approach assumed by an individual for solving problems, assessing ideas and making decisions. Review of literature depicts varying opinions and findings on the students' attitude towards Mathematics and their performances. According to Keeves (1992) [2] and Postlethwaite and Wiley (1991) [3], attitudes towards Mathematics are in highly favoured which indicating strong support for learning of Mathematics. There is also consistency across countries and age levels within a country. The researchers however reported that there is a marked decline in attitude towards Mathematics between the ten-years old and fourteen-years old levels. Greenfield (1995) [4], Parker et, al., (1996), Mullis, et.al., (1998) in their investigations revealed that in countries where there has been an emergent thrust for Students Attitude Towards Mathematics and Academic Achievement in Some Selected Secondary Schools in South western Nigeria by the technological development, there were very favourable attitudes towards Mathematics.

Now days Mathematics dominates almost every field of our life. All countries are trying to exceed others in providing new ways of life which serves as a timely warning to our country to reorient Mathematics education in our schools and colleges in the shortest possible time. So we can face the world with confidence and dignity. If anyone is having a favorable attitude towards computer, then may be tempted to make use of the computer and can gain knowledge about the computer (Jayanthi 2017) [6]. In this paper effort has been made to find out that there is a significant relationship between academic achievement in mathematics with study habits, home environment and their combined effect (Parvinder Singh 2016) [1]. It is the sole responsibility of the men of Mathematics to make this knowledge available to all and to develop a study habit to the complex problem of life.

Mathematics - Concept and Nature

There are several factors which cause difficulties in Mathematics.

1. The student-related factors, the subjects generally have an average mental ability as evidenced by their I.Q. score. Which have positive attitude and interest toward Mathematics and their study habits, as shown by the different dimensions, fall within the acceptable range. Some problems though may be attributed to occasional laziness, boredom, and personal problems. Their learning styles are generally extroverted learning, sensing and judging though they also possess some limited strengths in introversion. Their index of reading level is generally below the reading level of first year high school. Such reading deficiencies lead to reading frustration and failure to comprehend complex concepts and knowledge. They implement some strategies in their studies especially before examinations.
2. The mathematics faculty were academically prepared but may not be well-equipped with the skills to teach the subject. Furthermore, inadequate knowledge on human growth, learning and development make them unable to deal with appropriate instructional methods and strategies. This is attested by their beliefs and styles of teaching.
3. Parents are generally supportive of the students and they are positive that their children have the capacity to tackle Mathematics. Students do not consider their parents as contributory factors to their problems in their study of the subject.
4. Though the students have average mental ability, they still encounter difficulties in mathematics which is attributed to the reading deficiencies in vocabulary, comprehension and study skills. A good note however that is the students are aware of their own strengths and limitations and they undertake actions to overcome their limitations.

As regards school related factors, the inadequate pedagogical knowledge of the faculty can be a deterrent in teaching effectively. The number of years they have spent teaching mathematics may have made them experts in the area with respect to content but this is not everything in teaching. One has to know "how" he content can be translated into objectives and be able to accomplish them. What a teacher believes in and his/her personal professional principles will dictate her methods and strategies of teaching.

It is best that a teacher sees learning as a dynamic process where one has to be open for changes. The Mathematics disciplines, like College Algebra curriculum, are a skill-based curriculum and as such, prerequisite skills must be mastered before moving on to next. To enhance the learning process, library facilities must be adequate for research and additional information.

Mathematics Education

The Secondary Education Commission (1953) has recommended that every secondary school pupil should study general mathematics as a compulsory subject. Seminar on the teaching of mathematics in secondary schools held at Tara Devi (Simla) in 1956 dealt with almost all the problems facing the inclusion of General mathematics as a core subject for the higher secondary classes. One of the recommendations of Kothari Education Commission (1966-69) was that mathematics should be made a compulsory subject in school curriculum. The recommendation was accepted and Mathematics was made compulsory in school.

Importance of Mathematics Laboratory in Higher Secondary School

All these could be possible if the laboratory is adequate. With adequate resource materials, it is expected that there will be enough materials and equipment to go round the students at any given time of practicals. The establishment of a mathematics laboratory is one way of stimulating interest in learning mathematics. A mathematics laboratory is a place, where things can be stored, kept, counted, ordered, recorded, packed, unpacked, grouped, regrouped, arranged, rearranged, measured, joined and partitioned among numerous other activities. The students carry out their projects and other activities in the laboratory. The Mathematics laboratory should be the focal points of all mathematics work in the school. It should be the calculating center of the school. The truth of abstractions is demonstrated in a concrete manner and the students, who are slow to comprehend abstractions, appreciate them more readily and become interested in mathematics. The mathematics laboratory is a specially equipped room in a building, where mathematics lessons or activities hold on a regular basis or a corner of the regular classroom with tables and apparatus or a room containing a collection of teaching aids for students manipulation. Some of the advantages of having a mathematics laboratory according to ias Olatunde (2010) [5] include:

Advantages of Having Mathematic Laboratory

- It makes mathematics learning very interesting, meaningful and exciting
- It is a means of verifying a mathematical principle, law or theory
- It can be used to illustrate basic principles, laws or rules and development of such principles, laws or rules
- It is a means of practicing one or more of the cognitive and psychomotor skills like the ability to construct, measure, arrange, observe, classify and interprete data
- It provides opportunity for students to learn how to use cutters, turners, drill bits, mathematical set, paint, brush, models of solids and charts and other kinds of laboratory equipment in mathematics
- It encourages mathematical exploration and manipulation by students and keeps them alive and thinking, which also helps them to realize the applications of mathematics

Instruments

Two instruments were used for data collection. These instruments are Questionnaire for Mathematics Teachers (QMT), Students Mathematics Attitudinal Scale (SMAS) and Mathematics Achievement Test (MAT).

Questionnaire for Mathematics Teachers (QMT)

The QMT was developed by the researcher. It consists of Section A, which is made up of 10 questions dealing with the name of the school, age, gender, qualification, years of experience, number of students in the mathematics class of teachers, number of periods of teaching mathematics in a week. Section B consists of 14 items, which deal with the attitude of teachers towards the teaching of mathematics and has the options Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) and rated on the four point Likert Scale; Section C has 7 items, which deal with the perception of teachers towards mathematics laboratory programme in schools. The instrument was validated and the Cronbach alpha value obtained was 0.67.

Students Mathematics Attitudinal Scale (SMAS)

This is an attitudinal scale developed by the researcher and it is made up of statements relevant to mathematics. It is made up of two sections (A and B). Section A solicits for personal information about students like school, gender, age and local government area. Section B consists of forty items. The statements were rated on a four-point Likert scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). Scoring will be 4, 3, 2,1 for SA, A, D, SD, respectively for positively worded items, while negatively worded items ratings was reversed. The SMAS was validated with calculated Cronbach alpha value of 0.75.

Mathematics Achievement Test (MAT)

This test was developed by the researcher in order to assess the level of acquisition of mathematical concepts of the students. It covers the main topics of mathematics taught in SS2 up to the third term of the school year. It consists of 40-item multiple choice questions with 4 options A-D and was based on three cognitive levels knowledge, understanding and application. The test items were scored manually. Each correct answer attracted one mark, while a wrong answer was scored zero. The level of achievement of a student was taken to be the student's total test score. Kuder-Richardson formula KR-20 was used to determine the reliability coefficient. The value obtained was 0.74. The average difficulty index obtained was 0.45, which shows that the instrument was neither too difficult nor too simple.

Achievement

Achievements of an individual in allied fields provide sufficient information in regard to his habit for those fields of knowledge and skills. Without a habit for a particular subject, student cannot achieve highly in that subject. Bingham (1937) "There is a close relationship between achievements tests and habit tests because achievement in a particular branch of knowledge or skill is considered as a good indicator of habit". "An achievement test is used to ascertain what and how much has been learnt or how well a task has been performed."

- An achievement test is self – evident.
- It has been found useful in remedial teaching programmers as well as in determining the class to which a pupil should be admitted.
- Attainment of minimum performance standards.
- They provided reliable and valid information in regard to persons achieved abilities.
- It measures how much has been learned in the subject and what specific abilities or skills have been developed.

To measure the achievement of the students in different subjects, generally a teacher constructs achievement test. It is done with the help of the prescribed curriculum. Achievement tests are merely tools and they should not be regarded as goals.

Objectives of Mathematics Education

Mathematics education aims at the realization of following objectives:

- Enhancing the problem-solving ability.
- Inculcating study habits in the young minds.
- Developing skills in handling and manipulating apparatus.
- Arranging subject fairs and exhibits.
- Preparing handmade apparatus, Drawing and Painting etc.,
- Inculcating socially desirable habits.
- Providing work for leisure.
- Providing Training for better living.
- Creating basis for sound carrier and latest specialization.
- To solve many problems associated with Modern life.

Mathematics Education at the Higher Secondary Level

- The present syllabus in Physics, Chemistry, Biology and Mathematics for Higher Secondary has been framed to develop proper study habit and skills in the pupils.
- In order to pursue their carrier in basic Mathematics and professional course students take up Physics, Chemistry, Biology and Mathematics.
- The present-day Mathematics education at Higher Secondary level provides basic information on several fields of Mathematics that has become life supporting disciplines.
- To make the learning of physics more interesting, application of concepts in real life situation are presented.
- The students have to be prepared to face the challenges of fast development. World based on Mathematics and facts.
- Mathematics is an effort in making the children to be the future scientist in various disciplines.

Need and Importance of the Study

The National Mathematics Foundation was established in 1950 by an act of Congress to develop a national policy for the promotion of basic research and education in the Mathematics. Mathematics is playing a major role in the present age to satisfy the needs and desires of the people and it has also become one of the major human activities.

The nature of Mathematics education helps to promote the study habit required of an individual. The Higher–Secondary school is a place to promote the academic achievement in Mathematics among the students.

Study habit is within the reach of many schools to provide training in study observation and thinking through cheap materials.

It provides immense exciting and educational possibilities.

- Students can easily develop various aspects of the study skills, namely abstract, concrete and communication etc.,
- Problem-solving abilities and develop desirable personality traits like persistence and self-confidence in the face of frustration.
- The importance of individual work and opinion, group work, co-operation, sincerity, emotional stability and intellectual honesty.
- It provides ample opportunities for personal exchange of experience among students, strengthening.
- Discovery is the familiarized them with the staff and operations of Mathematics.
- To achieve varied objectives for various categories of the students at different levels of treatment right throughout the school.

Study habit and Academic achievement in Mathematics of plus one standard student is an important area for research. Knowledge of the level of study habit held by student population will be helpful in planning Mathematics education. Individuals having high study habit are needed for the modern Indian society. Knowledge and the expectation that the solution of the problem will come through the verified knowledge. To develop study habit the teachers should always remember that without a questioning of mind and a spirit of inquiry, studies in Mathematics will only mean acceptance of dogma and will never led to development of study habit in the students.

In India, the Higher Secondary school students has no freedom to choose the curriculum that suits him and, curricular choices are made only at the beginning of the higher Secondary stage that too mainly on the basic of his academic achievement. But in develop countries; the students have the advantage of counselling and guidance, which is a part and parcel of the educational system.

Mathematics habit is the complex behavioral aspect of Mathematics. It can be studied at various educational levels say primary to post graduate. In the present study is concerned with the Study Habit of plus one standard student in relation to their achievement in Mathematics of higher secondary school students. It is also concerned with Gender, Type of school, Medium of Instruction. Locality and parental educational status. Today students are influenced by modernization. Hence it may be interesting to identify the study habit of plus one standard student in relation to their achievement in Mathematics.

The investigator wanted to identify the study habit in relation to academic achievement in Mathematics among plus one student to get useful educational data. To what extent do the Higher Secondary students the study habit in relation to academic achievement in Mathematics.

- Is there any difference in the study habit of boys and girls Higher Secondary level?

Scope of the Study

The study was indented to find out the habit and achievement of students towards the learning of Mathematics at Higher Secondary level. The study was indented to increase the attention and understanding towards the subject. The study was indented to improve the fundamental knowledge about the qualities of study activities. The study is used to bring out the hidden gem like potentialities in pupils to see that the flowers do waste their fragrance in wilderness.

Statement of the Problem

The problem selected for the present study is stated as "Correlation between study habits and achievement of higher secondary students in mathematics".

Objectives of the Study

The objectives of the study are as follows:

- To find out whether there is any significant relationship between study habit and achievement in Mathematics of the higher secondary plus one student.
- To find out whether there is any significant gender difference in study habit and achievement in Mathematics.
- To find out whether there is any significant difference in study habit and achievement in Mathematics with respect to locale.
- To find out whether there is any significant difference in study habit and achievement in Mathematics with respect to Parental educational status.

Hypotheses of the Study

In the light of the above objectives, the following null hypotheses are formulated for testing.

- There is no significant relationship between study habit and achievement in Mathematics of the higher secondary plus one student.
- There is no significant relationship between study habit and achievements in Mathematics of the higher secondary plus one boys.
- There is no significant relationship between study habit and achievement in Mathematics of the higher secondary plus one girls.
- There is no significant relationship between study habit and achievement in Mathematics of plus one rural students.
- There is no significant relationship between study habit and achievement in Mathematics of plus one urban students.
- There is no significant relationship between study habit and achievement in Mathematics of plus one student who have educated parents.
- There is no significant relationship between study habit and achievement in Mathematics of plus one students who have uneducated parents.
- There is no significant difference between higher secondary plus one boys and girls with respect to study habit.
- There is no significant difference between higher secondary plus one boys and girls with respect to achievement in Mathematics.
- There is no significant difference between rural and urban schools plus one students with respect to study habit.
- There is no significant difference between rural and urban schools plus one students with respect to academic achievements in Mathematics.
- There is no significant difference between plus one students of educated parents and uneducated parents with respect to study habit.
- There is no significant difference between plus one students of education parents and uneducated parents with respect to achievement in Mathematics.

Methodology

The success of any research depends upon suitable methodology with specific operational step and well-constructed tools. The data collected were analyzed by the appropriated statistical precedence and the objectives were fulfilled by interpreting the results. While explaining the research design, the researcher should justify the back ground for selecting appropriate research method and sections of variables are to be justified. The investigator has to explain the nature of population, characteristics of sample, precedence, appropriate sampling technique and sample size. On construction of data gathering instruments, the researcher should explain in detail the relation, construction and validation of research tool.

Limitation of the Study

Limitations are the boundaries of the study. The limitation in selecting sampling is very essential for drawing conclusion of the study. Variables are defined with defined limits. Availability of materials can also be considered as one of the limitations of the study. The researcher always concentrates on a narrow area and limits his field or area. The research may provide basic back ground materials for a new problem for future research.

If the problem is limited to a geographical area that should be clearly defined. A clear statement of the research problem and identification of the limitation of the study are essential for the successful completion of the research. Due to the heavy syllabus prescribed for higher secondary courses in Mathematics, it is not possible to test in academic achievement for the whole syllabus. Moreover it is Educational District.

Research Design

A Research design is the arrangement of condition for collection and Analysis of data in a manner that aims to combine relevant to the research purpose with economy in procedure. The Research design requires a plan which stimulates work and is such.

That follow up work procedure be in conformity with the plan. The Research plan deals with the tools, sampling, frame the pilot study and its implication for the final study. A suitable program of instruction is necessary for helping efficient learning of any subject.

Design of the Study

PHASE – I	PHASE – II	PHASE – III	PHASE – IV
Identification Of the Problem ↓ Identification Of the Schools ↓ Contacting the HM's / Teachers For the students	Selection of Tool for Study ↓ Development of Tool ↓ Finalization of the Tool	Selection of Sample ↓ Administration of Tool ↓ Collection of Data	Analysis of Data ↓ Interpretation of Results ↓ Findings

Variable of the Study

Variables considered for the present study are as follows:

- Independent variable- Study Habit.
- Dependent variable- Academic Achievement in Mathematics.
- Moderate variable

- Gender (Male and Female)
- Locality (Rural and Urban)
- Parent's Educational Status (Educated and Uneducated).

Identification of Problem

The present-day pupils do not show an interest in learning Mathematics subjects such as Physics, Chemistry, Botany and Mathematics. Higher secondary students do not have much knowledge and awareness in Mathematics subject. The cause for the lack of interest in Mathematics can be discovered in this study.

Identification of Schools

The study was conducted by the investigator to find out the study habit and academic achievement of the higher secondary students in Mathematics. This investigator has collected data from higher secondary students in selected schools at random in Cuddalore Educational District. The random sample of schools which include all the selected variables for carrying out the research work.

Schools Selected for the Study

1. Government Girls Higher Secondary School, Chidambarm.
2. Government Boys Higher Secondary School, Cuddalore.
3. Government Higher Secondary School, B.mutlur.
4. Government Higher Secondary School, Bhuvanagiri.

Sample of the Study

The population meant for the study is the students at higher secondary level. The investigator decided to collect data from the plus one students studying in higher secondary school of Cuddalore Educational District. To meet the representatives of sample of population the investigator collected a random sample of students studying in different higher secondary schools in Cuddalore educational district.

There were two types of samples. The first sample consisted of 50 students (25 male and 25 female) were selected at random the first sample was used for establishing the reliability of the tool. The second sample was the main sample. This was used for the collection of data. The main study was conducted with the higher secondary school students from Government Girls Higher Secondary School, Chidambaram, Government Boys Higher Secondary School, Cuddalore, Government Higher Secondary School, B. Mutlur, Government Higher Secondary School, Bhuvangiri were selected for investigation while selecting the plus one students, care was taken to select students in their Gender, Parent's educational Status, Locality. The main study consisted of 200 plus one students from different higher secondary school in Cuddalore Educational District were selected by adopting simple random sampling technique. The researcher after obtaining prior permission from the Head of the schools and personaly administered the tools Study Habit and academic achievement of these students.

During the time of answering the tool by the students the investigator gave proper instructions to the respondents. There was a good rapport between the researcher and the respondents. The time taken to complete the tool was approximately 45 minutes.

Table 1: The breakup details of the sample

Sl. No	Variable	Sub Variable	Sample	Total
1.	Gender	Boys	100	200
		Girls	100	
2.	Locality	Rural	100	200
		Urban	100	
3.	Parent's educational Status	Educated	80	200
		Uneducated	120	

Collection of Data

The investigator himself visited the different Higher Secondary schools located in Cuddalore educational district and met the Heads of the respective schools and got permission to administer the questionnaire. First the investigator explained the aim and the purpose of the study and then administered the tool to the students. The students responded freely for each and every items of the statement that are given in the questionnaire. Then their responses were recorded in it. When the filled questionnaire were compiled and taken into account for final analysis of data.

Analysis of Data

In any investigation the method of analysis is an important step. After collecting the data from the respondents the student's responses were entered in the Master table. The scores were also given to each and every students of the questionnaire and there scores were used for the statistical analysis.

Research Method

George J. Mouly "No category of educational Research is more widely used than the type known variously as the survey". The broad classification comprises a variety of specific Techniques and procedures all are similar form of the stand point of purpose. (i.e.) so establish the status of phenomenon under investigator. The investigator used normative survey in this study to collect data from the higher secondary students studying in the selected higher secondary schools of Cuddalore Educational district. In this study the investigator developed and used questionnaire to collect data from the respondents.

Research Tool

An investigator is expected to decide the method of his

investigation and tools to be used. It was decided to use the questionnaire method. The investigator developed and used a tool for measuring the study habit of higher secondary plus one students. The investigator also developed and used a tool for measuring higher secondary student's achievement in Mathematics. Tools appropriate to the purpose of research need selected with care. The questionnaire method is the chief and the most frequently used tool in our educational investigation. This method is the most feasible and frequently used tool in the educational investigation. Investigator used the questionnaire as a research tool when gathering information about the variables of study is needed. It is a self-reporting instrument and consists of a number of question and items.

Study Habit Scale

After the selection of variables of the study, the investigator went through the related literature, thesis and catalogue of Psychological tests to locate a tool to measure the study habit of plus one students. Since the investigator could not find an appropriate tool to measure the study habit, the investigator decided to construct a tool for the present study. An assortment of multiple-choice type questions are required for the measurement of study habit, the investigator found the habit scale as the most appropriate for constructing the tool. Habit in present condition, which is indicative of an individual's potentialities for the future. It is a device designed to indicate a person's potential ability for performance of a certain type of activity of a specialized kind, the test does not directly measure future accomplishment. It measures present performance, which is symptomatic of future accomplishment.

Steps in the Construction of Study Habit Scale

The investigator constructed the study Habit tests. It is necessary first to define that which is to be measured. To analyze into component processes then to device and select specific, items, which will test these processes the practical function in which is that, the habit expresses itself. The tests devised after analyzing the trait are still of unknown value their value must be established by tryout it is a problem of validation. The validity of any tests various types of criteria which have been used for validation purposes.

- Minnesota paper form Board Tests.
- Minnesota Mechanical Assembly Tests.
- Bennett Mechanical comprehension Tests.
- Mathematics Habit Test: NIE, Delhi.

The investigator to select the Habit test in the Mathematics subject, this battery was developed for Educational and Vocational Guidance of plus one students, there is a test requires the ability to visualize a three dimensional object from a two dimensional pattern, as well as the ability to imagine accurate and confidently. In a test some items are having, more than one correct answer.

Scoring

The answer to the test items were of the type multiple choice questions therefore one mark was awarded to each right answer given by the student. Sum of the items scores gave the scores on preference. In Mathematics, the score for each student was calculated separately.

Administration

The final form of the study habit scale was administered on three hundred students; the tool was given to students. The students were asked to read the instructions carefully and mark their responses.

Time Duration

The time given to complete the tool was 45 minutes.

Academic Achievement

"An achievement test is one which is designed to measure a student's grasp of somebody of knowledge or his proficiency in certain skills".

A close relationship between achievement tests and habit test because achievement in a particular branch of knowledge, skill is considered as a good indicator of habit. It provides sufficient information in regard to an individual's habit.

"Achievement test is designed to measure knowledge, understanding, and skills in a specified subject or group of subjects". Achievement tests have been found useful in remedial teaching programmed as well as in determining the class to which a pupil should be admitted. Administration of achievement tests at regular intervals is helpful for the teachers in knowing the kinds of difficulties faced by the students in learning. Achievement tests are useful in discovering the effectiveness of teaching and also suggest the required improvement in the methods of teaching.

- Test is prepared to measure the attainment of understanding in a given field of knowledge or skill.
- Teacher-made tests are generally achievement tests.

Construction of Achievement Tests

For constructing an achievement test, it is necessary to specify its purpose and objective. Without a clear understanding of the purpose for which an achievement test has to be prepared will be defective. After deciding the purpose, the level for which the test is being prepared has also to be determined. The test maker should have a very clear idea of the level of achievement which should form the basis of the prescribed curriculum. After the purpose and level the content of achievement test has to be determined. The items of test can be planned in such a manner as will enable, to indicate the understanding of a subject skill.

Many teachers prepare achievement tests, which enable them to measure the achievement of their students in different subjects. Generally, achievement tests are constructed by a teacher. There are many types of achievement tests namely- completion type, true-false type, multiple choice type, Matching type, classification type, etc. The investigator selected the multiple-choice type of achievement test.

In achievement tests where multiple-choice type of test items are also included the pupil has to write the number of the best answer to the question on the line at the right of the question. The multiple –choice type is widely adaptable and relatively high in ability to discriminate between better and poor students. It is somewhat more difficult to write than some other items types but its advantages seem so apparent that it has become the type most widely used in tests constructed by specialists. Multiple-choice type of test is widely used because with the help of it good and poor students can be sorted out. Another advantage is that the multiple-choice type tests have greater reliability than a true-false test.

Blue Print

It is the most important step in construction of achievement test. It requires survey of aims and objectives of instruction of particular subject chosen. Construction should match the objectives written for teaching the subject. The objectives considered here are of cognitive domain; they are:

- Knowledge
- Comprehension or understanding
- Skill
- Application

The objectives were classified according to Bloom's classification of objectives in cognitive domain.

Three to four test items were written under each instruction objectives. These items were also scrutinized by the guide for the correctness of the content, plausibility of the distracters and the match between the items and the respective instructional objectives. The following sources were consulted for construction of Achievement test in Mathematics.

- Plus one Mathematics text books, Government of Tamil Nadu.
- Personal Experience of the Investigator.

Three dimensioned blue print showing coverage of content, instructional objectives and types of items was prepared by referring the plus one standard text books of Mathematics and in consultation with the guide and personal experience.

Table 2: Distribution of Marks to different Instructional Objectives

Sl. No	Instructional Objectives	Marks	Percentage (%)
1.	Knowledge	10	40
2.	Comprehension	6	24
3.	Skill	4	16
4.	Application	5	20
	Total	25	100%

Table 3: Question Type weight age

Sl. No	Instructional Objectives	Marks	Percentage (%)
1.	Objective Multiple-choice Questions	25	100%
	Total	25	100%

Screening of test Items

The test was referred to representatives of plus one students. This was done with a view to retain one of the synonymous items and the items, which could fit in to the framework of the competency. Items, which were vague, were discarded and remaining items were edited to make it clear.

Try Out

Before constructing the test items the investigator did through study of the methodology and objectives of Mathematics. Initially 25 items were prepared. The test was tried out in higher secondary schools in Cuddalore district. In order to administer the test, the co-operation of the school teachers was sought.

The students were specifically given to understand that:

- The scores of the test would be used only for research purpose.
- The honest and accurate answers of the student to test items would help the researcher in developing a reliable test in Mathematics.

Scoring

The answer to the test items were of the type multiple choice questions therefore one marks was awarded to each right answer given by the student. Sum of the items scores gave the scores on preference. In Mathematics, the score for each student was calculated separately.

Item Analysis

Each test item was subjected to analysis in terms of

- Difficulty value.
- Item validity.

First arranged in the descending order, the two groups – "high scoring" and "low scoring". For determining item validity, numerous indices and procedures were available in the present study. The correlation approach and correlating the items scores with the test score was followed. For computing item test correlation, the point biserial correlation method (Guilford – 1954, P427) was used The item validity value of the test item was determined by using the following formula:

$$\frac{U+L}{D} = 2$$

Where D = Difficulty value of the item

U = Percentage (%) of students scoring the item correctly in the upper or higher scoring group.

L= Percentage (%) of students scoring the item correctly in the Lower or low scoring group.

Preparing Data for use of Chart

The test papers were divided into 3 groups: High, Average, Low, Groups following the procedure suggested by Kelly *et al*., (1939) [8] showed that the product – moment correlation between a test items scores and the total score on the test could be estimated by using only the tails of the distribution and also showed that the most efficient division to use was the top and bottom 27% tails. The answer scripts were arranged from the highest score to the least score.

Following Kelley's *et al*., suggestion, the best 27% of the answer scripts were kept in one group and treated as the Top group. The poorest 27% of the answer scripts were kept on the other group as Bottom group.

The middle group consisting 46% of the paper was kept aside since the two extreme groups, High and Low were needed for the item analysis.

Table 4: Difficulties and Item Validity Values of Mathematics

Test Item	Upper Limit	Lower Limit	Correlation discrimination value/ level	Difficulty value/level	Significance
1.	44	12	0.48	28.0	Yes
2.	75	07	0.72	41.0	Yes
3.	61	30	0.39	45.5	Yes
4.	30	07	0.36	18.5	Yes
5.	64	22	0.51	43.0	Yes

6.	47	07	0.53	27.0	Yes
7.	33	04	0.49	18.5	Yes
8.	74	26	0.55	50.0	Yes
9.	37	19	0.27	28.0	Yes
10.	41	07	0.48	24.0	Yes
11.	52	07	0.56	29.5	Yes
12.	52	07	0.55	29.5	Yes
13.	63	26	0.45	44.5	Yes
14.	52	19	0.54	35.5	Yes
15.	22	03	0.45	12.5	Yes
16.	26	03	0.39	14.5	Yes
17.	26	11	0.52	18.5	Yes
18.	59	30	0.52	44.5	Yes
19.	41	04	0.42	22.5	Yes
20.	86	09	0.29	47.5	Yes
21.	27	07	0.30	17.0	Yes
22.	59	07	0.37	33.0	Yes
23.	37	04	0.75	20.5	Yes
24.	46	17	0.49	31.5	Yes
25.	74	19	0.76	46.5	Yes

Final Tool

Item with 100% and items with less than 0.27 validity co-efficient were deleted: The final tool consists of 25 items in all. The directions for using the test were found to work well and were retained without modifications.

Reliability of the Achievement Test

1. **Stability Reliability:** The Co-efficient of stability of the achievement test was determined by the test-retest method. For this purpose the achievement test was re-administered to a random sample of 50 students out of 100 involved in the first try out two weeks after the first administration. Then co-relation between the test and re-test scores was computed, the co-efficient of correlation between the two sets of scores on the achievement test was found to be 0.6 which is quite significant at 0.05 levels. This implies that the achievement test has stability reliability.
2. **Consistency Reliability**: The Coefficient of consistency of the achievement test was determined by the Split half method. For this purpose, scores obtained on re-administration of the achievement test, the total scores were divided into two halves – on relating to odd numbered items and the other to even number items. The obtained co-efficient of correlation between the scores on the halves was corrected for full-length of achievement test by means of Spearman- Brown prophecy formula. The co-efficient of consistency of achievement test was found to be 0.86, which is significant at 0.05 level. This implies that achievement test has consistency reliability.

Validity of the Achievement Test

1. **Intrinsic Validity:** Intrinsic validity of the achievement test was computed from its reliability co-efficient (Guilford – 1954). The range of validity co-efficient was between 0.959 and 0.994, which speaks of the intrinsic validity of the test.
2. **Content Validity:** Five teachers of the higher secondary schools teaching Mathematics acted as judge in establishing content validity of the achievement test. They examined the test items, instructions and the scoring procedure. They were satisfied with the relevance of the test items and the scoring procedure. They were also satisfied with the adequate coverage of the content of Mathematics at plus one standard. This implies that the achievement test in Mathematics is comprehensive and relevant.

Preparation of Multiple-Choice Test

While preparing a multiple-choice type of test due care should be taken in selecting wrong alternatives or distracters. Distracters should represent misconduct and common errors, which actually do arise in the student's thinking. Distracters, which are implausible, are not likely to be chosen, even by a poor student. Type will not contribute to the measurement of his achievement distracters, if properly developed; it can serve as important a function in the question as the correct answer in that they serve as the starting point for diagnosis of individual difficulties. The role of distracters in multiple choice type of test is very important provided they are selected carefully. Distracters should not be such as are easily discovered by students to be wrong. As a matter of fact, there should be a minute difference between the correct answer and the distracters. The investigator constructs the achievement test on the basis of the prescribed curriculum in higher Secondary schools.

Statistical Techniques Used

Statistical Techniques serve the fundamental purpose of the Descriptive, Differential analysis and Relational Analysis.
Mean and Standard deviation.
't' – test for determining the significant differences between the means of groups in the study. The't' – test is applicable in order to determine the significant difference between any two means. Correlation Coefficient (r): Correlation Analysis for knowing the relationship between the study habit and achievements in Mathematics of higher secondary plus one students.

Analysis and Interpretation of Data

The most important part of the investigation is the analysis and interpretation of data. Analysis and interpretation of data means studying the tabulated materials in order to determine inherent facts of meanings. It involves breaking down existing complex factors into simple parts and putting them together in a new arrangement for the purpose of interpretation.

Interpretation is not mechanical process. It is the careful, logical and critical examination of result analysis. This is useful in making statements about what the result of analysis indicate.

The present study is intended to know the "Correlation between study habits and achievement of higher secondary students in mathematics" The data collected were analyzed statistically with regard the objectives of the study. The purpose of the chapter is to analyze the data collected and presented in such a way that meaningful interpretation and discussion can be made. In this chapter the investigator has presented the collected data and its interpretation by using statistical hypotheses testing. The hypotheses formulated for the present study were tested by applying statistical techniques.

Statistical Analysis used for the Present Study

Descriptive Analysis

It provides information about the nature of a particular group of individuals. To compare the scores in terms of performance mean and pooled down standard deviation were calculated. The essential descriptive statistics served as inputs for further inferential analysis.

In the present investigation mean and standard deviation were calculated from the student's performance in an achievement test in Mathematics.

Differential Analysis

It provides inferences involving determination of statistical significance of difference between groups with reference to selected variables. In the present Investigation' t' values were calculated to test the significant difference between the mean scores of sub variables.

Relational Analysis

To find out whether the significant relationship between the study habit of higher secondary plus one students in relation to their academic achievement in Mathematics, is its own or due to the influence of some other intervening variables. The product moment coefficient of correlation was applied. The correlation coefficient is calculated between the study habit and achievement in Mathematics.

Data Analysis

In the present investigation the scores by the plus one student of the selected higher secondary schools in Cuddalore Educational District were collected and their mean and standard deviation scored were calculated and described.

Table 5: Mean and standard deviation scores of plus one student in respect of their study habit and achievement in Mathematics.

S. No	Variable	No. of Students	Study Habit		Achievement	
			Mean	Standard deviation	Mean	Standard deviation
1	Total students	200	14.17	3.54	16.06	3.74
2	Boys	100	13.52	2.93	14.66	3.31
3	Girls	100	18.93	4.01	17.81	3.51
4	Rural school students	100	13.31	2.84	12.71	3.05
5	Urban school students	100	17.40	3.68	18.15	3.91
6	Students have educated parents	80	18.91	3.16	15.72	3.53
7	Students have uneducated parents	120	12.74	3.68	16.25	3.85

The above table shows the distribution of mean and standard deviation of plus one students of selected higher secondary school in Cuddalore Educational District in their study habit and achievement towards Mathematics.

Hypothesis Testing – Relational Analysis

Hypothesis – 1

There is no significant relationship between study habit and achievement in Mathematics of the higher secondary plus one students.

This hypothesis was tested by using correlation (i.e) product moment correlation was computed to find out the significant relationship between study habit and achievement of higher secondary plus one students in Mathematics.

Table 6: Relationship between study habit and achievement in Mathematics of higher secondary plus one students.

Variable	No. of students	Category	Correlated value (r)
Higher secondary plus one students of selected schools	200	Study Habit	0.97
		Achievement test in Mathematics	

The coefficient of correlation obtained between study habit and achievement in Mathematics of the higher secondary plus one student is 0.97. Hence there is a positive correlation between them. So, the null hypothesis is rejected.

Therefore, it is concluded that there is a significant positive relationship between study habit and achievement in Mathematics among higher secondary plus one students.

Hypothesis – 2

There is no significant relationship between study habit and achievement in Mathematics of the higher secondary plus one boys.

This hypothesis was tested by using correlation (i.e) product moment correlation coefficient was computed to find out the significant relationship between study habit and achievement of higher secondary plus one boys in Mathematics.

Table 8: Relationship between study habit and achievement in Mathematics of higher secondary plus one boys.

Variable	No. of students	Category	Correlated value (r)
Boys	100	Study Habit	0.978
		Achievement test in Mathematics	

The coefficient of correlation obtained between study habit and achievement in Mathematics of the higher secondary boys is 0.978. Hence there is a positive correlation between them. So, the hypothesis is rejected. Therefore, it is concluded that there is a significant positive relationship between study habit and achievement in Mathematics among higher secondary plus one boys.

Hypothesis – 3

There is no significant relationship between study habit and achievement in Mathematics of the higher secondary plus one girls.

This hypothesis was tested by using correlation (i.e) product moment correlation coefficient was computed to find out the significant relationship between study habit and achievement of higher secondary plus one girls in Mathematics.

Table 9: Relationship between study habit and achievement in Mathematics of higher secondary plus one girls.

Variable	No. of students	Category	Correlated value (r)
Girls	100	Study Habit	0.938
		Achievement test in Mathematics	

The coefficient of correlation obtained between study habit and achievement in Mathematics of the higher secondary plus one girls 0.938. Hence there is a positive correlation between them. So the hypothesis is rejected.

Therefore, it is concluded that there is a significant positive relationship between study habit and achievement in Mathematics among higher secondary plus one girls.

Hypothesis – 4

There is no significant relationship between study habit and achievement in Mathematics of plus one rural students.

This hypothesis was tested by using correlation (i.e) product moment correlation coefficient was computed to find out the significant relationship between study habit and achievement in Mathematics of plus one rural students.

Table 10: Relationship between study habit and achievement in Mathematics of plus one rural students.

Variable	No. of students	Category	Correlated value (r)
Rural school students	100	Study Habit	0.908
		Achievement test in Mathematics	

The coefficient of correlation obtained between study habit and achievement in Mathematics of plus one rural students is 0.908. Hence there is a high positive correlation between them. So the hypothesis is rejected. Therefore, it is concluded that there is a significant positive relationship between study habit and achievement in Mathematics of plus one rural students.

Hypothesis – 5

There is no significant relationship between study habit and achievement in Mathematics of plus one urban students.

This hypothesis was tested by using correlation (i.e) product moment correlation coefficient was computed to find out the significant relationship between study habit and achievement in Mathematics of plus one urban students.

Table 11: Relationship between study habit and achievement in Mathematics of plus one urban students.

Variable	No. of students	Category	Correlated value (r)
Urban school students	100	Study Habit	0.974
		Achievement test in Mathematics	

The coefficient of correlation obtained between study habit and achievement in Mathematics of plus one urban students is 0.974. Hence there is a high positive correlation between them. So, the hypothesis is rejected.

Therefore, it is concluded that there is a significant positive relationship between study habit and achievement in Mathematics of plus one urban students.

Hypothesis – 6

There is no significant relationship between study habit and achievement in Mathematics of plus one students who have educated parents.

This hypothesis was tested by using correlation (i.e) product moment correlation coefficient was computed to find out the significant relationship between study habit and achievement in Mathematics of plus one students who have educated parents.

Table 12: Relationship between study habit and achievement in Mathematics of plus one students who have educated parents.

Variable	No. of students	Category	Correlated value (r)
Students who have educated parents	80	Study Habit	0.944
		Achievement test in Mathematics	

The coefficient of correlation obtained between study habit and achievement in Mathematics of plus one students who have educated parents is 0.944. Hence there is a high positive correlation between them. So the hypothesis is rejected.

Therefore, it is concluded that there is a significant positive relationship between study habit and achievement in Mathematics of plus one students who have educated parents.

Hypothesis – 7

There is no significant relationship between study habit and achievement in Mathematics of plus one students who have uneducated parents.

This hypothesis was tested by using correlation (i.e) product moment correlation coefficient was computed to find out the significant relationship between study habit and achievement in Mathematics of plus one students who have uneducated parents.

Table 13: Relationship between study habit and achievement in Mathematics of plus one students who have uneducated parents.

Variable	No. of students	Category	Correlated value (r)
Students who have uneducated parents	120	Study Habit	0.650
		Achievement test in Mathematics	

The coefficient of correlation obtained between study habit and achievement in Mathematics of plus one students who have uneducated parents is 0.650. Hence there is a positive correlation also existed between them. So the hypothesis is rejected. Therefore, it is concluded that there is a significant positive relationship also existed between study habit and achievement in Mathematics of plus one students who have uneducated parents.

Differential Analysis

Differential statistics is applied to analyze the data aspect apart from descriptive statistics. The significant difference between the one sub-variable of scores of study habit and achievement test in Mathematics.

Hypothesis – 8

There is no significant difference between higher secondary plus one boys and girls with respect to study habit. This hypothesis was tested by using 't' test. The 't' value was computed to find out the significance in study habit mean scores between higher secondary plus one boys and girls.

Table 14: Significance of difference in study habit mean scores of plus one boys and girls.

S.no.	Gender	No. of students	Mean	Standard deviation	't' value
1	Boys	100	13.52	2.93	3.399**
2	Girls	100	18.93	4.01	

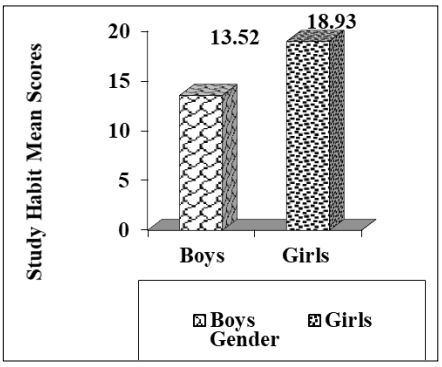
** - Significant at 0.01 level. Critical value for 0.01 level = 2.58

The calculated 't' value 3.399 is greater than the critical value 2.58 corresponding to the 0.01 level of significance. This implies that the difference in the study habit mean scores under consideration is significant. Hence the null hypothesis is rejected.

Therefore, it is concluded that the higher secondary plus one boys and girls differ significantly in respect of their study habit.

Further, the high mean scores of girls are better than boys in study habit.

Bar Graph Shows the Significance of Difference in Study Habit Mean Scores of Plus One Boys and Girls



Hypothesis – 9

There is no significant difference between higher secondary plus one boys and girls with respect to achievement in Mathematics. This hypothesis was tested by using 't' test. The 't' value was computed to find out the significance in achievement mean scores between higher secondary plus one boys and girls.

Table 15: Significance of difference in achievement mean scores of plus one boys and girls.

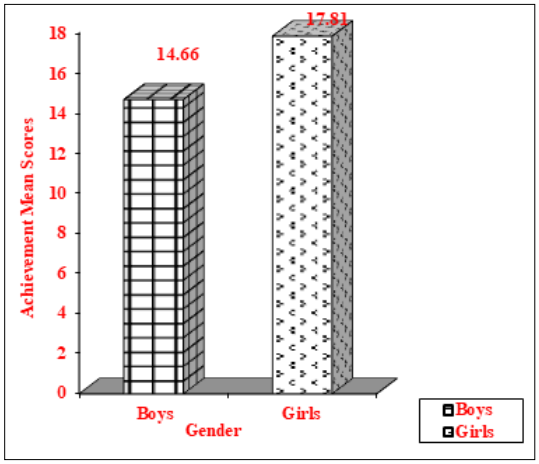
S.no.	Gender	No. of students	Mean	Standard deviation	't' value
1	Boys	100	14.66	3.31	7.895**
2	Girls	100	17.81	3.51	

** - Significant at 0.01 level. Critical value for 0.01 level = 2.58

The calculated 't' value 7.895 is greater than the critical value 2.58 corresponding to the 0.01 level of significance. This implies that the difference in the achievement mean scores under consideration is significant. Hence the null hypothesis is rejected.

Therefore, it is concluded that the higher secondary plus one boys and girls differ significantly in respect of their achievement in Mathematics. Further, the High mean scores of girls are better than boys in their achievement in Mathematics.

Bar Graph Shows the Significance of Difference in Achievement Means Scores of Plus One Boys and Girls



Hypothesis – 10

There is no significant difference between rural and urban schools plus one students with respect to study habit.

This hypothesis was tested by using 't' test. The 't' value was computed to find out the significance in study habit mean scores between the plus one students of rural and urban schools.

Table 16: Significance of difference in study habit mean scores of the plus one students of rural and urban schools.

S.no.	Locale	No. of students	Mean	Standard deviation	't' value
1	Rural	100	13.31	2.84	2.541*
2	Urban	100	17.40	3.68	

***– Significant at 0.05 level. Critical value for 0.05 level = 1.96**

The calculated 't' value 2.541 is greater than the critical value 1.96 corresponding to the 0.05 level of significance. This implies that the difference in study habit mean scores of the plus one students of rural and urban schools under consideration is significant. Hence the null hypothesis is rejected.

Therefore, it is concluded that the rural and urban schools plus one students differ significantly in respect of their study habit. Further, the Higher mean scores of urban area schools students are better than rural area schools students in their study habit.

Hypothesis – 11

There is no significant difference between rural and urban schools plus one students with respect to achievement in Mathematics. This hypothesis was tested by using 't' test. The 't' value was computed to find out the significance in achievement mean scores in Mathematics between the plus one students of rural and urban schools.

Table 17: Significance of difference in achievement mean scores of the plus one students of rural and urban schools.

S.no.	Locale	No. of students	Mean	Standard deviation	't' value
1	Rural	100	12.71	3.05	2.5934*
2	Urban	100	18.15	3.91	

* Significant at 0.05 levels. Critical value for 0.05 level = 1.96

The calculated 't' value 2.5934 is greater than the critical value 1.96 corresponding to the 0.05 level of significance. This implies that the difference in achievement mean scores of the plus one students of rural and urban schools under consideration is significant. Hence the null hypothesis is rejected. Therefore, it is concluded that the rural and urban schools plus one students differ significantly with respect to their achievement in Mathematics. Further, the Higher mean scores of urban area schools students are better than rural area schools students in terms of their achievement in Mathematics.

Hypothesis – 12

There is no significant difference between plus one students of educated parents and uneducated parents with respect to study habit. This hypothesis was tested by using 't' test. The 't' value was computed to find out the significance in study habit mean score between students of educated parents and uneducated parents.

Table 18: Significance of difference in study habit mean scores of students of educated and uneducated parents.

S.no.	Parent's educational status	No.of students	Mean	Standard deviation	't' value
1	Students of educated parents	80	18.91	3.68	5.001**
2	Students of uneducated parents	120	16.28	3.16	

** - Significant at 0.01 level. Critical value for 0.01 level = 2.58

The calculated 't' value 5.001 is greater than the critical value 2.58 corresponding to the 0.01 level of significance. This implies that the difference in study habit mean scores under consideration is significant. Hence the null hypothesis is rejected.

Therefore, it is concluded that the plus one students of educated parents and students of uneducated parents differ significantly with respect to their study habit.

Further, the higher mean scores of students of educated parents are better than the students who have uneducated parents in their study habit.

Hypothesis – 13

There is no significant difference between plus one students of educated parents and uneducated parents with respect to achievement in Mathematics.

This hypothesis was tested by using 't' test. The 't' value was computed to find out the significance in achievement mean score between plus one students of educated parents and uneducated parents.

Table 19: Significance of difference in achievement mean scores in Mathematics of students of educated and uneducated parents.

S.no	Parental educational status	No. of students	Mean	Standard deviation	't' value
1	Students of educated parents	80	15.72	3.53	1.200^{NS}
2	Students of uneducated parents	120	16.25	3.85	

NS – Not Significant at 0.05 levels. Critical value for 0.05 level = 1.96

The calculated 't' value 1.200 is less than the critical value 1.96 corresponding to the 0.05 level of significance. This implies that the difference in achievement mean scores under consideration is not significant. Hence the null hypothesis is accepted.

Therefore, it is concluded that the plus one students of educated parents and students of uneducated parents of do not differ significantly with respect to their achievement in Mathematics.

Conclusion

In the highlight of the research findings, it is felt that the present piece of research may contribute to enhance the achievement in Mathematics. It is hoped that appropriate instructional strategy may be formulated training may be given to increase their study habit and to develop their achievement in Mathematics among higher secondary students. Also the various educational commission reports insist on the development of the knowledge among students at all levels. The findings and results are not the end of the problem but just a beginning of the search for innovation. By applying these results the Mathematics students' habit and achievement may be strengthened.

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