CHAPTER II
REVIEW OF RELATED
LITERATURE
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2.1 INTRODUCTION:

Review of related literature provides a path to identify the studies related to the problem “Impact of in-service training in the class room teaching of primary mathematics”. It also helped the investigator in selecting appropriate method of study and analysis of data. It enables a researcher to

- Define and limit the problem
- Place the study in a historical and associational perspective.
- Avoid unintentional and unnecessary replication.
- Select promising methods and measures.
- Relate the findings to previous knowledge and suggest further research.

The investigator reviewed 7 Foreign studies and 37 Indian studies related to the present study.

2.2 FOREIGN STUDIES

2.2.1 STUDIES ON ACHIEVEMENT IN MATHEMATICS

Dianna t. Kenny Gavin Faunce (2004) assessed the effects of out-of-school hours academic coaching on students’ (a) academic performance on end-of-year examinations in English, Mathematics, and Science; (b) attainment of academic scholarships; and (c) acceptance to Gifted and Talented (GT) classes and selective high schools. Participants were 1,724
elementary and secondary school (Years 4 to 12) students. Results of analysis of co-variances, with IQ as the covariate, indicated that coached and un-coached students performed equally in most subjects across most of the academic school years from Year 7 to Year 12. Logistic regression indicated that IQ was the best predictor of outcome for all aptitude tests. However, coaching had a significant effect on success on the GT entrance examination, a lesser impact on entrance to selective high schools, and no impact on the scholarship examination. Intensive test-wideness and test-taking skills training appears to have compromised the integrity of some selective entrance examinations, particularly for younger students.

Leah P. McCoy (2005) examined the effect of demographic and personal variables and attitudes on achievement of 8th-grade algebra students. Participants (N=107) in 4 classes completed a questionnaire that determined demographic characteristics. They also completed attitude scales at the beginning and end of the school year. Dependent measures were the North Carolina State End-of-Grade Mathematics Test and North Carolina State End-of-Grade Algebra I Test, which were required of all students. Analysis of variance results showed that ethnicity, socioeconomic status, and attitudes significantly affected mathematics scores. On the attitude measure, post scores were significantly less positive than were pre scores. There was a significant difference in schools that was explained partially by qualitative observations of variation in teacher quality.
Steven B. Sheldon Joyce Epstein (2005) conducted Study On Involvement Counts: Family and Mathematics Achievement

“Focus on Results in Math” is part of an ongoing project in which research and educators are studying the measurable effects of school, family and community partnerships on students in elementary, middle and high schools across the country. Eighteen schools from states including Ohio, Maryland, Wisconsin, Minnesota, Michigan, Kansas and California returned baseline and follow-up surveys. About half of the schools in the study were elementary schools (n=10) and the rest were middle or high schools (n=8). The schools were located in inner-city (n=7), urban (n=4), suburban (n=3) and rural (n=4) areas and ranged in size from 124 to 1,280 students. School leaders for partnership expressed high levels of confidence that family and community involvement activities can help improve student learning and achievement in mathematics.

Eunsoon Hong Maggie Sas John C. Sas (2006) explored test-preparation and test-taking strategies that high school students used in algebra tests. From a pool of high school students (N=156), 61 students participated in interviews and of those interviewed, 26 represented those who were high achieved as well as highly interesting in mathematics (n=15) vs. those who were low achieved and showed a low level of interest in mathematics (n=11). The authors performed category elicitation by using the interview protocols of 56 participants in 3 areas: test-preparation strategy, test-preparation awareness and test-taking strategy.
Elicited constructs included cognitive as well as emotional and motivational strategies and concerns. Whereas some strategies and awareness were common in high and low achievers in mathematics, some strategies varied between the 2 groups. The authors discussed the need for strategy instructions for enhancing high school students’ study and test-taking strategies and for addressing their motivation concerns. The participants attended two private urban high schools in a major metropolitan area in the southwest region of the United States. The investigators limited the sample size to 80 because of the time constraints involved in pulling students out of their classes for interviews. Of the 80 students, 69 students returned the consent or assent forms for the second level data collection that involved interviews and think aloud problem solving. Students’ responses to the question on test-preparation strategies were classified into three areas: cognitive strategies, environmental and structural management and motivational awareness. We classified students’ responses to the question on test-taking strategies into three areas: structural organization, cognitive strategies and motivational awareness. We did find group differences in any of the constructs in motivational awareness. That is, high and low achievers stated their confidence or lack of confidence or motivational problems in mathematics test preparation in similarly low frequencies. Students in the high-achieving group were concerned about structural organization in solving test problems more than were their low-achieving counterparts. High-achieving students reported using cognitive
strategies more frequently during mathematics tests than did low-achieving students. Only a few students used deep-level strategies; low-achieving students used fewer such strategies.

Noor Azina Ismail (2007) conducted a study on self-motivation in mathematics learning: Are there difference between girls and boys?

The study was designed to provide trends in eighth-grade mathematics and science achievement in an international context involving participation of 46 countries including Malaysia. The result from this study shows that girls performed significantly higher in the overall average mathematics achievement as well as in three areas of mathematics content namely, number, algebra and data. It is not surprising that among the five mathematics content areas, both sexes scored highest in number because students were introduced to number sense much earlier than other content areas. And it is also not surprising that despite having lower average achievement than girls in almost all the mathematics content areas, the boys portrayed higher self-confidence level as perceived by them. They seemed to think that they tend to do well in mathematics and that they understand quickly in learning the subject. In terms of extra mathematics classes, the study revealed greater proportion of the boys than girls at the two extreme ends. However, girls scored much higher than boys in terms of enjoyment in mathematics learning, interest in taking up more mathematics subjects, the importance of mathematics in relation to other school subjects, university education and employment. Girls also seemed to have a better and wiser
scope of the need to seriously learn mathematics because of the value they place.

2.2.2 STUDIES ON TEACHING OF MATHEMATICS

Dr. Pervz A. Ahami (2006) conducted a study on teaching of mathematics: Way Forward

Activity based approach emphasizes practical development and application of concepts rather than theoretical. Most of the teachers in the study were bachelor's degree holders, professionally well qualified having experience of teaching mathematics. In this study, teacher's opinion and feedback on the activity based practical components of existing mathematics curriculum was solicited. From the responses received, a majority of the teachers (74%) indicate that existing mathematics course is deficient of practical activities. However, 20% considered some were in between and only 6% felt it as appropriate. 78% teachers responded that they were teaching mathematics as a theoretical subject due to the pressure to cover a lengthy syllabus in overcrowded classes. Most of the teaching (70%) neither access to the equipment nor to the material for conducting practical activities in the schools. 84% of the teachers even expressed their limitation of teaching mathematics through practical activities; where as only 16% were feeling comfortable with the evolving opportunity of teaching mathematics through laboratory activities. The study leads to the conclusion that learning environment must be both knowledge-centered and learner-centered to the feature of education in the 21st century. Rigorous and
resolute thoughts are being accompanied by warning not to ignore education practically mathematics. The advocated trend of teaching math through laboratory activities will continued to gain acceptance and even become more pronounced into clear orientation and reality.

2.2.3 STUDIES ON MATHEMATICS CURRICULUM

Michelle Pasko (2006) made a study on the Curriculum Connections: Linking Literature and Mathematics

The Action Research was Project was conducted with the 26 third graders, 19 boys and 7 girls. Throughout the course of the research, much data was addressing and answering the questions and it was found enlightened to note students’ ability to connect Mathematics and Literature and to enjoy reading about Mathematics. Not only did the students connected Mathematics with Literature, but also they enjoyed it. It justified the teaching philosophy that learning should be enjoyable and meaningful for the students. When learning is a fun for them, it seems that more learning takes place and their desire to learn more and to refine their knowledge has also increased. The energy of the students in the classroom throughout these lessons has increased each day and can be compared to fireworks, each explosion becoming louder, brighter and more powerful than the previous one.
2.3 STUDIES IN INDIA:

2.3.1 STUDIES ON TEACHING OF MATHEMATICS

Obad, Mahyoob Mohamammad Ali. (1989) investigated the relationship of maturation of space and of mental imagery with achievement of concept of polygon triangle and quadrilateral among pupils studying in Grade VI (age 12+) to Grade VIII (age 15+) of government schools in Aden Governorate in the P.D.R. of Yemen.

The study centres around the investigation into the relationship of maturation of space and of mental imagery with achievement of concept of polygon among pupils studying in Grades VI to VIII of government schools in Aden Governorate in the P.D.R. of Yemen.

**OBJECTIVES:** (i) To identify the relationship between concept maturation and concept achievement of polygon of Grades VI, VII and VIII levels among the Aden/Governments Unity Schools' pupils in the P.D.R. of Yemen and (ii) to find out the extent to which the maturation of the basic concepts of space and mental imagery determine the achievement of the concept of polygons (triangles and quadrilaterals)

**FINDINGS:**

The ATM and ATP components of mental imagery were significant determiners of achievement of the concept of the polygon-composite at all the three grade levels and also of the four constituents of the polygon concept at the three grade levels except in the case of contributions of ATP to the
variance of relations between polygons at Grade VI level and the variance of properties — quadrilateral and triangle at grade VIII level, and also in cases of contributions of ATM to the variance of relations between polygons at Grade VII level, and to the variance of properties — triangles at Grade VIII level i.e. in case where the contributions were not significant.


**FINDINGS:**

1. Present status of students' ability to identify the problem solving ability to identify the strategies is pitiable.
2. A remedial measure is needed to develop this skills among the students.
3. 31% of students' achievement in mathematics is contributed by problem solving Strategies.

Nalayini, S.(1991) analyzed the effectiveness of using number games to teach arithmetic at primary level.

**OBJECTIVES:** (i) To find the impact of the number games on primary school children in doing mathematical operations, and (ii) to study the relationship between their academic performance and their family background including 'the economic- and educational level of the parents.

Methodology : The Sample Comprised Students Of Classes I To Iv of Kendriya Vidyalaya, Coimbatore.
MAJOR FINDINGS: (1) Among eight comparisons, five comparisons showed significant improvement due to the supplementation of ordinary teaching by number games. In the other three comparisons, though the difference was not significant, the means of the experimental groups were higher than the control-group mean, (2) It was also found that neither the educational level nor the economic status of parents influenced the arithmetic growth score of the pupils. (3) Thus it was concluded that number games motivated children to develop the computational skills.

Managalaraj D.J (1994) studied about the "Impact of special coaching programme for SC/ST candidates in developing numerical ability"

FINDINGS:

The coaching program had been very effective in improving numerical ability of the whole group of candidates. The performances improved gradually in successive tests.

That remedial teaching had resulted in remarkable improvement in numerical ability.

Kamini Devi M. (1999) conducted a study on the attainment of 5th std pupil in Tamil, Mathematics and EVS with reference to MLL programme

Findings:
1. 80% achievement has been found is none of the competencies in Tamil.

2. In mathematics MLL approach is effective but not upto the mastery level.

3. In EVS – 1 more % of pupil attained mastery level.

4. In EVS –II more % of Pupil attained mastery level.

Ganesan A. (2000) found the effect of problem solving modeling in enhancing students achievement in mathematics. The main objective is to design and develop the problem Solving modeling (PSM) to enhance the problem solving ability (PSA) of learners in mathematics.

M. K. Satapathy D.Dash(2003) aimed at finding out the effectiveness of activity-based classroom transaction in terms of quality of the pupils and retention of the competencies learnt. The study was carried out for environmental studies in class IV in two schools, one a large-sized urban school and the other, a small-sized rural school in and around Bhubaneshwar. A two-group experimental pre-test design was adopted.

From the post-test achievement score as well as the intercept value of the linear regression model, it was noted that there was significant increase in the achievement score following activity-based teaching as compared to the traditional method in both the small-sized class of the urban school. The decrease in slope value with the days was less and consequently, the retention of competencies was more with activity-based transaction as compared to the traditional method in both the schools. The
study revealed that activity-based transaction promotes true learning because of longer retention of concepts and competencies, both in large-sized and small-sized classes. The same method can be adopted for teaching of mathematics.

George A.A. (2003) conducted study on mathematical backwardness and its remediation. The main objectives of the study are

I. To construct and standardize an achievement test in mathematics for Standard VIII.

II. To identify backward students on the basis of scores on the standardized achievement test.

III. To construct a diagnostic test in mathematics for Standard VIII to identify the areas of errors committed.

IV. To conduct in-depth case studies to locate causes of backwardness and

V. To formulate remedial programmes for the selected case studies.

FINDINGS:

It was concluded that mathematical backwardness was due to neglect of mathematical basis during the early years. Positive attitude should be developed towards mathematics. Teachers should present mathematics in an interesting manner.

Kumar, S. and Anitha (2004) made a study on effectiveness of self-learning module in mathematics in relation to classroom environment. The objectives are
i. To study the effectiveness of self-learning modules, in terms of achievement of students;

ii. To study the effectiveness of classroom environment on achievement of students; and

iii. To study the interaction mode of teaching and classroom environment.

**METHOD:**

A sample of 140 students selected randomly were administered classroom environment scale (CSE) by Moss and Trickett (1986) and Achievement test in Mathematics prepared by the investigators. A pre-test and post-test was administered. The data collected from both the tests were treated with Mean and ANOVA.

**FINDINGS:**

i. Both the variables-self-learning module and classroom environment cannot be ignored in respect of their effect on achievement.

ii. There was no interaction between mode of teaching and classroom environment.

_Hannet Gandhi and Varma M. (2004)_ conducted a study on metacognition. Metacognition has deep implications for mathematical learning and pedagogy. If mathematics teachers encourage the students in acquisition and improvement of metacognitive skills, they may make their students better mathematical problem-solvers. While trying to develop metacognitive thinking skills for problem solving in mathematics, the teachers must realize that the
development of metacognition is not an automatic process but it is a result of long-term growth of the cognitive system. Metacognition is a cognitive agent that interplays with one’s knowledge, experiences and an interaction between the two. When children learn more about themselves, their strategies, and their tasks, they become better aware of themselves. They learn to reflect on their learning by regulating and executing control over their own thought processes. This type of intelligent thinking can be developed through practice, as according to Flavell (1979). “Metacongnition undoubtedly improves with practice.” One way to become better at metacognition is to practice it.

Md Abdul Halim (2004) studied about essential Learning Continua based Approach for Teaching of Mathematics. The main intention to study mathematics at primary level is to enable a child to acquire the basis of primary mathematics. Many research studies have indicated that achievement in mathematics is low. Essential Learning Continua has been a significant step foreseeing qualitative improvement in primary education. In this study 364 students were selected using cluster sampling technique. Tools were developed on the basis of attainable competencies. Essential Learning Continua based approach for improving teaching of mathematics was found having significant impact on the performance of students.

OBJECTIVES:
The following objectives were kept in focus:

i. To identify Essential Learning Continua selected unit;
ii. To develop adequately comprehensive plans for instruction for attainment of Essential Learning Continua;

iii. To study performance for different competencies.

FINDINGS:

This shows that students could not master concept of subtraction of 2-digit number. They could master the process of addition of 2-digit numbers. Average correct response for all eighteen competencies was found to be 77.97 percent. This shows that on an average 77.97 percent of students could attain identified Essential Learning Continua. It can be concluded that Essential Learning Continua based approach for improving instruction in mathematics was effective for class II. Finding of this research clearly indicates that Essential Learning Continua based approach has significant impact on the performance of students. This further implies that to improve instruction in mathematics, there is a need to evolve proper instructional plans stressing on remedial measures.

Sant Prakash (2004) studied about the joyful Primary Education. Universalization of Primary Education (UPE) has been one of the major concerns since Independence. Through the progress in this field has been considerable it remains greatly inadequate in relation to the size and growth of the population. It has not been possible to eradicate illiteracy and achieve UPE which in turn is the underlying cause of other problems faced by the country such as unemployment, poverty, child labour, population explosion, unhygienic condition, exploitation and superstitions.
We tried to identify local specific materials available at Raisin in M.P. and Osmanabad in Maharashtra which may be used in teaching-learning process at primary level (Class I to III).

JOYFUL LEARNING:

Children devote lot of time in the school. If teacher is strict, beats up, becomes angry then they feel to go back home as early as possible. If teacher is polite, sings, dances, chats, mixes up, laughs, plays, they will certainly like to stay in schools for longer period. Children are very critical observers. Whenever we try to interact, they always ask questions. During our visits to schools they have always asked different types of questions. Sometimes it becomes very difficult to give answers.

For making learning joyful teacher has to be resourceful. If he/she uses materials available in their local environment, it will accelerate the learning. Teacher should take them out of classroom in the natural surrounding of the school. Children are very much fond of picnics. If there is any special place or garden or historical buildings or statues or circus show or zoo, etc. they must be taken to these places. The charmers, nuts, puppet show men, etc. must be invited to visit schools. They must be given different types of swings, toys, balls of different sizes and colours to play. They must be given opportunities for painting and drawing. Children are always fascinated by seeing domestic pets like parrot, peacock, nightingale, duck, swan, cat, dog, cow, goat, sheep deer, etc. Children love flowers very much, Seasonal flowers like rose, mogra, louts, etc. will help
in developing many concepts. Today's children are exposed to various modern items like., telephone, tractor, scooter, cars, etc. They may not have them but they do know the usefulness of these items. If a proper room in a school is available teachers must prepare chart of all these items and display them. Time to time function, games and sports must be arranged in schools. Independence Day and Republic Day are always celebrated in government schools and sweets are distributed. Festivals of all the religions must be celebrated in schools. Time to time engineers, doctors, teachers, leaders, ministers, film personalities, musicians, dancers, artists distinguished personalities, etc. must be invited to schools and functions must be arranged. It may be noted that no learning will take place if the stomach of a child is empty and they are hungry. Children are very soft and innocent. Give them proper, good meals in the schools. They will be attracted to come to school and they will have joyful learning. Role of teachers in all such types of cases is very important. Once they start coming to schools many other activities can be started.

CONCLUSION:

India is a very vast country and has huge population. We have made process in many fields. Recently our country has conducted its nuclear tests and has become a nuclear weapon state. Our scientists and engineers were smiling with pride. We were also smiling at our scientists with pride. In other words the whole nation rose as one to celebrate this special event. The flawless and successful conducting of nuclear tests mark
India’s capability to manufacture nuclear bombs. Our country has sent a message across the world that in the field of high technology we have made a quantum leap. A feat by our scientists and engineers for which all felicitation will fall short for their hard work all these years. After this historic achievement, now we have to build a strong, self-reliant and self-confident India. This is possible only when we all are able to achieve Universalization of primary education. It is necessary to build proper and vital strategies. Let us utilize the resources in such a way so that in very near future there is no one country who is not able to read, write and think independently. The educational reforms cannot be observed in a year or two. It takes time. All good works do take time.

2.3.2. STUDIES ON MATHEMATICS EDUCATION IN DAILY LIFE:

Tuli, Murk Raja. (1988) studied the personality profiles of high- and low-creative persons in mathematics

*Major Finding:* (1) It was found that the high-creative persons in mathematics were happy-go-lucky, impulsive, lively, enthusiastic, tender-minded, dependent, over-protected, sensitive, self-sufficient, preferring their own decisions, resourceful, controlled, socially precise, following self-image, tense, frustrated driven, overwrought, expedient, evading rules, feeling few obligations, venturesome, socially bold, uninhibited, spontaneous, suspicious, self-opinionated, and hard to fool. (2) Significant differences existed in the personality profiles of high and low-creative persons in mathematics. (3) The creative person in mathematics
had a unique strand of mental abilities, interests, attitudes, temperament, and other variables characterizing thoughts, feelings and behavior.


**Objectives:** (I) To estimate the functional relationship between Mathematical Creativity and Study Habits in Mathematics (SHM) and Mathematical Creativity and Pupils' Perception of Teachers' Impressions about their Performance in Mathematics (PPTIPM), (ii) to determine the efficiency of pupils' study habits in mathematics and their perception of teachers' impression about their performance in mathematics (iii) to find intercorrelations among pupils fluency, flexibility and originality measures derived from a Mathematical Creativity Search (MCS) Battery, (iv) to estimate the combined efficiency of pupils study habits in mathematics and pupils perception of teachers impressions about their performance in mathematics and their mathematics achievement scores in predicting their mathematical creativity, and (v) to assess the effects of sex, castes, rural – urban locale, birth – order, home study time for mathematics, rank in class mathematics tests and self assessment of achievement in mathematics on pupils creativity in mathematics.
Major Findings: (1) Pupils' creativity in mathematics was found to be a linear function of each of the variables, study habits in mathematics and pupils' perception of teachers' Impressions about their performance in mathematics. The product-moment correlations in both the cases were positive, low but statistically significant. 9.8% and 8.7% of the total variation of pupils' mathematical creativity could be predicted from the variation in SHM and PPTIPM measures, respectively. (2) Pupils' Creativity in Mathematics was also found to be a function of those two variables SHM and PPTIPM taken together. The multiple correlation involving the Criterion (Mathematical Creativity Scores) and the Predictors (SHM and PPTIPM Scores) was positive and statistically significant; the variation of scores on the predictors could predict 11% of the total variation of the criterion measures. (3) A relationship was also found between Pupils Creativity in Mathematics and the combination of SHM, PPTIPM and Achievement in Mathematics. The multiple correlation was positive and statistically significant. Thirty-two per cent of the total variation in mathematical creativity measures was attributable to the joint variation of the measures of the predictors; achievement in mathematics accounted for about 28% of the variation in criterion measures. (4) Both SHM and PPTIPM had significant main effects on creativity in mathematics. (5) Urban students were found more creative in mathematics than their rural
counterparts. (6) Creativity in mathematics varied directly with the increase in the time devoted to study mathematics at home — from one or less than one hour to two hours. (7) Pupils who got the first four ranks in mathematics tests were found more creative in mathematics than their remaining classmates.

Padhi J. S. (1998) aimed at finding an answer to the following questions regarding teachers serving in elementary and secondary schools in Orissa:
1. How do Oriya elementary school teachers perceived a creative pupil?
2. How do Oriya secondary school teachers perceive a creative pupil?
3. Is there any difference in their perception and that of creative experts?

FINDINGS:
1. There was significant difference in both the competency-based achievement and the ability to use written English among the students in terms of locale of residence, type of school and medium of instructions studying in English and Telugu medium of schools.
2. There was a significant association between different variables related to school and family.

Surja kumari(2002) linked Mathematics Education With Life Skills
The aim of this study is to establish reasonably accurate picture of the debate and actual state of why mathematics education should be linked with life skills. We start exploring world views regarding place of
mathematics in school curriculum and then analyze aims and justification of changing role of mathematics education on the present age of technological society. The study has considered problem-solving situations a viable medium to link mathematics with life skills which entails us to the development of mathematical problem situations related with child’s real world environment and experiment and experiences.

2.3.3 STUDIES ON UNDER ACHIEVEMENT IN MATHEMATICS:

Dutta Anima (1990) studied about learning disabilities in reasoning power of the students in geometry –diagnosis and prevention.

Objectives: (1) To diagnose the major patterns of disabilities in a specific area of geometry with the help of tools specially developed for the purpose, and (ii) to try out experimentally teaching methods which would prevent development of learning disabilities in the area under study.

Findings: (1) The experimental group taught by audio-visual materials and techniques achieved significantly more than the control group taught by the conventional method.

The textbooks did not contain the objectives in clear terms. (2) Most of the teachers as well as students did not appreciate the physical aspects of the mathematics textbooks. (3) The teachers adopted the discussion method. The analysis-cum-discussion method was largely neglected. (4) 31% of the teachers did not bother to correct the homework signed to students. (5) Only 6.3% schools
had reference books and mathematical journals in the library. (6) Classroom tests and weekly tests were rarely conducted, and that too only in a few schools. (7) All the teachers disapproved of the system of central evaluation. The majority of the teachers preferred the procedure of awarding marks step-wise, negative marking was disapproved.

Vassanthi, R. (1991) identified the learning disabilities Objectives; (i) To identify the various types of mathematical learning disabilities among the Standard VII pupils, and (ii) to ascertain the relationship, if any, between mathematical learning disabilities, and (a) psychological factors like intelligence, neuroticism and behavior problems, (b) socio-economic status and gender, and (c) educational factors.

Madhusudan J.V. (1991) conducted a study of Competency based achievement test as an indicator of primary school improvement programme. The present study attempts to examine the discriminative ability of competency based achievement tests and their sensitive to different types of inputs that are provided to school as a part of planned interventions to improve the quality of primary education. The study was conducted on Standard IV students and teachers from six primary schools teaching the subjects of mathematics and environment science using competency based achievement tests, school schedule, teacher competency scale and classroom observation schedule. It was found that the two tools i.e., competency
based achievement tests in mathematics and environment science, have been found to be discriminative to measure the input variations in terms of school characteristics, teacher competency and classroom activities.

**OBJECTIVES:**

The special objectives of the study are as follows:

1. To find out the sensitivity of competency based achievement tests as indicator to discriminate schools classified as high and low on the basis of school characteristics.
2. To find out the sensitivity of competency based achievement tests as indicator to discriminate schools classified as high and low on the basis of teacher competency.
3. To find out the sensitivity of competency based achievement tests as indicator to discriminate schools classified as high and low on the basis of classroom activities.

**CONCLUSION:**

The study has two test material to study their sensitivity to test the input variation on three variables. The study provides an overall effects that comes across the study are summarized below:

1. The school characteristics as variable has been differentiated by both the tests under study.
2. The tests on mathematics is found to be not having the influence of teacher inputs in terms of teacher competency. This may be
due to the reason that the mathematics outcomes are influenced by the long-term learning and not by a single teacher of a year.

3. The test on environmental science is found to be not having the influence of teacher inputs in terms of classroom observations.

Further comparative discussion is found not possible, as the similar types of studies are not available. The present study has helped to identify the nature of tests that can be used to test the impacts of different types of inputs that are implemented as planned design to improve the quality of primary education. The two tools i.e., competency based achievement tests in mathematics and environmental science, have been found to be discriminative to measure the input variations in terms of school characteristics, teacher competency and classroom activities.


OBJECTIVES:

i. To identify the problems of the primary education and to determine their comparative importance.

ii. To find out correlation between pupils in Classes III and IV, and

iii. To find out the correlation between pupils’ physical facilities at home and academic achievement.
**METHODOLOGY:**

Questionnaires were developed to collect data from pupils, assistant teachers, headmasters and classified. Their relative importance was worked out in terms of percentage. Correlations between academic achievement of Class IV pupils and their daily attendance, between academic achievements of pupils in Classes III and IV, and between physical facilities at home and academic achievement.

**MAJOR FINDINGS:**

(1) Lack of physical facilities at school was the major problem of the primary schools:

   a) Forty-six percent of the schools did not have school buildings.
   b) Forty-two percent of schools had adequate seating arrangement for their pupils.
   c) Lack of facilities for health and hygiene was a serious problem.

   Sixty-one percent of the schools did not have facilities for the drinking water.

**Dr. Ravindra Akre and Dr. Guru U.S. (2004)** made a study on difficult curriculum of mathematics

Procedure and Date collection

For this task, investigators had chosen a group of 25 students from the classes of I and II of two different schools of Sagar district in Madhya Pradesh. One of those offering Let’s LEARN-MATHEMATICS from rural area and other
from urban area. The obtained remarks from the copies of mathematics given by their teachers were collected.

Suggestions: On the basis of the conclusions obtained in present study and the experts opinion. The following suggestions are given by the investigators.

1. The curriculum should be prepared with help of teachers those who are taught mathematics at class I & II at least there years. The teachers from high and normal standard schools of rural and urban areas.

2. As per age of kids the difficult and confused part may be dropped.

3. At this elementary level of learning particularly in mathematics subject, curriculum should be short and average standard, so that educand may be motivated in learning mathematics. It might be helpful to develop their interest and attitude towards mathematics.

4. They should have mastery over basic concepts.

5. At these stage kids should take interest in learning mathematics. They should not be discouraged in mathematics.

6. Fear in mathematics subjects should not be developed in kids at this stage.

7. In curriculum simple and less in terms might be used.

Curriculum should be set up as per average kids.

Roohi Fatima (2005) analyzed about the reasons for mathematics as difficult subject. The structure of mathematics is the basis of its nature and compared to other school subjects. The nature of mathematics can be understood by the following points;
1. Mathematics is a subject of sequence and it is not easy to understand a topic when the topics that have gone before are not properly understood. One cannot follow multiplication and division unless one knows addition and subtraction.

2. Mathematics has a peculiar language in which symbols occupy a most important position. Mathematical symbols represent lengthy statement accurately and in exact form. Effective learning of mathematical concepts does not result from mastery over activities alone. It depends on how far teachers are successful in developing the language or other symbolic representations, building links with past experiences to formulate corresponding abstracts or laws. The transitions from concrete to abstraction depends upon explanation given in simple terms.

3. Mathematics disciplines the mind and develops reasoning power. Mathematics develops a habit of reasoning. A person who has studied mathematics is capable of using his power of reasoning in an independent and easy manner.

4. Memory plays a more prominent part in the study of other subjects of the school curriculum than in that of mathematics. Researches have found that mathematics ability is highly correlated with cognitive response than in other subject at least at the elementary level.

   In mathematics the mathematical results are always verifiable, the students are easily made aware of their error. As the error is
often exposed in the presence of classmates, the student becomes discouraged and he begins to think that he is incapable of understanding mathematics and devotes his time to the study of a subject in which he gets distinction with the aid of pure retentive memory as opposed to logical memory.

5. It is only in mathematics that you can encourage the students to think for themselves and arrive at definite and true conclusion.

2.3.4 STUDIES ON REMEDIAL TEACHING:


Objectives: (i) To develop programmed instructional material on fractions for students of Class V, (ii) to use programmed instructional material as a remedial tool, (iii) to test the effectiveness of programmed instructional material in classroom teaching for students of Class V, and (iv) to test the significance of difference between the traditional method of teaching and teaching through programmed instructional material.

Methodology: A sample of 50 students was selected from two M.C.D. primary schools of Karol Bagh, New Delhi (twenty-five students from each school).
Major Findings: (1) Teaching and learning through programmed instruction could definitely help both students and teachers. (2) Students receiving the programmed instructional material did better in post-test as compared to the other group. (3) The programmed instructional material worked effectively as a remedial tool. (4) Programmed instructional material not only helped the students to learn better but also helped the teacher to know how the students learn better.

G.N. Vadivambal (2002) found Remedial Teaching in the Achievement of Standard II Mathematical Competency “Addition of Two Digit Numbers With and Without Carry over”

- OBJECTIVES OF THE RESEARCH:
  - To achieve the competency adding of two digit numbers, with and without carry over.
  - To strengthen understanding of basic mathematical concepts.

SAMPLE:

The sample was a heterogeneous group of students from an adopted rural Panchayat Union Elementary School, comprising eight II standard students and ten III standard students and scored less than 95 percent in the diagnostic test conducted by the investigator.

RESULTS:

A rapid look at the performance of the students reveals some facts. All the students showed improvement in their performance. The use of
graded, activity-based learning involving songs, games, individual activities had considerably improved the competency of class II and III standard to do addition of two digit numbers.

2.3.5 STUDIES ON ASSESSMENT OF IN-SERVICE:

Yadav, Chhangur Prasad. (1988) conducted study of the attitude of teachers towards the new mathematics in secondary schools of Uttar Pradesh.

The study examines the attitude of various categories of secondary school teachers towards teaching of the new mathematics.

Objectives: (i) To ascertain the status of the new mathematics in secondary school curriculum, (ii) to identify the problems of teaching the new mathematics, and (iii) to assess teachers attitude towards the new mathematics.

Major Finding: Male teachers and female teachers, more experienced teachers and less experienced teachers, and post-graduate teachers and undergraduate teachers did not differ significantly in respect of their attitude towards the new mathematics.

Kaur, Amarjit, (1988) studied about the development of professional competency of social studies and mathematics teachers as related to process and structure variables of educational environment in government in- service training centers. It is an attempt to study the development of professional competency of social studies and
mathematics teachers as related to process and structure variables of educational environment, government in-service training centers.

Major Findings: In-service education and training significantly contributed to the development of professional competency of social studies and mathematics teachers as related to process variables – that is, teaching effectiveness and educational awareness of teachers and structure variables that is teacher attitude, rigidity and flexibility of teachers. Process and structure variables had a positive bearing on product variables, that is, achievement of teachers and school results of teachers. Achievement of teachers as a criterion measure of professional competency was positively correlated with only one of the process variables, that is, teaching effectiveness.

The findings indicated that teachers at different stages had a favorable attitude towards creative learning and an unfavorable attitude towards creative teaching. Age, sex, teaching experience and academic discipline did not tend to affect the attitude of different levels of teachers towards creative learning and creative teaching.

Meera S. (1988) conducted a study of the relationship between teacher behavior and teaching aptitude of teacher-trainees. To explore the relationship between factors of Teaching aptitude and teacher behavior components which may bring to light observations helpful to teacher-educators.
Objectives: 1. To explore the class room verbal behavior of student - teachers through Flanders’ technique.

2. To find out if there is any relationship between teacher behavior and teaching aptitude.

**Dandapani, C. (1992)** identifies the dimensions of effective teaching of mathematics. The study identifies the process variables and the characteristics of mathematics teachers which contribute to the effective teaching of mathematics. Further, it builds up a model to identify effective and ineffective teachers.

Objectives: (i) To observe the differences, if any, in the perception of effective teaching of mathematics of teachers with respect to sex, qualification, place of work, type of management of schools, experience, hours of teaching per week, and the type of the school, (ii) to study the factorial structure of the perception of teachers on effective teaching of mathematics, (iii) to identify the dimensions of effective learning of mathematics based on their perception, (iv) to investigate the relationship between the perception of teachers and the evaluation of headmasters, (v) to evolve a method to identify effective and ineffective teachers based on the headmasters' evaluation, (vi) to compare the perception of effective and informative teachers on the eleven aspects of effective teaching, and (vii) to construct a mathematical model to classify teachers into effective and ineffective teachers.
Major Findings: (1) Female teachers had a significantly higher perception than the male teachers (2) Teachers' perception had been found to vary with their years of experience. This agitation was found to exist on all the eleven aspects of effective teaching (3) The perception of teachers did not differ because of their qualifications (both academic and professional) place of work, via rural and urban, type of management, type of school and number of periods per week of teaching mathematics. (4) Teachers perception had been significantly related to their headmasters evaluation, and consequently, to their characteristics. (5) There had been 57 effective and 52 ineffective teachers. (6) The effective teachers differed significantly from the ineffective teachers on all the eleven aspects to etching.

Mattoo, B.K and Chand, Shekhar (1992) identified the problems of teachers in single – teacher / two – teacher primary schools,

It attempts to identify the problems of teachers in single – teacher and two – teacher primary school.

Major Findings: (1) Most of the single/two primary schools lacked physical and facilities, like urinals, school buildings, furniture, library facilities, black-boards, chalk, etc. (2) About 60% of the primary school teachers expressed that they needed a short training in handling Operation Blackboard materials in their classrooms. (3) All the responses clearly pointed out difficulties like overcrowding and lack of interest in multi-grade teaching and 86%
primary teachers needed orientation in multi-grade teaching.

(4) Among these problems faced by primary teachers administrative problems, personal, health and stay arrangements at the place of posting were the more pronounced ones.

**Gandhi.C (1992)** conducted a study on “Problems in implementing operation Black board scheme (OBS) in solaikottai Panchayat Union

Findings:

1. There are inadequate facilities to protect the materials received under the OBS.
2. Supplied Materials do not have any relevance to the syllabus.
3. Damaged Materials are not replaced.
4. Proper training has not been given to all the teachers.
5. Teacher pupil ratio is a major problem.
6. some materials are not provided to aided schools.


Findings.

1. Most of the schools don’t have adequate physical facilities.
2. Single teacher school is another problem.
3. All the materials are used fully by the good school teachers.

3. The Maths kits are utilized to a great extent in government primary schools than private management primary school teachers.
Kamini Devi M. (1994) conducted a study on assessment of in-service Training programme of DIET for primary school teachers on MLL in Mathematics for III std.

Findings:

In area I of MLL, the number of Pupil achieved each competency after adopting MLL is more than the number of Pupil achieved the competency before adopting MLL

2. In area II pupil lack in Understanding X and %

3. In area III pupil lack in understanding the relationship between length, Mass and capacity.

4. In area IV the orientation to teachers on fractions based on MLL is satisfactory.

2.3.6 STUDIES ON ACHIEVEMENT IN MATHEMATICS:


Objectives: (i) To study the relationship of mathematics learning and temperamental traits, (ii) to study the influence of sex differences and socio-economic-status on the variables, temperamental traits, mathematics learning and the cognitive variables considered conducive to mathematical learning, and (iii) to study the temperamental factor structure of high, average and low achievers as well as of over, normal and underachievers in mathematics.
**Major Findings:** (1) A low but positive and significant correlation was found between mathematics learning and responsible and ascendant temperaments. (2) A low but negative and highly significant correlation was found between mathematics learning and temperamental dimensions, viz. sociable, accepting and impulsive, which means the negative ends of these traits. (3) IQ and reasoning were found significantly related to the dimensions ascendant, responsible, critical and plentiful, to the dimensions responsible, critical, solitary, tender-minded and lethargic. (4) Girls were found more gloomy, more tender-minded and more irritable than boys who were found more active than girls. (5) As far as cognitive abilities, basal to mathematics learning are concerned, boys were found superior to girls on quantitative and total educational ability and mathematics learning. (6) The temperamental profiles of high, average and low achievers were found to differ considerably from one another. (7) The high achievers were found to be more critical, more responsible, more solitary and more ascendant, than the average achievers, who were tender-minded. (8) Middle-class students were found more active than the students from upper class. (9) The three groups; i.e. the high, average and low socio-economic status groups were found to be in the descending order on all the cognitive abilities considered as basal to mathematics learning.
Pal Asutosh (1989) conducted a critical study of some affective outcomes of the students as predictors of their mathematical ability. In this study four variable of the affective dimensions, via self concept, anxiety, attitude and academic motivation, related to mathematics have been taken and their relation to achievement in mathematics has been studied.

Objectives: (i) To construct and standardize four tests on self-concept, anxiety, attitude to mathematics and a questionnaire on academic motivation (ii) to find out their relation to students achievement in mathematics sex-wise (iii) to fit a regression equation that prediction of achievement in mathematics can be made.

Findings: (1) Boys showed higher self-concept than girls. (2) There existed significant correlation between mathematics and self-concept, between mathematics and anxiety, between mathematics and academic motivation.

Yadav, R.S. (1990) conducted a study of the relationship of school environment and socio-economic status (SES) in the formation of geometrical concepts among school children.

The study aims to explore whether the home culture of the children in the form of their learning process in the classroom.

Major Findings: All the three factors, namely, age, SES of school environment, had a significant effect upon concept formation in geometry, whereas age had the greatest effect and the school environment
had the lowest effect. The SES occupied the second position. The position was reversed in the case of middle schools. (2) Interaction effects (age x schools and age x SES) significantly affected the concept formation in geometry at both the levels, i.e. both primary and middle school pupils. However, the interaction (school x SES) had no significant effect over concept formation in geometry.

Caroline (1991) conducted a study of selected variables associated with achievement in mathematics.

Major Findings: (1) There was a significant association between (a) attitude towards mathematics, (b) educational aspiration, (c) numerical ability, (d) abstract reasoning, (e) personality factor A. and (f) personality factor G and achievement in mathematics. (2) None of the other variables studied showed association with achievement in mathematics.

Rosaly A. (1992) found the relationship between attitude of students towards mathematics achievement. The study attempts to find out whether high school students have a favorable attitude towards learning mathematics, and whether the favorable and unfavorable attitudes of the students affect their achievement in mathematics.

Objectives: (i) To construct an attitude scale to measure the attitude of high school students towards learning of mathematics, (ii) to construct an achievement test in mathematics, and (iii) to find out the relationship between attitude and achievement in mathematics.
Major Findings: (1) The education of the father had no effect, on the problem-solving ability of rural as well as urban children. (2) The mother's education had no impact on rural children's problem-solving ability whereas the problem-solving ability of urban children was affected by the mother's education. (3) The father's occupation indicated no effect on both rural and urban children's problem-solving ability. (4) The occupation of the mother also showed no effect on rural and urban children's mathematical problem-solving ability.

2.4 SYNTHESIS OF FOREIGN STUDIES:

2.4.1 Synthesis of studies on achievement in mathematics


Leah P. McCoy (2005) examined the effect of demographic and personal variables and attitudes on achievement of 8th-grade algebra students.


Eunsook Hong Maggie Sas John C. Sas (2006) explored test-preparation and test-taking strategies that high school students used in algebra tests.
Noor Azina Ismail (2007) designed a study to provide trends in eighth-grade mathematics and science achievement in an international context involving participation of 46 countries including Malaysia.

2.4.2 Synthesis of Studies on teaching of mathematics


2.4.3 Synthesis on Studies on mathematics curriculum


2.5 Synthesis of studies in India:

2.5.1 Synthesis of studies on teaching of mathematics

Obad, Mahyoob Mohamammad Ali. (1989) investigated the relationship of maturation of space and of mental imagery with achievement of concept of polygon triangle and quadrilateral among pupils studying in Grade VI (age 12+) to Grade VIII (age 15+) of government schools in Aden Governorate in the P.D.R. of Yemen.


Nalayini S.(1991) analyzed the effectiveness of using number games to teach arithmetic at primary level.
Managalaraj D.J (1994) studied about the Impact of special coaching programme for SC/ST candidates in developing numerical ability.


Ganesan A. (2000) found the effect of problem solving modeling in enhancing students achievement in mathematics. The main objective is to design and develop the problem Solving modeling (PSM) to enhance the problem solving ability (PSA) of learners in mathematics.

Satapathy M. K, Dash D. (2003) aimed at finding out the effectiveness of activity-based classroom transaction in terms of quality of the pupils and retention of the competencies learnt.

George A.A. (2003) conducted study on mathematical Backwardness and its Remediation. It was concluded that mathematical backwardness was due to neglect of mathematical basis during the early years.


Hannet Gandhi and M. Varma (2004) conducted a study on metacognition. Metacognition has deep implications for mathematical learning and pedagogy.

Md Abdul Halim (2004) studied about essential Learning Continua based Approach for Teaching of Mathematics. The main intension to study
mathematics at primary level is to enable a child to acquire the basis of primary mathematics.

**Sant Prakash (2004)** studied about the joyful Primary Education.

### 2.5.2. SYNTHESIS OF STUDIES ON MATHEMATICS EDUCATION IN DAILY LIFE:

**Biswal. J.(1988)** made a study on creativity in mathematics as a function of study habits and pupils' perception of teachers' impression about their performance in mathematics.

**Tuli, Murk Raja. (1988)** Studied the personality profiles of high- and low-creative persons in mathematics.

**Padhi J. S. (1998)** aimed at finding an answer to the following questions regarding teachers serving in elementary and secondary schools in Orissa:

1. How do Oriya elementary school teachers perceived a creative pupil?
2. How do Oriya secondary school teachers perceive a creative pupil?
3. Is there any difference in their perception and that of creative experience?

**Surja Kumari(2002)** linked mathematics education with Life Skills. The aim of this study is to establish reasonably accurate picture of the debate and actual state of why mathematics education should be linked with life skills.
2.5.3 SYNTHESIS OF STUDIES ON UNDER ACHIEVEMENT IN MATHEMATICS:

Dutta Anima (1990) Studied about learning disabilities in reasoning power of the students in geometry –diagnosis and prevention.

Vassanthi, R. (1991) Identified the learning disabilities. The study aims (i) to identify the various types of mathematical learning disabilities among the Standard VII pupils, and (ii) to ascertain the relationship, if any, between mathematical learning disabilities, and (a) psychological factors like intelligence, neuroticism and behavior problems, (b) socio-economic status and gender, and (c) educational factors.

Madhusudan J.V. (1991) studied about the achievement. The study attempts to examine the discriminative ability of competency based achievement tests and their sensitive to different types of inputs that are provided to school as a part of planned interventions to improve the quality of primary education.


Roohi Fatima (2005) analyzed about the reasons for mathematics as a difficult subject.

2.5.4 SYNTHESIS OF STUDIES ON REMEDIAL TEACHING:

Bhatia, Kusum (1992) made a study on identification and remedy of difficulties in learning fractions with programmed instructional material.


2.5.5 Synthesis of Studies on assessment of in-service:

Yadav, Chhangur Prasad. (1988) conducted study of the attitude of teachers towards the new mathematics in secondary schools of Uttar Pradesh.

Kaur, amarjit, (1988) studied about the development of professional competency of social studies and mathematics teachers as related to process and structure variables of educational environment in government in service training centers.


Dandapani, C. (1992) identifies the dimensions of effective teaching of mathematics. The study identifies the process variables...
and the characteristics of mathematics teachers which contribute to the effective teaching of mathematics.


Gandhi, C (1992) conducted a study on “Problems in implementing operation Black board scheme (OBS) in solaikottai Panchayat Union.


M. Kamini Devi (1994) conducted a study on assessment of in-service training programme of DIET for primary school teachers on MLL in Mathematics for III standard.

2.5.6 SYNTHESIS OF STUDIES ON ACHIEVEMENT IN MATHEMATICS:

Deshmukh, Venna, (1988) made a study on correlates of mathematics learning. This study aims to study the relationship of mathematics learning and temperamental traits, (ii) to study the influence of sex differences and socio-economic-status on the variables, temperamental traits, mathematics learning and the cognitive variables considered conducive to mathematical learning, and to study the
temperamental factor structure of high, average and low achievers as well as of over, normal and underachievers in mathematics.

Pal Asutoshb, (1989) conducted a critical study of some affective outcomes of the students as predictors of their mathematical ability. In this study four variable of the affective dimensions, via self concept, anxiety, attitude and academic motivation, related to mathematics have been taken and their relation to achievement in mathematics has been studied.

Yadav, R.S. (1990) conducted a study of the relationship of school environment and socio-economic status in the formation of geometrical concepts among school children.

Caroline. (1991) conducted a study of selected variables associated with achievement in mathematics. There was a significant association between (a) attitude towards mathematics, (b) educational aspiration, (c) numerical ability, (d) abstract reasoning, (e) personality factor A. and (f) personality factors and achievement in mathematics.

Rosaly, A. (1992) found the relationship between attitude of students towards mathematics and achievement. The study attempts to find out whether high school students have a favorable attitude towards learning mathematics, and whether the favorable and unfavorable attitudes of the students affect their achievement in mathematics.
2.6 Conclusion:

From the literature review the investigator identified five foreign studies on achievement in mathematics. One study on mathematics curriculum and one study on teaching of mathematics. 37 Indian studies were reviewed. 12 studies on teaching of mathematics, 4 studies on use of mathematics in daily life, 6 studies on under achievement in mathematics, 2 studies on remedial teaching, 8 studies on assessment of in-service, 5 studies on achievement in mathematics were identified. No study was done in statement problems earlier. Hence the present study is an attempt for the investigator.