Chapter 6

SUMMARY
CHAPTER VI

SUMMARY

This chapter, which is the last chapter of the present investigation, reports a brief summary of the study. Need and significance of the study, statement of the problem, objectives of the study, hypotheses, assumptions, delimitations of the study, procedures for the execution of research, scheme of data analysis, findings and suggestions for further research have been outlined in this chapter.

6.1. INTRODUCTION

Mathematics is a systematized, organized and an exact branch of science. Adequate knowledge of the fundamental processes of mathematics like counting, addition, and subtraction, multiplication, division, weighing, measuring, buying and selling and the skill to use them are the preliminary requirement of a human being. For an ordinary man, mathematics learnt during the primary and middle stages will suffice. Therefore every mathematics teacher should acquaint himself with the aims and objectives of teaching Mathematics in order to give a strong foundation to the children’s mathematical approach to life.

The Indian Education Commission (1964-1966) has envisaged a course of compulsory Mathematics in the primary and the secondary courses. Diversification of the courses has been recommended at Higher Secondary level with the result that Mathematics at Higher secondary stages is optional and is meant only for those who want to study higher mathematics or to take up vocations and professions requiring specialized knowledge of Mathematics.
The committee formed under Dave H. N. (1986) as chairman to implement the New Education Policy 1986, has classified the primary school mathematics curriculum of each class into different competency area. Mathematical competencies at the primary level include the understanding of whole numbers and numerals, the ability to add, subtract, multiply and divide whole numbers, the ability to use and solve simple problems of daily life relating to units of money, length, weight, capacity, area and time, the ability to use fractions, decimals and percentage, and the understanding of geometrical shapes and spatial relationships.

The Indian Education Commission Report (1960) suggests that the quality of mathematics teaching is to be raised considerably so as to achieve its objectives and purposes, to promote the understanding of the basic principles, to develop problem solving and analytical skills and the ability to apply them to the problems of material environment and social living and to promote a spirit of inquiry and experimentation.

The existing trend in the teaching of Mathematics presents a sad picture. While teaching mathematics, the teachers give less importance to the mathematical concepts. Due to various constraints, they don’t focus their attention upon the objectives of teaching Mathematics. Teaching learning process becomes evaluation oriented instead of being objective oriented. Children are compelled into rote learning and memorizing and the mathematical competencies remain unattained. Due to insufficient motivation, the children of Primary classes develop a negative attitude towards mathematics and the mathematics teacher. Children consider mathematics a problematic subject, and start disliking the subject. This results in poor achievement in mathematics. It is the duty of the Mathematics teacher to make his pupils attain the prescribed Mathematical competencies to fulfill the objectives in the teaching of Mathematics.
6.2. NEED AND SIGNIFICANCE OF THE PRESENT STUDY

Mathematics at the primary level should help children to develop an understanding of key mathematical concepts through appropriate experiences with materials from the physical world and immediate environment. It should develop an understanding from the concrete to the abstract, from the specific to the general.

The National Policy on Education (1986) stresses the importance of activity based approach to make teaching learning process, child centred. The teacher Education curriculum for the primary school teachers was also modified by giving importance to activity based and child centred approach of teaching.

The District Institutes of Education and training were established in all the Districts of Tamil Nadu to give training to the teachers. Funds were allotted to improve the infrastructure facilities of the schools. In spite of all this, universalization of quality education has not been achieved so far. The level of achievement of the children in Mathematics also remains poor.

In order to help the children attain the expected mathematical competencies, to make education a process of interaction between the child and the class room environment, to provide the children a good opportunity to think for themselves during the motivational stage and to lead them towards the competency to be taught, the investigator attempted to develop a specific activity based teaching strategy which will allow the teacher the freedom of using any method or model of teaching. This would enhance the level of achievement in mathematics among the primary children.

Many research studies have been undertaken throughout the country and abroad to explore the possibilities of improving the status of Mathematics.
These studies aim at making a comparison of the different methods, devices, principles and techniques in the teaching of Mathematics, finding out problem areas in the teaching and learning of mathematics, testing the results in terms of student achievement, and bringing out suggestions for remedial measures to be followed in Indian classroom situations.

The current trend of mathematics education shows a strong need for teacher generated learning activities, learning by doing, discovering and experimenting by the pupils, developing individual, group and whole class work, using the local environment and creating an interesting classroom. To gain this, the teachers of mathematics should aim at professional excellence by planning their teaching strategies. This would help them to overcome the pitfalls and hurdles of the curriculum and the existing method of teaching and learning. The present study is an earnest attempt to find out the effectiveness of activity-based teaching strategies in enhancing the level of achievement in mathematics at primary level.

6.3. SYNTHESIS OF REVIEW OF RELATED LITERATURE

Review of related literature is indispensable as it provides helpful suggestions for further research work. Without a review of related literature, it would not be possible to proceed with the research work with a firm ground and justification. With this motive in view, a review of previous studies in the relevant area of the present study was attempted in this study.

The findings of the related studies reveal that a scientific attitude, a perspective attitude, and participatory learning by the pupils should be included from the primary stage of the pupils. A review of the literature related to this research work was done under the following heads:
Studies on mathematics teaching

Studies on learning mathematics

Studies on diagnostic tests, achievement tests and remedial teaching

Other related studies in mathematics education

An overall review of the related literature indicated that there is a need for the designing of activity based teaching strategies with special reference to the knowledge, understanding and application level of educational objectives. Moreover, studies of this type will be of an immense use to improve the quality of primary education in Mathematics.

Having this as the background, the present study was planned with a view to develop a specific activity based teaching strategy to enhance the level of achievement in mathematics among the primary children.

6.4. STATEMENT OF THE PROBLEM

Mathematics is one of the important subjects in the school curriculum. It is imperative that a pupil studying mathematics should attain the competency to apply what he has studied in various life situations. To make the primary school children attain the expected mathematical competencies, teaching learning process should be focussed on knowledge, understanding, and application component of each unit. The level of achievement in the various components of mathematics depends upon the innovative and interesting teaching strategies adopted by the mathematics teacher. Through this experimental study, the investigator intends to develop innovative and effective teaching strategies for teaching mathematics in the classroom in order to enhance the level of
achievement of primary children in mathematics. Hence the problem for the present study has been stated as follows:

“ROLE OF ACTIVITY BASED TEACHING STRATEGIES IN ENHANCING THE LEVEL OF ACHIEVEMENT IN MATHEMATICS AMONG PRIMARY CHILDREN”

6.5. OBJECTIVES OF THE STUDY

This experimental study was conducted in order to achieve the following objectives:

1. To design and develop activity based teaching strategies to enhance the level of achievement in Mathematics among the primary children.
2. To apply the activity based teaching strategies to the teaching of Mathematics among Primary children.
3. To find out the effect of activity based teaching strategies in enhancing the level of achievement in Mathematics among the primary children.
4. To find out the effect of activity based teaching strategies in enhancing the level of achievement in Mathematics among the low, average and high achievers.
5. To find out the effect of activity based teaching strategies in enhancing the levels of knowledge, understanding and application in Mathematics among the primary children.
6. To identify whether the activity based teaching strategies develop a positive attitude towards Mathematics among the primary children.
7. To identify the role of activity based teaching strategies in developing a positive attitude among the primary children towards Mathematics teacher.
6.6. **HYPOTHESES**

Keeping the objectives and the variables under study in mind, the literature and research in the related area were looked into to generate the hypotheses.

1. There is significant difference in the level of achievement in Mathematics between the experimental group and the control group.

2. There is significant difference in the level of achievement in Mathematics between the low achievers of the experimental group and those of the control group, the average achievers of the experimental group and those of the control group and between the high achievers of the experimental group and those of the control group.

3. There is significant difference in the level of achievement in Mathematics between the children of the experimental group and those of the control group in the knowledge level.

4. There is significant difference in the level of achievement in Mathematics between the children of the experimental group and those of the control group in the understanding level.

5. There is significant difference in the level of achievement in Mathematics between the children of the experimental group and those of the control group in the application level.

6. There is significant difference in the level of achievement in Mathematics between the low achievers of the experimental group and those of the control group, between the average achievers of the experimental group and those of the control group and between the high achievers of the experimental group and those of the control group in the knowledge level.
7. There is significant difference in the level of achievement in Mathematics between the low achievers of the experimental group and those of the control group, between the average achievers of the experimental group and those of the control group and between the high achievers of the experimental group and those of the control group in the understanding level.

8. There is significant difference in the level of achievement in Mathematics between the low achievers of the experimental group and those of the control group, between the average achievers of the experimental group and those of the control group and between the high achievers of the experimental group and those of the control group in the application level.

9. There is attitudinal change positively towards Mathematics after adopting activity based teaching strategies among the boys, girls and the entire experimental group.

10. There is attitudinal change positively towards Mathematics teacher after adopting activity based teaching strategies among the boys, girls and the entire experimental group.

6.7. DELIMITATIONS OF THE STUDY

In spite of careful planning and designing, the study had to face certain delimitations which were unavoidable.

1. Primary children studying in the fifth standard alone were selected.

2. Only two schools were selected for the experimental study.

3. Due to the following constraints, the pupils of the experimental group and the control group were chosen from two different schools.
i. The duration of treatment is long

ii. Two methods of teaching inside the same school for the children of age group below ten will develop psychological barriers among them.

iii. Two methods of teaching in the same campus will affect each other through peer group learning.

4. Selection of the experimental group and the control group was done by matching the marks in the quarterly examinations. It was possible to match the scores of only sixty out of the eighty children in the experimental group due to extreme variations in the marks scored in the quarterly examinations. For the same reason the marks of only sixty children out of the eighty six children were matched and selected as the control group.

6.8. PROCEDURE FOR THE EXECUTION OF RESEARCH

The research design gives the conceptual structure of the design. The type of design to be selected, advance planning of methods to be adopted, tool to be used, collection of relevant data and techniques to be used in analysis, in relation to objectives of research and availability of staff, time and money.

6.8.1. Experimental Design

The experimental method is a scientific method of approach and it is a systematic and logical way for answering the research question. It establishes cause and effect relationship between variables and helps to test hypotheses or causal relationship between variables. The researcher draws inferences about
reliability and decides the nature of treatment to whom it is to be applied and to what extent. Based on the above advantages of the experimental research, the investigator has adopted an experimental design for the present investigation.

Four main steps are involved in this Experimental Research

i. Surveysing the literature relevant to the problem
ii. Identifying and defining the problem
iii. Formulating a problem hypothesis, and defining the basic terms and variables

Constructing an experimental plan which would involve identifying all the non experimental variables that might contaminate the experiment and determining how to control them, selecting a research design, selecting a sample of subjects to represent a given population, assigning subjects to groups and assigning experimental treatments to the groups, selecting or constructing and validating instruments to measure the outcomes of the experiment, outlining procedures for collecting the data and possibly conducting a pilot or trial run test to perfect the instruments or design, and stating the statistical or null hypothesis.

6.8.2. Variables

The present investigation was an attempt to determine the effectiveness of activity based teaching strategies in enhancing the level of achievement in Mathematics among children at the primary level. The variables involved were:

i. Independent variables:
The independent variable in the present investigation was the activity based teaching strategies involved in the teaching of Mathematics at the primary level.
ii. Dependent variables:
The achievement score of the students in solving problems in Mathematics was treated as the dependent variable in this study.

iii. Control of extraneous variables:
a. Gender Variable:
This was controlled by the selection of the experimental group and the control group of students from two co-education schools.
b. Location:
Though the children of the control group and the experimental group belong to different schools, investigation was carried out in the same urban locality, and are of the same socio-economic and cultural background.
c. Maturation:
Investigation was carried out within the duration of 3 months.
d. Age: Children of the same age group between 9 to 10 years were chosen for the study.

6.8.3. Phases of Experimentation

Phase I

1. Identifying suitable areas in the Mathematics Text book for the application of appropriate activity based teaching strategies at the primary level.
2. Understanding the terminology of 'Activity based teaching strategies' for instruction.
3. Developing a systematic model of teaching for the application of activity based teaching strategies.
Phase II

1. Developing instructional materials for the enhancement of the level of achievement in Mathematics among primary children through activity based teaching strategies.
2. Preparation and validation of psychological tools to measure the children’s attitude towards Mathematics teacher.

Phase III

1. Assessing the entry behaviour of the children in the sample using the achievement marks scored by them in the Quarterly Examination in Mathematics.
2. Grouping the students on the basis of the achievement scores into two groups with equal number of children in both the groups, namely, the Control group and the Experimental group through statistical techniques.
3. Administering of psychological tools to the children of the experimental group.

Phase IV

1. Teaching the children through two methods. The children of the control group to be taught through the traditional method and the experimental group to be taught through the activity based strategies of teaching.
2. Duration of the treatment would be three months.
Phase V

1. Administering the post-test after the completion of instructions through traditional method for the children of the control group and through activity based teaching strategies for the experimental group of students.

2. Entering, categorizing and analyzing the pre-test, and the post-test scores

6.9. SAMPLE FOR THE STUDY

Location:

The present investigation was carried out in two schools, one in a co-education Govt. middle school at Krishnancoil, Nagercoil, and another in a Christian minority Private Primary School namely, Home church Tamil Primary School. Both the schools are located at Nagercoil town in Kanyakumari Dist., TamilNadu, within a distance of half a kilometer from each other having the same feeding from the same socio economic status of the society.

Selection of the sample:

The experimental group of 60 students was selected from among 80 students studying in Std V of Govt. middle school, Krishnancoil and the control group of 60 students were selected from among the 86 students studying in Home Church Tamil Primary school, Nagercoil. These sets of students formed the sample for the study.

6.10. DURATION OF TREATMENT

After selecting the two groups the Control group and the Experimental group, the investigator conducted the experiment. The students of the Control
group were taught by the traditional method. The Experimental group was taught through activity based teaching strategies. The duration of the treatment was three months. The investigator utilized the respective teachers who were handling the classes in the two schools.

6.11. CONSTRUCTION AND VALIDATION OF TOOLS

The following tools are used to measure the pupils attitude towards mathematics and the attitude towards mathematics teacher in addition to the achievement test to measure the level of achievement.

i. Achievement test in Mathematics

ii. Scale to measure the pupils’ attitude towards mathematics

iii. Scale to measure the pupils’ attitude towards mathematics teacher

All the three tools were developed and validated by the Investigator.

6.12. DATA COLLECTION

Students studying in the V std in Govt. Middle School, Krishnancoil and Home Church Primary School at Nagercoil were matched on the basis of the marks scored in Mathematics in the Common Quarterly Examination conducted by the Elementary Education Department at the District level. 60 students from one school were treated as the control group and another set of 60 students from the other school were treated as the Experimental group.

The Control group was taught by the traditional method and the experimental group was taught through activity based teaching strategies. An
achievement test was conducted for the two groups of children using the same question paper. The question paper contained items of objective type, very short answer, short answer and long answer type of questions. Due importance was given to find the level of attainment in knowledge, understanding and application based on Bloom’s Taxonomy. The attitude of the children towards Mathematics and the attitude of the children towards the Mathematics teacher were measured before and after intervention using the same scale already prepared.

6.13. STATISTICAL TECHNIQUES USED FOR DATA ANALYSIS

In the present study, the relevant data obtained from the test scores in the pre-test and the post-test have been analyzed using different statistical techniques. The scores measuring the attitude towards mathematics and the mathematics teacher before and after the intervention were also analyzed as follows:

Descriptive Analysis

It provides information about the nature of a particular group of individuals. Mean and standard deviation were calculated to determine the central tendencies and dispersion variables to describe the properties of the sample and to compare them.

Differential Analysis

It provides inferences involving determination of statistical significance of difference between groups with reference to selected variables. To compare the difference the between the means of the small sample and the large sample, t-test was used.
Correlation Analysis

Correlation is the relationship between two or more paired variables or two or more sets of data. The degree of relationship is measured and represented by the coefficient of correlation. This coefficient may be identified by either the letter r, the Greek letter rho (\(\rho\)), or other symbols depending upon the data distributions and the way the coefficient has been calculated. The product moment correlation was used to measure the association between the experimental group and the control group.

6.14. RESEARCH FINDINGS

The results have been drawn keeping in view the objectives formulated for the study and by the testing of hypotheses framed thereafter. Major findings of the study presented in accordance with the objectives are as follows:

1. (i) The activity based teaching strategy was found to be effective in enhancing the level of achievement in Mathematics among the primary children.

(ii) The activity based teaching strategy was found to be effective in enhancing the level of achievement in Mathematics among low achieving primary children.

(iii) The activity based teaching strategy was found to be effective in enhancing the level of achievement in Mathematics among average achieving primary children.

(iv) The activity based teaching strategy was found to be effective in enhancing the level of achievement in Mathematics among high achieving primary children.
2. (i) The activity based teaching strategy was found to be effective in enhancing achievement in the knowledge level in Mathematics among the Primary children.

(ii) The activity based teaching strategy was found to be effective in enhancing achievement in the knowledge level in Mathematics among the low achieving primary children.

(iii) The activity based teaching strategy was found to be effective in enhancing achievement in the knowledge level in Mathematics among the average achieving primary children.

(iv) The activity based teaching strategy was found to be effective in enhancing achievement in the knowledge level in Mathematics among the high achieving primary children.

3. (i) The activity based teaching strategy was found to be effective in enhancing achievement in the understanding level in Mathematics among the primary children.

(ii) The activity based teaching strategy was found to be effective in enhancing achievement in the understanding level in Mathematics among low achieving primary children.

(iii) The activity based teaching strategy was found to be effective in enhancing achievement in the understanding level in Mathematics among average achieving primary children.

(iv) The activity based teaching strategy was found to be effective in enhancing achievement in the understanding level in Mathematics among high achieving primary children.

4. (i) The activity based teaching strategy was found to be effective in enhancing achievement in the application level in Mathematics among the primary children.
(ii) The activity based teaching strategy was found to be effective in enhancing achievement in the application level in Mathematics among the low achieving primary children.

(iii) The activity based teaching strategy was found to be effective in enhancing achievement in the application level in Mathematics among the average achieving primary children.

(iv) The activity based teaching strategy was found to be effective in enhancing achievement in the application level in Mathematics among the high achieving primary children.

5. (i) The activity based teaching strategy was found to be effective in building a positive attitude towards Mathematics among the primary children.

(ii) The activity based teaching strategy was found to be effective in building a positive attitude towards Mathematics among the boys.

(iii) The activity based teaching strategy was found to be effective in building a positive attitude towards Mathematics among the girls.

6) (i) The strategy was found to be effective in building a positive attitude towards Mathematics teacher among the primary children.

(ii) The activity based teaching strategy was found to be effective in building a positive attitude towards Mathematics among the boys.

(iii) The activity based teaching strategy was found to be effective in building a positive attitude towards Mathematics among the girls.

6.15. EDUCATIONAL IMPLICATIONS

The objectives of teaching any unit in Mathematics can be achieved through employing effective teaching strategies. The findings of this
experimental study show that, the activity based teaching strategies developed by the investigator can be practised in the class room situation in order to attain the competencies in Mathematics.

It is quite clear from the research findings that the activity based teaching strategies are effective among all the pupils in a class room (i.e.) low achievers, average achievers, and high achievers. Moreover it is proved that these strategies help to enhance the level of achievement of all the pupils in knowledge level, understanding level and application level in each competency in mathematics. It is proved that activity based teaching strategies can develop a positive attitude among pupils towards mathematics as a subject and towards the teachers.

On the basis of the findings, the investigator makes the following suggestions to enhance the level of achievement in mathematics among the primary children.

a. The student teachers in the pre-service training should be given training to identify the knowledge level, understanding and application level in each unit, and prepare activities suitable to the particular unit.

b. Teachers’ hand book may be prepared and supplied to the teachers, taking into consideration that a prominent part should be allotted to activity based motivation, and activity based evaluation and the activities for knowledge, understanding and application level.

c. In-service training programmes may be conducted for primary school teachers in order to make them understand the idea behind activity based teaching strategies and to develop a positive attitude among them towards the implementation of the same in class room situation.
6.16. SUGGESTIONS FOR FURTHER RESEARCH

To overcome the limitations of the present study and to extend the research findings of the study, a few suggestions are given below for further research

1. The present study was conducted among V standard pupils only. Therefore it is suggested that it may be conducted among the pupils of other primary classes also.
2. The present study was conducted among the pupils of two urban area schools. So it is suggested that the study may be extended further to be conducted among the pupils of semi-urban and rural schools.
3. It is suggested that this study may be conducted at the upper primary level.
4. The present study was conducted to find the role of activity based teaching strategies in enhancing the level of achievement in Mathematics. It is also relevant to be conducted to enhance the level of achievement in other subjects like science, social sciences etc.

6.17. CONCLUSION

Activity based teaching strategies developed for the primary level children (children belonging to the age group of 5 to 10 years) will make them mentally alert and physically active. The motivational strategy developed by the investigator will create an insight among the children. Moreover the attainment of objectives related to knowledge level, understanding level, and application
level becomes possible among the children through a set of well planned activities.

These strategies provide ample opportunity for recapitulation. The exercises for practice help retention and long term memory. Continuous and comprehensive evaluation conducted through activities will enable the teacher to identify the mistakes committed by the children which in turn paves the way for remedial teaching. Follow up activities will strengthen the learning outcomes and help the children to apply their knowledge and understanding of the subject in various life situations.