Chapter: VI

SUMMARY, CONCLUSIONS AND SUGGESTIONS

This chapter briefly presents three major dimensions of the study and hence has three parts. The objectives of the study, hypotheses formulated for the conduct of the study, review of the procedures adopted for the study, a summary of the major findings and the like are included in the first part of the study. The second part deals with the conclusions based on the findings. The third and final part of the chapter presents the suggestions based on the findings and suggestions for further research.

Part - I OBJECTIVES AND DESIGN

6.1 Study in Retrospect

The major aim of the present research has been to study the effectiveness of remedial programmes in Mathematics for the disadvantaged children of primary schools. The study has been designed with achievement in Mathematics as dependent variable. The independent variables used for the present research are instructional strategies. This include remedial programmes as a package and conventional direct instruction method.

6.2 Objectives of the Study

The prime objective of the study was to test the effectiveness of remedial programmes in Mathematics for the disadvantaged children of primary schools. As a part of achieving this objective some other objectives which are supportive to the major objective were also taken into consideration.
The objectives of the study are given below.

1. To identify the socially, culturally, economically and academically backward children (disadvantaged) at the upper primary level.

2. To determine the common nature of the disadvantaged children at the upper primary level.

3. To determine the reasons and causal factors for the disadvantaged nature of children.

4. To find the achievement of disadvantaged children in Mathematics on selected topics at the upper primary level.

5. To diagnose the areas of difficulty and weaknesses with regard to selected topics in Mathematics of the disadvantaged children at the upper primary level.

6. To analyse the difficulties and weaknesses of the disadvantaged children at the upper primary level in terms of errors committed by them in Mathematics and find out the frequency of errors on selected topics.

7. To develop remedial programmes on selected topics in Mathematics for the disadvantaged children at upper primary level.

8. To test the effectiveness of remedial programmes on selected topics in Mathematics for the disadvantaged children at upper primary level.

9. To test the effectiveness of direct instruction method on selected topics in Mathematics for the disadvantaged children at the upper primary level.
(10) To compare the effectiveness of the remedial programmes over the direct instruction method for the disadvantaged children at the upper primary level.

(11) To compare the effectiveness of remedial programmes over direct instruction method for the disadvantaged children at the upper primary level based on boys and girls.

(12) To compare the effectiveness of remedial programmes over direct instruction method for the disadvantaged children at the upper primary level based on government and private institutions.

(13) To compare the effectiveness of remedial programmes over direct instruction method for the disadvantaged children at the upper primary level based on rural and urban locality.

6.3 Hypotheses Formulated for the Study

On the basis of the above mentioned objectives and the analysis of related studies, the following hypotheses are formulated by the investigator for the study.

(1) The disadvantaged children in schools are backward in academic achievement.

(2) The disadvantaged children commit more errors in Mathematics and hence the difficulties are more in Mathematics.

(3) The achievement by the experimental group, taught through remedial programmes is higher than that of the control group, taught through the direct instruction methods.
(4) The achievement of the boys in the experimental group, taught through remedial programmes is higher than that of the boys of the control group, taught through the direct instruction methods.

(5) The achievement of the girls in the experimental group, taught through remedial programmes is higher than that of the girls of the control group, taught through the direct instruction methods.

(6) The achievement of the urban children in the experimental group, taught through remedial programmes is higher than that of the urban children of the control group, taught through the direct instruction methods.

(7) The achievement of the rural children in the experimental group, taught through remedial programmes is higher than that of the rural children of the control group, taught through the direct instruction methods.

(8) The achievement of the government school children in the experimental group, taught through remedial programmes is higher than that of the government school children of the control group, taught through the direct instruction methods.

(9) The achievement of the private school children in the experimental group, taught through remedial programmes is higher than that of the private school children of the control group, taught through the direct instruction methods.

6.4 Sample for the Study

Simple random sampling technique was used for the selection of schools. The sample selected for the study was chosen from three districts in Kerala namely-Thiruvananthapuram, Kollam and Alappuza. Altogether, seven schools from these
districts had been selected and 726 children were selected as the sample based on the technique of stratified random sampling.

6.5 Design of the study

The objectives selected for the study enabled the investigator to conduct the study using the pre-test post-test non-equivalent group design. As the study was experimental in nature, it was decided to fix the experimental and control groups for the purpose of this study. Two groups identical in all aspects were selected from the disadvantaged group. One group was designated as the experimental group and the other as the control group. Thus, there were 363 students in the control group and 363 students in the experimental group.

6.6 Tools used for the Present Study

The relevant tools used for collecting the data for the study are the following.

(1) Socio-economic scale data sheet.

(2) Focus group discussion document.

(3) Achievement test in Mathematics

(4) Diagnostic test in Mathematics.

(5) Remedial materials in Mathematics.

(6) Direct instruction plan

6.7 Summary of the Procedures Adopted

This was an experimental study and was diagnostic in nature. This attempted to study the effectiveness of remedial programmes in Mathematics for the disadvantaged children of primary schools.
The first task of the investigator was to identify the disadvantaged children. A Socio-Economic Status Scale data sheet was used for this purpose. Provision was given to identify the social, cultural, educational and economical conditions of the learner under study.

The second task was to select the class and topics in Mathematics for the study. Standard seven is the terminal stage of the primary level and is the stage to lay down the basement of abstract ideas in Mathematics. So standard seven was selected to implement the study. In the case of selection of topics of the subject Mathematics, it was decided to select one chapter each from Arithmetic, Algebra and Geometry. Hence, Ratios, Factors and Angles were selected as the topics.

Achievement tests were developed on the topics - Ratios, Factors and Angles. The fundamentals related with the concepts discussed on the topics were given priority in the achievement tests. The maximum score for each test was 25 and time was one hour. The same pre-achievement test administered in the beginning was also the post-achievement test implemented at the end of the study.

Diagnostic tests were developed based on the fundamentals of the topics selected. All the possible conceptual ideas related with the areas under study were included in the diagnostic tests.

The achievement tests and diagnostic tests were implemented to both the experimental and control groups. The valuation of achievement tests and diagnostic tests were made. Analysis of answer scripts were made and the strengths, difficulties and weaknesses of the students in learning selected topics in Mathematics were identified. The frequency of errors based on the three chapters were also determined.
After the careful diagnosis of the achievement, defects and the weaknesses of students, remedial materials were prepared. Three materials were developed for remediation based on the chapters- Factors, Ratios and Angles. The materials were developed in such a way that the pupils could identify their own weaknesses and carry out the remedial work with minimum assistance from the teacher.

The remedial treatment was given to the experimental group. Steps were initiated to familiarise the remedial materials and activity cards to the experimental group as a part of the teaching learning process. Clear directions in this regard were given to the teachers. The control group was oriented by the conventional direct instruction method.

Then, post-achievement tests were implemented to both the experimental and control groups in a time bound manner. The post-achievement tests were the same achievement tests used as pre-achievement tests. The valuation of answer scripts based on the post achievement tests were made. Then comparison effectiveness of achievement was found out.

6.8 Statistical Techniques and Methods of Analysis

The main statistical technique adopted was analysis of covariance. But as a standard procedure arithmetic mean, median, quartile deviation and standard deviation of the scores obtained by the two groups of various schools were also calculated. In order to test the significant difference between the means, critical ratio was used.
Part II  CONCLUSIONS

6.9 Conclusions Based on the Findings

Conclusions based on the identification of disadvantaged children

The study revealed that more than 50 percent of children are disadvantaged.

This is supported by the following findings.

The primary objective of the study was to identify the disadvantaged children. The socio-economic scale data was used for this purpose. The study found that irrespective of rural/urban, Government/aided, girls/boys more than 50 percent of children in an ordinary school are disadvantaged children. Out of 1400 children considered from various districts, it was found that 726 (53%) are disadvantaged children. This is a notable situation in a state like Kerala. The disadvantaged children acquiring general education in the Government and aided schools are to be supported by various measures to alleviate or reduce the disparities existing in the society.

Conclusions based on the identification of common nature of disadvantaged children.

The following common nature of disadvantaged children were identified through the study.

(i) The disadvantaged children display poor academic achievement. Their span of attention is limited and performance were below the expected level.

(ii) They are inattentive in the classroom and express a distracted nature. They are not in a position to concentrate well on activities performed in the classroom.
They lack self confidence.

Their ability for communication is very poor and they had difficulties in understanding abstract ideas.

Disadvantaged children take more time in learning a particular task.

Disadvantaged children exhibit poor performance in written examination. Due to the multiple disadvantaged nature, their performance in the examinations is below the expected level.

This is supported by the following findings.

1. The pre-achievement test conducted for both the experimental and control groups showed that the achievement of disadvantaged children are below the expected level. Less than 30 percent scores were obtained by 58.7 percent children in the pre-achievement test. Only 8 percent children scored more than 60 percent. This agrees with the conclusion that the disadvantaged children display poor academic achievement and poor performance in the examination.

2. As a part of standardisation of the achievement test the terminal scores in Mathematics of the children were examined by the investigator. It was found that on an average 20 percent students scored 30 percent and above in the written examination. This also display the poor performance of the children in Mathematics.

3. The teachers informed that some of the students perform well in other subjects. But the performance in Mathematics is poor. This is due to the abstract nature of the subject. The disadvantaged children had difficulties in understanding abstract ideas of Mathematics.
(4) In the focus group discussion, teachers and experts presented that the disadvantaged children lack self confidence and they have poor ability for communication. They need not attend the class regularly and hence their power of concentration is very poor. The span of attention of these children are also very poor.

These findings clearly indicates that the common nature of disadvantaged children is not satisfactory for performing well in the class room. Urgent action and support in this matter is necessary.

**Conclusion based on the reasons and causal factors for the disadvantaged nature of children**

The reasons and causal factors for the disadvantaged nature of children identified were the following.

- **Disadvantaged children have very poor economic condition.**
- **Very limited involvement of disadvantaged children in social activities.**
- **More number of members in the family of the disadvantaged children.**
- **Members of the disadvantaged family have low educational background.**
- **Very poor home conditions and support to the children.**

These conclusions are supported by the following findings.

(i) The average income of the family of the disadvantaged children were very low. The monthly income of the family of 60 percent of children were below Rs.3,000/-. Most of the parents are either doing some part-time jobs or procure income through cultivation.
(ii) With regard to the social nature of the disadvantaged children, only 20 percent of the disadvantaged children participate in the social activities. Only 15 percent of students involve in co-curricular activities.

(iii) The number of family members were more in the family of disadvantaged children. In 20 percent cases, the number of family memebrs were seven or more. Only in 22 percent of families the number of family members were 4 or below. Due to congested nature in the small home they become under achievers.

(iv) The picture of educational background of the parents gave some interesting scenes. Some parents were only primary educated. Sixty percent of parents (both father and mother) were educated upto secondary level. Hence it could be seen that 75% of parents were secondary educated and they had a positive feeling in sending their children to schools for education. But, it could be brought to the mind of the school authorities that the quality education could be given to all children attending the school.

(v) Another reason for the disadvantaged nature was very poor home conditions and lack of support to the children. The study showed that 95 percent of students didn’t have separate study room. They study in the varanda or main hall where the family members sit and talk the family matters. Eighty Five percent houses were not spacious. These conditions prevent the children to learn well. Only 20 percent students read other materials such as news papers, magazine and the like. With regard to the journey to school, in rural areas 70 percent go to school by walking whereas in towns only 40 percent go by walking. In town areas only 50 percent children avail bus service for their journey.
Due to these findings it is interpreted that the disadvantaged children are academically backward.

Conclusion based on diagnosing the difficulties and weaknesses of the disadvantaged children in learning Mathematics

The following are the difficulties and the weaknesses of disadvantaged children identified through the study.

a) Areas of difficulty related with the pre-requisites to learn the chapter Ratios.

1. Difficulty in converting measures from grams into kilograms and vice versa.
2. Difficulty in converting measures from litres into millilitres and vice versa.
3. Difficulty in converting measures from metre into kilometre.
4. Difficulty in converting measures from paisa into rupees.
5. Difficulty in finding the common factor of numbers.
6. Difficulty in finding the highest common factors of two or more numbers.
7. Difficulty in finding the most simplest form of fractions with large numbers.
8. Difficulty in doing division with mixed fractions.
9. Difficulty in doing the division with decimal numbers.
10. Difficulty in operations with percentages and ratios.

This is supported by the following findings.
(1) In the area of conversion of grams into kilograms and vice versa, litres into millilitres and vice versa around 16 percent of children committed errors. But the performance in conversion of metres into kilometres (31 percent error) and paisa into rupees (55 percent error) were difficult for more children. This implies that disadvantaged children possess average understanding in the fundamental areas related with conversion of units.

(2) Finding the common factor of numbers were difficult for 75 percent of students, whereas the finding of Highest Common Factor was even more difficult (87 percent). The difficulty increased as the numbers became larger. The most simplest form of fractions with large numbers were very difficult (93 percent) for the children.

(3) Division of decimal numbers were difficult for majority of children (more than 80 percent). Most of the children felt difficulty in placing the decimal point in the correct position.

(4) Doing the division with mixed fractions were challenging to the disadvantaged children. More then 90 percent children have difficulties in this area.

All these support that a lot of difficulties are faced by the disadvantaged children and these difficulties are due to the lack of previous knowledge in the subject and lack of exposure in the real life situation.

b) Areas of difficulty related with the pre requisites to learn the chapter Factors.

1. Difficulty in adding terms with variables repeatedly.
2. Difficulty in finding the multiple of numbers.
3. Difficulty in answering word problems.
4. Difficulty in finding prime factors of numbers.
5. Difficulty in writing a number as a product of prime factors.

6. Difficulty in identifying the prime numbers.

7. Difficulty in finding the least common multiple of numbers.

8. Difficulty in identifying the composite numbers.


10. Difficulty in simplifying fractions with variables.

This is supported by the following findings.

(1) In the area repeated addition is the multiplication, for the questions like 
\[ k + k + k + k + k = \ldots \], ten percent of children wrote \(k5\) as the answer. This is an important weakness to be noted.

(2) Multiplication in word problems were difficult for 34 percent of children but the activities in finding the prime factors of a number (57 percent), writing a number as a product of prime factors (77 percent) created much difficulty for the children.

This showed that the difficulties were more as the number became larger.

(3) In the case of identification of the prime numbers and composite numbers the process was very difficult for the children. 88 percent of children felt difficulty in comprehending the concept of prime numbers and 97 percent felt difficulty in comprehending the concept of composite numbers. This is due to the abstract nature of the subject. Activity based practical approach is needed to tackle this situation.

(4) Finding LCM of large numbers (62 percent), simplification of fractions with numbers and variables (more than 90 percent) were also difficult areas for the children.
All these findings support that for the disadvantaged children, lot of difficulties occur in the learning of the chapter Factors.

c) Areas of difficulties related with the pre-requisites to learn the chapter Angles.

1. Difficulty in understanding the concept of angles.

2. Difficulty in identifying the sides and vertices of an angle.

3. Difficulty in properly naming the angle.

4. Difficulty in identifying the total number of angles in a figure.

5. Difficulty in identifying right angles, acute angles, and obtuse angles and their peculiarities.

6. Difficulty in understanding the concept of linear pair.

7. Difficulty in understanding the concept of complementary angles.

8. Difficulty in understanding the concept of supplementary angles.

9. Difficulty in finding the measures of angles in a given figure.

10. Difficulty in understanding the concept of opposite angles.

This is supported by the following findings.

(1) Idea about shapes, sides and vertex of angles were much familiar to the students. But still, around 25 percent of children felt difficulty in these areas.

(2) 59 percent of children felt difficulty in finding the total number of angles in a given figure.
(3) Around 75 percent of students have difficulties in classifying angles as acute, obtuse and right angle. Practical first hand experience are needed to tackle this situation.

(4) The idea of complementary angles and supplementary angles (51 percent difficulty), ideas of opposite angles (around 58 percent difficulty) were difficult for around half of the disadvantaged children.

(5) Finding the measures of angles in a given figure was very difficult (more than 90 percent) for the disadvantaged children. The concepts of measuring of angles are not discussed in real situations in the class room. This may be the reason for this crucial difficulty.

On the whole the areas of Geometry were also difficult for the disadvantaged children. First hand experience with real objects and situations can tackle the problems and difficulties of the disadvantaged children.

Analysis of the frequency of errors committed by disadvantaged children of the experimental and control groups in the three areas such as Ratios, Factors and Angles.

The study revealed that the disadvantaged children of both experimental and control groups have difficulties in the three areas mentioned. This difficulty was common in Government and aided schools both in rural and urban areas.

This is supported by the following findings.
(1) Frequency of errors in the area of chapter - Ratios.

The weaknesses of the disadvantaged children in the experimental and control groups in terms of the errors committed and the frequency of errors related with the pre-requisites to learn Ratios are discussed below.

Frequency of errors of experimental group based on the chapter Ratios.

More than 90 percent of children felt difficulty in the following areas.

(i) Finding the common factor of a number.

(ii) Finding the highest common factor of two or more numbers

(iii) Finding the most simplest form of fraction with large numbers.

(iv) Doing the divisions of numbers with mixed fractions.

Doing division with decimal numbers were difficult for 84 percent of children.

Frequency of errors of control group based on the chapter - Ratios

In the case of control group more than 90 percent errors occured in the following areas of Ratios.

(i) Finding the most simplest form of fractions with large numbers.

(ii) Doing the division of numbers with mixed fractions.

More than 80 percent errors occured in the following areas of Ratios.

(i) Doing the division with decimal numbers.

(ii) Finding the common factor of numbers.

(iii) Finding the highest common factor of two or more numbers.
Hence it can be concluded that the higher order concepts and ideas related with the chapter Ratios were very difficult for the children in the experimental and control groups. But the preliminary ideas with regard to Ratios such as idea of Ratio, conversion of units and the like were attended by many of the children from both the groups.

The remedial materials prepared will help the disadvantaged children to overcome these issues.

(2) **Frequency of errors in the area of the chapter - Factors.**

The weaknesses of the disadvantaged children in the experimental and control groups in terms of the errors committed and the frequency of errors related with the pre-requisites to learn Factors are discussed below.

**Frequency of errors of experimental group based on the chapter - Factors**

More than 90 percent of children felt difficulty in the following areas.

(i) Identifying the composite numbers.

(ii) Simplifying fractions with numbers.

(iii) Simplifying fractions with variables.

Eighty nine percent of difficulty felt on finding the least common multiple of numbers. More than 70 percent errors occurred in converting measures from Paise into Rupees.

**Frequency of errors of control group based on the chapter - Factors**

More than 90 percent errors occurred in the following areas based on the chapter - Factors.
(i) Identifying the composite numbers.

(ii) Simplifying fractions with numbers.

(iii) Simplifying fractions with variables.

More than 80 percent errors occurred in the following areas.

(i) Finding the least common multiple of numbers.

(ii) Identifying the prime numbers.

Around 60 percent errors occurred in the area writing a number as a product of prime factors.

Here also it is concluded that, the higher order concepts like least common multiple, simplification of Fractions with large numbers and simplification of Fractions with variables were very difficult for the children of both the groups. But the preliminary ideas such as finding the factors of a number were attended by many of the students from the two groups.

Here also the remedial material will support the children to a great extent.

(3) Frequency of errors in the area of chapter - Angles.

The weaknesses of the disadvantaged children in the experimental and control groups in terms of the errors committed and the frequency of errors related with the pre-requisites to learn Angles are discussed below.

**Frequency of errors of the experimental group based on the chapter - Angles**

More than 90 percent errors occurred in the following areas of Angles.

(i) Understanding the concept of complementary angles.
(ii) Understanding the concept of supplementary angles.

(iii) Finding the measures of angles in a given figure.

Around 80 percent errors occurred in the following areas.

(i) Identifying right angles, acute angles and obtuse angles.

(ii) Understanding the concepts of linear pair

Approximate 70 percent errors occurred in identifying the total number of angles in a given figure.

**Frequency of errors of control group based on the chapter - Angles**

In the case of control group more than 90 percent errors occurred in finding the measures of angles in a given figure.

Around 80 percent errors occurred in the following areas.

(i) Understanding the concept of linear pair.

(ii) Understanding the concept of complementary angles.

(iii) Understanding the concept of supplementary angles.

Around 75 percent errors occurred in identifying the right angles, acute angles and obtuse angles.

In the case of the chapter - Angles also, it is concluded that the higher order Mathematical concepts and ideas related with Angles were difficult for the experimental and control groups. Fundamental ideas in angles such as concept of angles, vertex of an angle, naming of an angle and the like were attended by most of the children.
The remedial materials prepared will support the children to tackle the higher order Mathematical concepts based on the chapter - Angles.

**Conclusions based on the objective to develop remedial programme materials in Mathematics.**

The remedial programme materials were self learning materials that could be used with minimum assistance from the teacher. Activity cards were part of the remedial programme materials. Enrichment materials will give sufficient ideas about the concepts discussed. The teacher manual part was helpful to provide suggested activities to the teacher. Each remedial material consists of (i) enrichment materials (ii) activities for attaining concepts (iii) self evaluation items (iv) directions and guidelines.

Conclusions based on critical ratio and analysis of co-variance.

**(I)**  **The study revealed that the remedial programmes for the experimental group are more effective than the conventional direct instruction method adopted for the control group in the teaching of Mathematics at Primary level.**

This conclusion is supported by the following findings.

1. When the post-test scores of the experimental and control groups were compared, the critical ratio obtained is 11.04 which is significant at 0.01 level. (Mean of experimental group = 52.0; mean of control group = 39.2)

2. When the gain scores of the experimental and control groups were compared, the value of the critical ratio is found as 47.03. This is significant at 0.01 level. (Mean of the gain scores of experimental group is 22.3 and mean of the gain scores of control group is 10.1.
(3) Using ANCOVA the calculated value $F_{yx}$ was tested for significance. $F_{yx}$ for the total sample is 2755.9. This is significant at 0.01 level (P < 0.01). It is clear from this that the two final means, which depend upon the experimental and control variables differ significantly after they have been adjusted for initial difference in X.

(4) The differences between the adjusted means were tested for significance. The $t$ value obtained 52.5 which is clearly significant at 0.01 level (P < 0.01). So it is clear that the learning through remedial programmes are more effective than learning through conventional direct instruction methods.

II. The study revealed that learning through remedial programmes by the boys of disadvantaged group are more effective than the learning of boys through conventional direct instruction method.

This conclusion is supported by the following findings.

(1) Using ANCOVA $F_{yx}$ was calculated, it was found that there is significant difference between the boys of the disadvantaged groups ($F_{yx} = 1284.12$, P < 0.01). From this it can be concluded that the learning through remedial programmes were more effective than learning through conventional direct instruction method for boys.

(2) The difference between the adjusted means of boys of the experimental group and control group were tested for significance. It was found that there is significant difference between the experimental group of boys and control group of boys ($t = 35.92$, P < 0.01).
III. The study revealed that the remedial programmes for the girls of the experimental group are more effective than the girls of the conventional direct instruction groups adopted with the control group in the teaching of Mathematics at primary level.

This conclusion is supported by the following findings.

(1) Using ANCOVA it is clear that there is significant difference between the girls of the experimental group and control group. \( F_{yx} = 1284.12, \ P < 0.01 \)

(2) When the difference between the adjusted means of girls of the experimental groups and control groups were tested for significance, it was found that there is significant difference between the girls of the experimental and control groups. \( t = 39.13, \ P < 0.01 \).

IV. From the study it is proved that remedial programmes are more effective than the conventional direct instruction method in the teaching of Mathematics at primary level in the rural school students.

This conclusion is supported by the following findings.

(1) ANCOVA was applied between the groups and within the groups. The \( F_{yx} \) was calculated, it was found that there is significant difference between the experimental group and control group. \( F_{yx} = 2448.4, \ P < 0.01 \).

(2) The difference between the adjusted means for the rural schools of experimental group and control group were tested for significance. It was found that there is significant difference between the experimental and control groups. \( t = 49.48, \ P < 0.01 \)
V. In the case of Urban school children also, it is concluded that the remedial programmes are more effective than the conventional direct instruction method.

This conclusion is supported by the following findings.

(1) The $f$ ratio $F_{yx}$ calculated by using ANCOVA showed that there is significant difference between the experimental and control groups in the urban schools. ($F_{yx} = 720.04, P < 0.01$). The experimental groups taught with the help of remedial materials performed better than the control groups taught through the conventional direct instruction method.

(2) The difference between the adjusted means of experimental and control groups in urban areas were tested for significance. It was found that there is significant difference between the experimental and control groups in the urban area. ($t = 26.84, P < 0.01$). The t value is significant at 0.01 level. This indicates that the experimental group taught with remedial programmes performed better than the control groups taught with conventional direct instruction methods.

VI. The study showed that the learning with the help of remedial programmes are more effective than the learning through conventional direct instruction methods in the case of Government school children.

This conclusion is supported by the following findings.

(1) The F ratio $F_{yx}$ obtained by using ANCOVA is significant at 0.01 level. ($F_{yx} = 1548.84, P < 0.01$). From this it can be concluded that in Government schools, the experimental groups learned with remedial
materials performed better than the control group learned with the conventional direct instruction methods.

(2) When the difference between the adjusted means of experimental and control groups were tested for significance, in the case of Government school children it was found that there is significant difference at 0.01 level. \( (t = 31.39, P < 0.01) \). This shows that the performance of the experimental group learned through remedial programmes are better than the performance of control group learned through conventional direct instruction method.

**VII. The research study proved that learning through remedial programme are more effective than the learning through conventional direct instruction methods in the case of private school children.**

This conclusion is supported by the following findings.

(1) Using ANCOVA the \( f \) ratio \( F_{yx} \) calculated showed that the value is significant at 0.01 level. \( (F_{yx} = 1611.05, P < 0.01) \) This clearly indicates that the performance of the experimental group learned through remedial programmes excelled the performance of the control group learned through conventional direct instruction methods in the case of private school children.

(2) The adjusted means for private school children were tested for significance. It is found that there is significant difference at 0.01 level. \( (r = 40.14, P < 0.01) \). This clearly indicates that the experimental group learned through the remedial materials performed better in private school children than the control group learned through conventional direct instruction method.
6.10 Tenability of the hypothesis

The tenability of the hypotheses may be tested by considering various experimental hypotheses on the basis of the scores achieved in the post-tests of the experimental and control groups. The analysis of the data suggests that all experimental hypotheses could be considered to be generally substantiated. Minor variations from the expected pattern do not invalidate these hypotheses. As the sub hypotheses were substantiated to a convincing level, the major hypotheses also could be substantiated to a remarkable degree.

Part III  SUGGESTIONS

6.11 Suggestions Based on the Findings

The findings and conclusions have revealed a number of ideas which could be suggested to teachers of Mathematics, teacher educators, educational planners educational managers and researchers in the field of education. A large number of relevant points emerged as suggestions. These are summarised below:

6.12 Suggestions for Implementations

The study has emphatically shown that remedial teaching materials tried out was far superior to the conventional method in bringing about better attainment in Mathematics. Hence Mathematics teachers could be encouraged to use remedial teaching materials while dealing with the teaching learning process of the subject.

Remedial teaching materials were developed by the investigator only on selected areas in Mathematics. It is highly essential to develop remedial materials on other areas of the subject. Orientation in preparation of remedial materials could be given to the teachers. This could be an area in the in-service training module in Mathematics.
Identifying the strength of the learner in learning a particular content area and diagnosing the causes of difficulties are essential components of diagnosis and remediation. This could be attained only through the analysis of students’ answer scripts based on specific diagnostic tests in different areas of Mathematics. Detailed sourcebooks could be developed on analysis of content area and sample diagnostic tools. These could be attained only through the analysis of answer scripts of students responded on the basis of certain specific diagnostic tests in different areas in Mathematics. Detailed sourcebooks could be developed on pedagogic analysis of content area, sample diagnostic tools on all classes in the subject Mathematics.

Educational planners and managers could be trained to implement the remedial materials on all areas of Mathematics. The remedial materials could be prepared in the monthly cluster level, subject specific meeting and the result/impact of the material implemented could be discussed in the next cluster meeting. This would enable the teachers to discuss the content area in its deepest sense and hence the required objective of the content area could be attained.

The study revealed that more than 50 percent of students in Government and aided school were disadvantaged children. The disadvantaged nature could be addressed to all teachers. The teachers, school authorities and officers might be trained to identify the disadvantaged children and essential steps would be taken to reduce the disadvantaged nature.

Scholarship could be introduced with the help of sponsors to encourage the learning of socially and economically backward pupils.
Teacher organisations, professional bodies, non-governmental organisations business people, known academicians and other dignitaries could be involved in the sponsorship.

Handbooks could be developed for teachers with innovative ideas. Learner friendly, joyful, environment based and activity based learning materials are essential for the classroom teacher for all classes. Monitoring system and remedial teaching strategies could be included in the material.

Research projects could be launched by State Council of Educational Research and Training (SCERT) on education of the disadvantaged children in the following topics.

- Preparation of standardised diagnostic tools on selected areas in the subject Mathematics
- Preparation of remedial materials in Mathematics.

6.13 Suggestions for further research

- The encouraging results obtained from the study should pave the way for similar investigations in other subjects which are difficult for the children such as English, Hindi and Science. Possibility for further investigation on all other subjects can also be considered.
- The present study concentrated at primary level only. It can be extended to secondary and Higher Secondary levels.
• The study revealed that remedial teaching is helpful to all students in the sector of general education. Without restrictions to the disadvantaged students, the study can be done in total representative samples selecting from various schools.

• The study also revealed the need for having reliable diagnostic tools that are suitable to the Indian situations; Hence development of standardized diagnostic tools on all areas of Mathematics can be a vast area for many investigators.

• Survey can be conducted with regard to the identification of difficulties of children in the government and aided schools of Kerala in the achievement at various levels in Mathematics. This may enable the department to plan and execute remedial measures at various levels.

• Case studies can be conducted for subjects like Mathematics to pinpoint the crucial issues and hard spots in the subject at different levels.