CHAPTER - 6

SUMMARY
6.1.0 Title of the Study

“A study to test effectiveness of Constructivist Approach to teaching Mathematics at Middle School Level”.

6.2.0 Objectives of the Study

1. To compare effectiveness of Constructivist Approach and traditional method of teaching Mathematics to Std. VII students.

2. To evaluate the effectiveness of Constructivist Approach with respect to the objectives viz. knowledge, comprehension, application, process and skill.

3. To administer an opinionnaire to the students of experimental group to find out their opinion about Constructivist Approach of the teacher.

6.3.0 Hypotheses

1. There is no significant difference between the post-test scores of the students of control group and experimental group taught by traditional and Constructivist approach respectively.

2. There is no significant difference between the proficiency level attained by the students of control group and experimental group as measured in terms of percentage of correctly answered questions on each learning objective viz. knowledge, comprehension, application, process and skill on the post-test as well as on the formative tests.
6.4.0 Sample

Two classes of Std. VII (A and B) of S.P.M. English School were chosen for the study without disturbing the class schedules and without scattering the subjects for randomization.

Number: Experimental group (7A) : 47
Control group (7B) : 47

Sex: Both boys and girls
Age: Average 13 years

6.5.0 Procedure

1. Two classes of Std.7 of S.P.M. English School, Pune were chosen for the present study.

2. Non-randomized pre-test, post-test control group design of quasi-experimental type was employed.

3. Class 7 A was taught by Constructivist method whereas class 7B was taught by traditional method by another teacher.

4. Teacher had interactive sessions with students of experimental group in order to probe their thinking process that leads to construction of mathematical concepts and problem solving.

5. At the end of each unit in Mathematics, a formative test of 10 marks was administered to two groups.
6. In case of students of experimental group, researcher marked the errors made by the students on formative test so as to make further investigation and to find a wrong construct leading to unusual response.

7. Formative test was criterion referenced and thus there was an item to test the students' achievement on every specification of learning objectives such as knowledge, comprehension, application, process and skill.

8. Researcher measured the proficiency in terms of percentage attained by the students on each objective on the formative tests.

9. After teaching all 24 units, students of two groups were given post-test of 80 marks which included the questions based on objectives viz. knowledge (and comprehension), comprehension, application, process and skill.

10. Percentage of correctly answered questions on each objective by the students of two groups were calculated so as to compare the proficiency levels attained by the students on each objective.

11. Post-test means of two groups were compared by using statistical technique called ANOCOVA.

12. During the Constructivist teaching programme, researcher used the strategies such as "talk through" sessions with students, record of observations and error analysis.
6.6.0 Special Strategies used in Constructivist teaching programme

1. “Talk-through” sessions with the students

Constructivism believes that learners actively take knowledge, connect it to previously assimilated knowledge and make it theirs by constructing their own interpretation (Check, 92). With this assumption we can say that errors committed by the students in problem-solving must be having their origin in student's construction of knowledge related to prerequisite concept. Thus, it is for the teacher to find out problem in the construction at cognitive level in order to eliminate errors in the students' performance. But cognitive construction is an abstract process and it is very difficult for the teacher to extract it from the young students verbally.

However, teacher should communicate with the student in order to know his thoughts and ideas behind every step in problem-solving. This helps the teacher to know the level at which the student is having obstacle. For example, the student knows the formula but he may not know its use in the given problem or he may not be able to interpret the meaning of given problem to carry out further processing. Once the problem is identified, student can be guided in the right direction by the teacher. Some examples of such interactive sessions are given in Chapter-3.
2. Formative Evaluation

Formative evaluation refers to evaluation of students' progress only on a specific unit. In this a formative test on each unit is prepared. Usually, a formative test is criterion referenced i.e. there is a test item based on every specification of each learning objective expected to be achieved by the students after learning the respective unit. Assessment of formative tests helps the teacher to know whether the students have learnt a specific unit to the expected degree of achievement of objectives previously set.

Details of formative evaluation have been given in Chapter 3.

3. Error Analysis

Formative tests are given to the students. Errors made by them are marked. Then, the teacher tries to probe the student's cognitive construction to find the causes of errors by conducting interactive sessions with them.

4. Record of Observations

Teacher keeps a record of errors made by the students and also of a dialogue established with them. This reveals the thought process of the student while solving a particular problem. It also helps the teacher to keep a track if the student's construction has become clear and sophisticated over a period of time. Some examples from this record have been given in Chapter 3.
6.7.0 Findings of the Study

- Analysis of co-variance (ANOCOVA) explains that the post-test means of experimental group and control group do not differ significantly. ($F_{y,x} = 0.00026$ not significant at 0.01 and 0.05 level). Whatever meagre difference is seen in the post-test means of two groups may be by chance and is normally expected between two equivalent groups and it is not due to Constructivist Approach.

- Thus, there is no significant difference in the post-test scores of control group and experimental group as taught by traditional method and Constructivist Approach respectively.

- Students taught by Constructivist Approach acquired greater proficiency on higher level objectives such as application, process and skill on formative tests and post-test as compared to the students taught by traditional methods.

- On primary level objectives such as knowledge and comprehension students taught by Constructivist Approach and traditional method performed to equal levels of proficiency.

- According to the researcher’s observations, Constructivist Approach helped the teacher to probe into thinking pattern of the students and to know the wrong constructs at their cognitive level leading to incorrect response. Over the period of time researcher could notice gradual development in the student’s performance as the drawbacks in the
process of cognitive construction were removed. Students could perform simple as well as complex mathematical operations more logically and with great ease.

- Opinnaire which was administered to the students of experimental group showed the opinion favourable to Constructivist Approach. Students liked to learn mathematics with activities. They were happy to have interactions with the teacher as it clarified many of their doubts.

6.8.0 Limitations of the Study

- Present study was conducted on a limited sample of the subjects from the selected school. Hence, the results can not be generalized for larger population.

- Initially, the groups were not made equivalent by using any randomization technique. Thus, the variables such as I.Q. etc were not controlled and law of chance was more instrumental during the experimentation. However, this drawback was discarded further using ANOCOVA.

- Present study was limited only to teaching Mathematics. Thus, the utility of Constructivist Approach is not known for other subjects. Also, the results of the present study can not be applied for the experiments with the teaching of other subjects.

- The major objective of the present study was to test the effectiveness of Constructivist Approach to teaching Mathematics. Hence, the
researcher had mainly focused on the planning and implementation of Constructivist lesson plans. Items on the post-test were analyzed for its standardization but validity and reliability of the post-test were not tested.

6.9.0 Recommendations for the further study

1. Constructivist Approach was found very useful in developing students' logical thinking and problem solving in Mathematics. It should be also tried for science subjects.

2. Constructivism requires a practical approach on teacher's part and its implementation in prevalent classroom conditions is a difficult task. Hence, studies should be conducted at teacher's training level so that the teachers in future may wish to apply Constructivist strategies in their classes.

3. Experiments should be conducted on the implementation of Constructivist Approach to teaching the children with special needs as it directly deals with the very process of construction at cognitive level. Thus the students with learning disabilities will be benefited by Constructivist Approach. Also, the gifted students may be guided better if the teacher knows how they think and construct knowledge for themselves.

4. The study on Constructivism and its implementation should be conducted on larger and various samples so as to test its efficacy
with respect to different variables such as I.Q. Age, Sex, Community, medium of instruction (regional/English), geographical area (rural/urban) etc.

5. Constructivist Approach should be tried for teaching the children at elementary level of school because the basic ideas of various disciplines of knowledge are built up at this stage. Thus, the teachers can help the children construct the foundation of primitive knowledge for further learning.