CHAPTER - III

THE PROBLEM

3.1 General Statement of the Problem

The purpose of the study was to investigate the effectiveness of the Developmental Model in teaching geometrical theorems on higher cognitive abilities and achievement among IX grade pupils.

3.2 Variables Considered in the Study

The variables in the study are:

Independent Variables

i. Developmental model, and

ii. Traditional model.

Dependent Variables

i. Inducto-deductive reasoning,

ii. Analytico-synthetic reasoning, and

iii. Achievement.
3.3 Specific Objectives of the Study

The study was undertaken with the following nine specific objectives in view:

i. To compare the effectiveness of Developmental and Traditional models of teaching geometrical theorems in developing higher cognitive abilities/inducto-deductive reasoning among IX grade pupils;

ii. To compare the effectiveness of Developmental and Traditional models of teaching geometrical theorems in developing higher cognitive abilities/analytico-synthetic reasoning among IX grade pupils;

iii. To compare the effectiveness of Developmental and Traditional models of teaching geometrical theorems on achievement among IX grade pupils;

iv. To investigate the interaction between 'treatments' (aforesaid teaching model) and 'levels of pupils' (determined on the basis of General intellectual or mental ability) with reference to development of inducto-deductive reasoning;

v. To investigate the interaction between 'treatments' and 'levels of pupils' with reference to development of analytico-synthetic reasoning;
vi. To investigate the interaction between 'treatments' and 'levels of pupils' with reference to achievement;

vii. To investigate if pupils retain inducto-deductive reasoning abilities developed through Developmental model of teaching the subject;

viii. To investigate if pupils retain analytico-synthetic reasoning abilities developed through Developmental model of teaching the subject; and

ix. To investigate if pupils retain achievement gained through Developmental model of teaching the subject.

3.4 Research Hypotheses

In pursuance of the above stated nine objectives, the following research hypotheses were set up:

i. Developmental model of teaching geometrical theorems is more effective than traditional model in terms of development of inducto-deductive reasoning among IX grade pupils.

ii. Developmental model of teaching geometrical theorems is more effective than traditional model in terms of development of analytico-synthetic reasoning among IX grade pupils.
iii. Developmental model of teaching geometric theorems is more effective than traditional model in terms of achievement among IX grade pupils.

iv. There is interaction between 'treatments' and 'levels' with reference to development of inductive-deductive reasoning.

v. There is interaction between 'treatments' and 'levels' with reference to development of analytic-synthetic reasoning.

vi. There is interaction between 'treatments' and 'levels' with reference to improvement of pupils' achievement.

vii. Pupils retain inductive-deductive reasoning abilities developed through Developmental model of teaching the subject.

viii. Pupils retain analytic-synthetic reasoning abilities developed through Developmental model of teaching the subject.

ix. Pupils retain achievement gained through Developmental model of teaching the subject.

3.5 Scope of the Study

i. The study was confined to Kannada medium pupils only;

ii. The study was limited to theorems in geometry of IX grade, prescribed by the
iii. Out of the higher cognitive abilities, only inducto-deductive reasoning abilities and analytico-synthetic reasoning abilities were considered in evaluating the effectiveness of the Developmental model.

3.6 Definition of Technical Terms

In this research report different technical terms are used. These technical terms are defined/described as follows:

i. Developmental model

ii. Traditional model

iii. Inducto-deductive reasoning

iv. Analytico-synthetic reasoning

v. General mental ability

vi. Interaction

(i) Developmental Model

A teaching method designed to increase general intellectual development, especially logical reasoning.
The model consists of three phases: (i) confrontation with stage relevant task, (ii) inquiry, and (iii) transfer. In phase one the students are presented with a situation that confronts them with the illogic of their thinking or that is puzzling to them. The confronting situation must be relatively well matched both in its substance and form to the learners developmental stage.

In phase two the students' responses are elicited and probed to determine their level of reasoning. Generally probing consists of asking for justifications and offer counter-suggestions.

In phase three the students are presented related task, on that students are required to reason and give counter-suggestions (4:123).

(ii) Traditional Model

A teaching method accepted from time memorial and practiced so far, in teaching theorems in geometry in secondary schools.

It includes lecturing, demonstration, experiments, explanation with the help of black board and other audio-visual aids by the teacher. Basically it is teacher centred.
(iii) **Inductive-Deductive Reasoning**

**Inductive reasoning:** - Inductive reasoning is a research or reasoning method that uses the process of induction to infer general principles, laws, etc., from specific instances.

**Deductive reasoning:** - Deductive reasoning is a research or reasoning method that starts with the formulation of a hypothesis then deduces testable consequences of this hypothesis and finally tests these predictions by observation, experiments, thought experiment.

(iv) **Analytic-Synthetic Reasoning**

**Analytical reasoning:** - It proceeds from unknown to known. Analysis in geometry means a chain of reasoning, back to the hypothesis of unproved theorem, thus closing the logical chain necessary to establish the validity of the desired conclusion. Diagramatically the chain of reasoning may be written: $C_1 \leftarrow C_2 \leftarrow H_2 \leftarrow H_1$, where the symbol ' $\leftarrow$ ' is read 'is implied by', $H$ - hypothesis and $C$ - conclusion (1:76).

**Synthetic reasoning:** - It proceeds from known to unknown. Synthesis in geometry means a chain of reasoning starting from the hypothesis and ending with the conclusion.
Diagramatically the chain of reasoning may be written
\[ H_1 \rightarrow H_2 \rightarrow C_2 \rightarrow C_1, \] where the symbol \( \rightarrow \) is to be read 'implies' (1:75).

(v) General Mental Ability

It is the person's ability to apprehend, observe and conceive relations and develop systematic method of reasoning which indicates his capacity for intellectual activity & clarity in thinking (8:2).

(vi) Interaction

Interaction is the differential response to one factor in combination with varying levels of a second factor applied simultaneously. That is, interaction is an additional effect due to the combined influence of two or more factors (6:272).
REFERENCES


