

**CHAPTER - III****PLAN AND PROCEDURE**

Introduction.

Method of procedure.

Selection of Schools.

Tools used.

Method of analysis of data.



**INTRODUCTION:**

The present study attempts to investigate the ability of adolescents to state and test different variables, which is a basic ingredient of experimentation in science. The stating and testing of hypothesis is a scheme of thought propounded by Piaget which appears during the formal operational stage of intellectual development during adolescence.

The progressive changes in the thinking process takes place as the individual grows from early adolescence (11+ years) to the late adolescence (15+years). Abstract thinking is essential for learning science as one is required to manipulate ideas and possibilities in mind. The development of abstract reasoning among adolescents is more urgent today. According to Piaget it is an aspect of formal reasoning where thinking is dominated more by the possibility rather than the reality.

**Objectives of the study :**

- (1) To investigate adolescent thought through an instrument incorporating Piaget type tasks.
- (2) To find out the difference in the mental

operations of stating of hypotheses and testing of hypotheses among gifted, normal and below normal adolescents.

- 3) To determine the sex differences on the ability to do controlled experimentation.
- 4) To determine the relationship between two mental operations : stating of hypotheses and testing of hypotheses.
- 5) To look for varied patterns of responses leading to the formation of experimental mind in different age groups during adolescence.
- 6) To determine the relationship between the ability to do controlled experimentation and achievement in science.

**Method of Procedure :**

**Sample**

In this field experiment, to find out the answers to the objectives stated above, a sample of about 400 pupils were initially drawn randomly from

among, pupils of four middle and high schools of urban area, belonging to grade VII, VIII, IX and X.

Later, the age and grade were controlled by selecting pupils of 11+, 12+, 13+ and 14+ years studying in grades VII, VIII, IX and X respectively.

The final size of the sample from whom all the data could be collected was 300.

#### **Selection of Schools :**

The Schools selected were all private Schools situated in the city of Aurangabad and the students drawn for this study had English as their medium of instruction. All these schools followed the same syllabus, that is, the syllabus prescribed by the Maharashtra Secondary Board of Education.

#### **Tools used :**

- (1) Stating of Hypotheses Questionnaire.
- (2) Testing of Hypotheses Questionnaire.
- (3) Culture Fair (free) Intelligence Test (Scale II, Form - A) (Cattell and Cattell).

The culture free ( or fair ) intelligence tests aims to single out the most consistent core of basic mental capacity.

The culture fair tests help in the separation of intelligence measurement from scholastic and general knowledge while maintaining a validity of basic intelligence measurement better than performance tests and at least as good as traditional pencil and paper tests.

There are 4 tests. Test (1) Series, Test (2) Classification, Test (3) Matrices and Test (4) Condition (Topology). Each, with 12 items to be completed in 3 minutes, 14 items in 4 minutes, 12 items in 3 minutes and 8 items in 2½ minutes respectively.

This test was used in the present study to find out the I.Q. of certain groups of adolescent pupils and to determine its relationship with the other variables in the study.

(4) Scores on achievement of Science ( from School Record).

Scores on achievement of science from school record are taken to find out the relationship between achievement of science and I.Q. Similarly relationship between achievement of science and stating of Hypothesis, relationship between achievement of science and testing of Hypothesis.

(I) Stating of Hypotheses is a questionnaire consisting of the following four problems.

- (1) Flow of water through a tube problem.
- (2) The Pendulum problem.
- (3) The Ramp problem.
- (4) The Seed problem.

(II) Testing of Hypotheses is a questionnaire consisting of the following four problems:

- (1) Flow of water through a tube problem.
- (2) The Pendulum problem.
- (3) The Ramp problem
- (4) The Worms problem.

These two questionnaires were administered in the regular class room and there was no time limit as such. Pupils were allowed to think as freely as possible

and take as much time as they wanted. However, to complete each questionnaire children took between 50 to 65 minutes.

After the distribution of the questionnaire, the pupils were asked to fill- in the required information on the outer cover, that is, name, age etc. Then the instructions were read out aloud by the investigator alongwith the example and children were asked to follow it in their respective questionnaire. After making sure that all had followed what they were supposed to do, they were asked to go ahead with the other problems.

**Limitations of these Test instruments:**

- (a) It does not test achievement in science or any of its specific branches.
- (b) The Testing time of these tools were on the high side and had to be administered in three sessions.
- (c) It aimed at testing only the key thinking processes that cannot be observed directly.
- (d) It does not give hints and ones in the process of solving the problem and children are made to think for themselves.

- (e) Gifted, normal and below normal adolescents were decided according to their I.Q.

The problems used in this study were presented in three separate questionnaires. The study sample comprised of 300 pupils drawn from grade VII to grade X studying in Private Schools in Aurangabad which followed the same syllabus prescribed by the Maharashtra Secondary Board of Education. On this sample factual information and data were obtained yielding - variables, relating to this study, which were subjected to statistical Analysis. The variables were- Age, Intelligence.

**Method of Analysis of Data :**

Statistical measures such as mean and standard deviation were computed in pursuance of objectives. Appropriate 't' test was employed in order to test hypothesis 1 to 6.

