

CHAPTER – III
METHODOLOGY

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3.1 Introduction :-

This chapter deals with the methodology employed to achieve the objectives of the study mentioned in chapter one. Keeping in view the nature and objectives of the study appropriate sample was selected & tools was developed. This chapter deals with the research design, sample, tools used, data collected and statistics used.

3.2 Research Design :-

The research design is the detailed plan of an investigation. Infact it is the due print of the detailed procedure of testing the hypothesis and analyzing obtained data. The research design may be defined as a sequence of those steps taken ahead of the time to ensure that the relevant data permits objective analysis of the different hypothesis formulated with respect to the research problems.

Research design refers to the systematic scheduling of the time at which treatment is administered top subjects and at which observations are made on the performance of the subjects. This careful scheduling of the treatment and observations can be very helpful in reducing the threats to the internal validity of research.

3.2.1 Design of the study :-

The design followed for the study is experimental two group design. The input given to the both groups were the two approaches of teaching science. The investigator used pre test control group design to find out the effect of multimedia approach in teaching science among students of class VIII. Two groups of students were equated on the basis of Pre-test. One of the groups, called experimental group,

was exposed to multimedia approach & other one, control group, was taught through traditional approach. Then post test if taken to see achievement.

Table 3.1 Design of the study

Characteristics	Control Group	Experimental
Entry status	Pretest	Pretest
Treatment	Traditional approach of teaching	Structural approach of teaching .
Terminal status	Post Test	Post Test

3.3 Sample

Most of the educational phenomena consists of large number of units. It would be impractical to observe each unit of the population under controlled conditions is in order to arrive at the principle having universal validity. Some populations are so large that their study would be expensive in terms of time, money, effect and manpower. Sampling is a process by which a relatively small numbers of individual objects of events is selected in orders to find out something about the entire population from which it was selected.

An appropriately chosen sample size enhances the reliability & validity of research findings. Commonly used sampling techniques are random sampling, stratified sampling, quota sampling & purpose sampling.

For conducting the present study, keeping in view the limitations and resources available with the researcher the method of purposive sampling has been used Kerlinger C1979 stated that purposive sampling is characterized by the use of judgment & deliberate effect to obtain representatives sample by including presumably typical areas on groups in the sample.

Sample of the study is drawn from one schools it is People's Public School, Bhanpura, Bhopal. The size of the sample depended purely on the enrolment and attendance of the students in class VIII in the respective school. A preliminary sample of 60 students in both the samples was obtained to which tools were administered. But due to continuous absence during the period of intervention & Pre-test data obtained from 19 students is rejected & results of only 41 students are analyzed for final result.

Table 3.2 Details of sample

Group	Boys	Girls	Total
Experimental group	16	5	21
Controlled group	16	4	20
Total	32	9	41

3.4 Variables :

A variable is something that varies. It is property that takes in different values. Variables are the conditions or characterizes that the experimenter manipulates controls or observes. There are following types of variables :-

- 1. Independent Variables :-** The independent variables are the conditions or characterization that the experimenter manipulates, controls or observes. The independent variables in the present study are teaching approaches.

Teaching approaches :- In this study teaching approaches are Independent variables. The experimental group was taught by the multimedia approach and the traditional approach.

2. **Demographic variables** :- the demographic variables are the quantity and characteristics of the people especially in relations to there are and area. The demographic variable in the study is (a) gender.

3. **Dependent Variables** :- The dependent variables are the conditions or characteristic that appear disappear or change as the experimenter removes or changes independent variables. The effect studied was in relations to the achievement in science, self efficacy, intelligence, and attitude towards science.

3.5 Tools Used :-

To select or construct appropriate tools for the study is an important aspect of any research study. Sometimes, the researcher uses tools which have been constructed by others which are standardized; sometimes the researcher has to construct tools to fulfill his/her purpose.

In the present study, the researcher has use 3 readymade tools and 1 self constructed tool keeping in view the objectives of the study.

1. **Intelligence Tool** :-

2. **Self Efficacy Tool** :- General Perceived Self-Efficacy.

3. **Science Attitude Tool** :- Science Attitude Scale.

4. **Science Achievement Tool** :- Science Achievement Test

1. **Intelligence Tool : Test of “g” Culture Fair Scale 3, Form A** :- This Tool Was Developed By R.B. Cattell & A.K.S. Cattell.

Purpose of Culture Fair Test :

The culture fair intelligence test measures individual intelligence in a manner designed to reduce, as much as possible, the influence of verbal fluency, cultural climate, and educational level.

The tests, which may be administered individually or in a group, are non verbal & require only that examinees be able to perceive relationships in shapes and figures. Each scale contains four. Subtests, involving different perceptual tasks, so that the composite intelligence measure avoids spurious reliance on a single skill.

Items and time allotted to each subtest in scales 2 and 3

	Scale 3 Form A OR B	
	No. of items	Time Allotted
Test 1 series	13	3 min.
Test 2 series	14	4 min.
Test 3 series	13	3 min.
Test 4 series	10	2 ½ min.
TOTAL	50 Items	12 ½ min.

Reliability of the Culture Fair test Scale 3.

Method of Evaluation	Average Reliability Across Sample
Consistency over items	0.85
Consistency over parts	0.82
Consistency over time	0.82

Validity of the Culture Fair test scale 3

Concept validity 0.92

Concrete validity 0.69

2. Self Efficacy Tool :- General Perceived Self-Efficacy

This tool was developed by ralf schwarzer, and Matthias Jerusalem 1993. it was revised in 2000.

Reliability : The reliability of Self efficacy scale was estimated by the Spilt-half (0.85) and Test-retest (0.80) methods which was found to be quite satisfactory.

3. Science Attitude Tool- Science Attitude Scale.

This tool was developed by Mrs. Avinash Grewal. It consist of 10 positive items and 10 negative items. The SAS is a self reporting inventory consisting of 20 items desired to assess the attitude of individuals towards science. There is no time limit but normally it takes about 15 minutes for giving responses to the items of the scale.

Reliability : The reliability of the Science Attitude Scale was estimated by the Spilt-half (0.86) and Test-retest (0.75) methods which was found to be quite satisfactory.

4. Science Achievement Tool :- Science Achievement Test

Construction of tool :-

Achievement Test in science (SAT) The syllabus of science for class VIII was analyzed keeping in view objectives teaching science and competencies of the student. The topic "Pollution" was not taught so this particular topic was opted to prepare achievement test as well as for preparing multimedia programme.

The achievement test consists of following components of pollution.

1. Types of pollution;
2. Causes of pollution;
3. Effect of pollution; and
4. How to control pollution.

In the first draft the researcher constructed is items. These were given to two teachers who were teaching science to class VIII in the school. The two teachers suggested certain modifications to constructed tool, which were in turn discussed with the supervisor.

On the basis of suggestions it was restructured by adding 5 items. Hence the modified version contained 20 items. The time limit was 1 ¼ hours. The final format of achievement test consisted of match the pairs, fill in the blanks, yes or no and short answer type. The final format of the tools is given in this form of table below:-

3.3 Tool Description :-

Sr. No.	Name of the sections	No. of questions	Marks allotted	Time allotted tentative
1.	Fill ups	5	5	5 min.
2.	True & false	5	5	5 min.
3.	Short answers	5	5	5 min.
4.	Match the pairs	5	5	5 min.
	Total	20	20	20 min.

3.6 Tryout :-

In an attempt to establish reliability of the tool, the tool administered on 10 students of class VIII of the same school (other section). Due to time and resource constraints, it was not possible for the researcher to try out the tool on some other school separately.

When the tool was administered firstly it was revealed that the students could not understand the directions clearly and failed to answer questions. After probing the students with their teachers it became known that the students were not well conversant with the topic so as to understand all the directions & questions clearly. After confirming the fact, the tools were rewritten with examples for each item separately. This tool was then administered for the tryout on the same of 10 students.

3.7 Data Collection :-

Data was collected with the help of the tools described in the preceding section. The tools were administered personally by the researcher, spread over two sessions in the same day in the school.

The researcher first established a rapport with the students. After taking the students into confidence they were motivated to answer the questions with ease and honesty. The students were psychologically prepared by the researcher to do their utmost to sincerely respond to the items of tools & leave no unresponded. They were also assured that the whole process had nothing to do with their required examinations.

An illustration of each question was given on the test sheets but, these were further reinforced by having them read out to the students before they start answering. An example of each item which was given in the test was illustrated on the blackboard to make sure that the students understood it fully. The time given to the students for answering the questions was 1 hour and 15 minutes.

After teaching the two groups successively for two days by the two methods and administering the tools a\on them the raw scores are obtained.

Table 3.7 gives the detailed schedule of data collection and intervention of the two methods.

3.7 Table Schedule of Data Collection :-

Sr. No.	Period of Activities	Post Test
	Treatment of both groups	
1.	13-02-2009 (Morning) to 14-02-2009	15/02/2006 (forenoon)
2.	13-02-2009 (Afternoon) to 14-02-2009	16/02/2009 (Morning)

3.8 Tabulation of Achievement Test, Self efficacy test intelligence test and science attitude test.

With the completion of filed work the next task was to score the test sheets & tabulate the obtained data for statistical processing and analysis. The score of each student was tabulated in the data sheet.

3.8 Statistical Technique :-

This tabulated data was then processed for obtaining mean, standard deviation and t value of the components wise score to analyse the difference as aimed in the objectives of the study.