CHAPTER III

THE PLAN AND PROCEDURE OF THE STUDY

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CHAPTER III

THE PLAN AND PROCEDURE OF THE STUDY

3.1 INTRODUCTION

The present study is aimed at studying the effectiveness of the integrated approach to teaching social studies on the performance of pupils. The nature of the problem clearly indicates two tasks of the investigation viz., (1) development of instructional tools for the investigation suited to the integrated approach, (2) manipulation of the developed instructional tools in bringing about the desired behavioural changes in the pupils.

The details regarding the first task of the investigation are presented in fourth chapter. The second task implies resorting to some systematic method to find out the answer to the problem. Since experimental research method is the most sophisticated and exacting method it has been adopted for the present investigation.

The present chapter, therefore, deals with specific methodological aspects such as the specific hypothesis to be tested, the sample selected for the experiment, the experimental design, the tools employed during the experiment, tools used for measuring the outcomes, the scheme adopted for data analysis.

Since the hypothesis clearly brings out the implications for testing the stated relations, and focus

attention to the process of data collection, the present chapter begins with the statement of hypothesis.

3.2 THE HYPOTHESES

The hypotheses derived here are based on the previous studies. A group of five studies (Wrightstone 1936, Oberholter 1937, Alexander 1939, Farthing 1940, Khushdil 1960) which were conducted in the organisation of the subject content, indicated that integrated approach to teaching social studies is effective. Another set of ten experimental studies in method of instruction (Lux 1959, Passien 1965, Mark 1972, Lammer 1972, Mckinney 1972, Darcy 1973, Wright 1973, Walker G.L. 1973, Walker N.M. 1975 and Sisterunk 1976) advocated that variety of methods of instruction are rated superior. Three experimental studies (Davis 1968, Mccoleman 1974, Phair 1975) indicated that utilization of varied instructional materials in teaching social studies yield better achievement performance. Considering concrete contribution of the above mentioned studies the investigator too felt the need of testing the relation between the integrated approach and the performance. And as she agreed to the line of thinking expressed in previous studies, she formulated the hypotheses. The hypotheses are presented in the null hypotheses form; Because experimenters have found "the null hypotheses is a useful tool in testing the significance of differences".[1]

Hypotheses

It has been hypothesized as follows:

(1) There is no significant difference between the mean achievement of total performance of the group taught through integrated approach and the group taught through the conventional approach.

(2) There is no significant difference between mean achievement of knowledge and comprehension of group taught through integrated approach and the group taught through the conventional approach.

(3) There is no significant difference between mean achievement of "Skills", of the group taught through integrated approach and the group taught through the conventional approach.

(4) There is no significant difference between mean achievement of "Attitude" of the group taught through integrated approach and the group taught through the conventional approach.

3.3 THE PROCEDURE

The procedure indicates the strategy of investigation and includes the methods to be used to gather and analyze the data. The strategy indicates now the research objectives will be reached and now the problems encountered in the research will be tackled. The discussion about the procedure,

therefore, includes following issues:

(a) The sample

(b) The experimental design

(c) Tools employed in the present study

(d) Tools used for measurement

3.a. The Sample

The question would arise as to why the investigator has selected fourth standard pupils of the primary schools of Maharashtra state as a field for experiment.

The reason for selecting a sample from the Maharashtra state is that in Maharashtra state the integrated approach is yet to be adopted. History, Geography and Civics are still taught as separate entities under the caption of social studies. Secondly, the syllabus review committee of 1966, appointed by the State Government of Maharashtra state has aptly remarked that,

> "there is a total lack of reference material absolutely necessary for integrated approach to the teaching of social studies". [2]

Some other considerations that weighed with the investigator, while selecting the fourth standard as a sample for the experiment are (a) Content of the subject, (b) Childrens' ability, (c) Significance of the subject.

The present prescribed content for Std. IV mainly includes the history of Maharashtra State and the Geography of the State, both of which are very suitable for adopting

the integrated approach. Moreover, the historical facts are given in the chronological order, which are also suitable for the same. Pupils of the fourth standard generally belong to the age group eight to nine years. Certain characteristics that emerge in the lives of children at this stage deserve consideration in planning the social studies programme. It is at this stage that boys and girls both are interested in learning about events and activities in other times and places. Their planning, discussion, selection of activities and evaluations are conditioned by facts. Children of this age-group, boys and girls both become increasingly sensitive to the judgement of their age mates. This is the beginning of a period of very rapid growth in concept formation[3], language skills, problem solving ability, and in qualitative understanding that makes it possible for these children to grasp concepts of time, distance, direction and location on maps more clearly than here-to-before; historical ideas and events can be organized into major periods but chronology of events has still little meaning for most of the children at this age.

Lastly the teaching of social studies mainly History and Geography - starts from Std. III. In History pupils are taught only stories of great men, since historical sense is not yet developed at this stage; besides there is little correlation here between history and geography. In Std. IV on the other hand, they are introduced to the history and

geography of Maharashtra state. In history, events are presented chronologically for the first time and they are also related to the geography of the State. Thus Std.IV is the basic foundation of social studies in the true sense.

With these considerations in view the sample for the study was selected from one of the primary schools of Poona City.

3.b. The Experimental Design

As mentioned in the first chapter, the main aim of present investigation was to study the comparative effect of two teaching approaches for teaching social studies. It was, therefore, necessary to have two equally matched groups to conduct the experiment.

Two Groups:

In order to get two groups matched for the selected sample, G.B. Shah's Nonverbal Intelligence Test [4] was administered. On the basis of intelligence, the sample was divided into three I.Q. level groups viz.

(i) Above average I.Q. level (above 110 I.Q.)
(ii) Average I.Q. level (From 91 IQ to 110)
(iii) Below average I.Q. level (below 90 I.Q.)[5]

Further each I.Q. level group was divided into two groups, so that each group consisted of pupils above average I.Q., average I.Q., below average I.Q.

Further the two groups were matched on statistical technique of Mean, Standard deviation and "T" test was applied to study the significance of difference.

Hypothesis for matching the two groups:

Before starting the final experiment it was hypothesized that there was no significant difference between intelligence mean scores of the two groups.

Mean Scores of the Intelligence Test

Group	Mean	SD	t value
Group 1	88.27	13.02	
			0.74
Group 2	90.18	12.58	

"t" value 0.74 is not significant

Since the two groups consisted of 48 and 51 pupils respectively the required value to be significant at .05 level of significance was 1.98. The computed critical ratio of two groups was 0.74 for intelligence scores. The obtained value for the intelligence score is lesser than the required value to be significant at .05 level of significance. Therefore, null hypothesis of difference between mean scores of intelligence is not rejected.

On the basis of the analysed data it can be stated

that mean scores of the intelligence of two groups are equal.

As it was observed that there is no significant difference between the intelligence of two groups on non-verbal intelligence test, it can be mentioned that both the groups were having the same intelligence level. Randomly one group was taken for experimentation. In the experimental group teaching was conducted by integrated approach and in the controlled group teaching was conducted by conventional approach. Here it is very essential to clarify the meaning of the following terms.

(i) Conventional approach and integrated approach with respect to teaching of social studies.

(ii) Controlled group and experimental group.

Definition of Integrated Approach and Conventional Approach:

The present study mainly concerns with comparison between the respective effectiveness of the Integrated Approach and the Conventional Approach.

By Integrated Approach is meant a new treatment specially developed by the investigator forteachching social studies. The exact definition of the terms has already been stated in the first chapter, under the caption "Definition of Terms". Hence only the terms Conventional Approach has been discussed here.

Definition of Conventional Approach

The Conventional Approach means the traditional way of

teaching the subject which is still prevalent throughout the Maharashtra State. The main features of the Conventional Approach are as under:

(1) Teacher:

The sub heads viz. History, Geography and Civics that come under Social studies are taught separately by separate teachers.

(2) Syllabus:

The contents of History, Civics and Geography are covered according to the prescribed syllabus in the given sequential order.

(3) Teaching strategy and evaluation:

The strategy employed consists of usual class room teaching and evaluation is done as per regular school schedule etc.

Some salient features of the Conventional teaching strategy

Having discussed with the regular subject teacher about the Conventional strategy of teaching the subject and having actually observed the present classroom teaching, the investigator noticed the following salient features of the Conventional Approach.

(i) The teacher mainly uses the lecture method. Sometimes some questions are asked; but most of the time is spent in the teacher's narration.

(ii) The teacher uses any teaching aids very rarely and when he uses them the purpose is not served.

(iii) Very few opportunities are given to the pupils to participate in the class work.

(iv) During the teaching-learning process the pupils mostly remain passive, and the teacher dominates the field.

Definition of Control group and Experimental group:

The group in which teaching was conducted through conventional approach is termed the Control group.

The group in which teaching was conducted through integrated approach is termed the Experimental group.

The salient features of both the approaches are discussed under five headings.

(1) Teacher

(2) Organization of the content (syllabus)

(3) Content to be covered

(4) Teaching strategy

(5) Evaluation

Control Group : Teaching through Conventional Approach

Teacher:

In the control group teaching was conducted by the same regular subject teacher. He has been teaching the subject for about ten years.

Organization of the content matter (syllabus):

The content of social studies was organized separately

under three heads, History-Civics and Geography as prescribed by the Government of Maharashtra State. Hence there was separate syllabus for History-Civics and separate syllabus for Geography. Thus the present prescribed syllabus of social studies was implemented.

Content to be covered:

Content to be covered was the same in both the groups. But the sequence followed in the Experimental group was quite different from that of the Control group e.g. the topic which is included in the first chapter of the prescribed syllabus (and hence was taught at the beginning) was placed in unit VI of the Integrated syllabus, and was to be taught much later. Thus the sequence of the content was not parallel in both the groups. But the content to be covered in the Control group was decided before hand; it amount to first four units of the Integrated syllabus.

Teaching strategy:

The usual conventional teaching strategy was employed in the Control group. No change was suggested in the routine teaching of the subject, since the Investigator was of the opinion that it was not proper to disturb the teaching of the Control group by any innovations.

Evaluation:

The same academic achievement test was administered to both the Control and Experimental groups before starting the experiment, and after completion of the experiment; in between the Control group was left to its routine teaching

learning evaluation programme. Whatever evaluation programme was conducted in between the academic achievement tests, in the Control group was not considered for testing the hypotheses, formulated for the present investigation. In other words, for the present study Control group was considered only for pre and post test evaluation of achievement performance.

Experimental Group : Teaching through Integrated Approach:

Teacher:

In the experimental group teaching was conducted by the Investigator herself, who developed her own instructional materials for the implementation of the integrated approach.

Syllabus:

An integrated syllabus developed by the Investigator was implemented in the experimental group. This syllabus was developed by integrating the content of History, Civics and Geography of the prescribed syllabus. Thus there was only one integrated syllabus covering all the three sub-heads viz. History, Civics and Geography for the Experimental group instead of three separate syllabi as in the controlled group.

Content to be covered:

During the period of experimentation only four units of the integrated syllabus were covered. Content to be taught in the Control group was matched with the content of these four units. That means the same content was taught in both the groups, but the content was determined with

reference to the first four units of the integrated syllabus.

Teaching strategy:

A new integrated teaching strategy, specially developed by the Investigator for the purpose was adopted in the Experimental group. A noteworthy feature of this strategy is that it offers the pupils a great many opportunity to participate in the teaching-learning process. The details of the strategy are given in the fourth Chapter.

Evaluation:

(a) Unit Tests

The same achievement test was administered to both Experimental and Control groups, before starting the experiment and after completion of the experiment. In between, in the experimental group unit test was administered at the end of each unit. All four the unit tests were not considered for testing the hypotheses of the present investigation. But the purpose of these unit tests was to diagnose the weaker area of the pupils' achievement performance in each unit and to give them proper feed back according to their respective needs.

(b) Direct Observations

Besides the unit tests, direct observations of the working of the class were conducted periodically in the Experimental group. The hypotheses of the present

investigation were to be tested against above mentioned pre and post achievement test and these direct observations.

(c) Achievement Tests

The same achievement test was administered to both the groups before conducting the experiment. At the end of the experiment the same achievement test was administered again to both the groups and the results were obtained for testing the hypotheses.

Independent and dependent variables

Variables are the conditions or characteristics that the experimenter manipulates, controls or observes. Independent variables are the conditions or characteristics that the experimenter manipulates in his/her attempt to ascertain their relationship to observe phenomena. Hence in the present experiment Independent Variables were the types of approaches to teaching social studies, i.e.,

(a) Integrated Approach

(b) Conventional Approach.

The dependent variables are the conditions or characteristics that appear, disappear or change as the experimenter introduces, removes or changes independent variables. Hence in the present experiment Dependent Variables were the achievement scores measured on the achievement test, administered before starting the experiment and at the end of the

experimentation. The effect of the independent variables on the dependent variables would be obtained on the achievement of gain scores i.e. post test MINUS pre-test scores. Achievement scores measured on Achievement Test which was administered on the experimental and control group.

Controls

Variables that are not of direct interest to the researcher may be removed or their influence be minimized. In the present study the Investigator tried by means of different ways to minimise the influence of the following variables.

(1) Matched groups
(2) Teachers' efficiency
(3) Content matter
(4) Time-Factor
(5) Environment of the sample
(6) Allotment of New Treatment.

(1) Two Match Groups:

The present study experiment required two groups, hence, the experimental sample was divided into two groups on the basis of intelligence. Then they were matched on statistical technique of Mean, Standard Deviation and "t" Test was applied to test the significance of difference. The obtained "t" 0.74 value was not significant. Thus on the I.Q. level matched two groups were formulated.

(2) Teachers' Efficiency:

In the experimental group teaching was conducted by the Investigator while in the Control group teaching was conducted by a primary social studies teacher who had ten years' experience. Since the Investigator herself had developed the instructional strategy for the implementation of the Integrated Approach it was considered that she was quite efficient to handle the new strategy. The teacher of the Control group, on the other hand, had a considerable experience of teaching the subject and hence she was considered equally efficient in the teaching strategy of the conventional approach.

(3) Content Matter:

In the two groups - viz, Experimental and Control - the two different syllabi were used. In the Experimental group Integrated syllabus developed by the Investigator was implemented, while in Control group the prescribed syllabus of social studies was covered. And according to these syllabi teaching was conducted in both the groups as per plan of experimentation. Content which was taught in experiment group was also taught in control group; only the sequential order of the content was different in the two groups. But at the end of the experimentation the content covered in both the groups was the same.

(4) Time Factor:

Duration of the teaching in both the groups viz, the Experimental and the Control was the same. Consequently in

the experimental group some content of the syllabus (small scale and large scale industries, factories) was not covered in the Control group.

Regular teaching period was the same for both the groups viz, the third period of the regular class time table.

(5) Environment of the sample:

In order to avoid the environmental influence, sample for the experimentation was selected from one school only.

(6) Allotment of New Treatment:

After the two groups were matched on intelligence new treatment was allotted to one group randomly.

Thus investigator had tried to control extranious variables through different ways.

Design and Procedure of the experiment

The design selected for the present experiment was "The pre-post experimental control group design".

The sample of present experiment was divided into two matched groups and randomly one group was assigned for experiment. Before starting the experiment and at the end of the experiment the same achievement test was to be administered. In between pre-test and post-test treatments was to be given to both the groups.

The design of Matched group experimentation can be

represented as follows:

Experimental group	Control group
(1) Pre-test.	(1) Pre-test.
(2) Implementation of New Treatment.	(2) Implementation of Conventional Treatment.
(3) Post test.	(3) Post test.

Obtained data will be analysed and hypotheses will be tested by the comparison of gain scores.

3.c. Tools used for Measurement

In order to measure the different variables involved in the study, various tools were used. Details about these are as follows:

(1) Academic Performance Tests.
(2) Shah's Non-Verbal Group test of Intelligence(1965).
(3) Attitude Test.

(1) Academic Performance Tests:

For pre-post testing of the pupils' academic achievement performance the test which was developed by the investigator was used. In addition to that unit tests were used for measuring academic performance during the course of experimentation.

Details of the achievement test are given in Chapter IV, as they form part of the strategy too.

(2) Shah's Non Verbal Group Test of Intelligence(1965):

For the present study the objectives to be achieved through the teaching of Social studies were to develop competence in knowledge, certain skills and attitudes. The development of knowledge and academic skills are mainly concerned with intelligence, ability of reasoning, perception and memory.

Since G.B. Shah's Non verbal group test of Intelligence measures the above mentioned intelligence powers it was selected for matching two groups.

Shah's Non Verbal Group Test of Intelligence (1965)

This test provides a measure of the subjects' intelligence in the form of Intelligence Quotient (I.Q.). It was used to match the two groups. The test has as its underlying theory, Spearmans' two factor theory. It considers the general ability and specific ability. The factors considered are reasoning, perception, memory and numerical ability. The test has seven subjects, namely, Similarity, Classification, Anology, Absurdity, Progressive series substitution Table 1 and Table 2. The test is developed for the age range between 7 years 6 months to 14 years and 5 months.

The validity of the test is established on the

following grounds:

(a) Correlation of the test with verbal test of intelligence developed at the faculty of Education and Psychology, Baroda is found to be 0.7 ± 0.072 (at 0.01 level of significance).

(b) Correlation of I.Qs on the test with the standard scores of four subjects (Science, Mathematics, Gujarati and English) was found to be 0.53 ± 0.01 (at 0.01 level of significance). The reliabilities of the tests are:

(c) Reliability:

(i) By test retest method r = 0.94 ± 0.0057 (.99 confidence interval).

(ii) Split half method r = 0.92 ± 0.19, and (.99 confidence interval).

(iii) By the method of rational equivalence r = 0.961 ± 0.0098 (.99 confidence interval). (all values - significant at 0.01 level of confidence).

(3) Attitude Test:

Attitudes with which Social studies is much concerned are exceptionally difficult to measure. But it can be possible upto some extent through closed and open approaches.

In the present study both the approaches were used

for evaluation of the attitudes of the pupils. In the closed approach the attitude test developed by the Investigator was used.

Regarding the closed approach, two types of attitude tests were used. One was selection of alternative from the given alternative and the other was Multiple Choice Test.

1st Attitude Test:

Selection of the alternative from the given alternative: In this type of test the pupil was presented with a question on an imaginary situation and is asked to take a position on either agreement or disagreement level and if he/she took correct position on the given situation, one mark was given.

2nd Attitude Test: Multiple Choice Test:

Three situations ranging from a level of agreement to level of disagreement are given in the form of statements in this Test.

In this test the pupil was presented with a statement and was asked to choose a position. If he/she chooses the correct position one mark is given.

For open approach observation scheduled was used.

For the purpose of this open approach observation was to know how far the pupils have understood the democratic way of life and to what extent the same is reflected in their behaviour. Hence behaviour of the pupils was observed diredtly when they were engaged in some activity in the

classroom. For direct observation of the pupils, behaviour, Group work observation Attitude Rating Scale was developed by the Investigator. Basic theme was adopted from Tuckmans'[6] thoughts on observation. The Observation Rating Scale was developed. It was as follows:

GROUP WORK OBSERVATION - RATING SCALE

GROUP BEHAVIOUR

Specifying the behaviours to be evaluated :

List of Behaviours

The students		
(1) Complete their work within time ..		
(2) Co-operate with teacher ..		
(3) Work harmoniously with classmates ..		
(4) Exhibit an interest in learning ..		
(5) Utilize the resources of the classroom and school ..		
(6) Be neat and organized ..		
(7) Present work report systematically..		

RATING SCALE

Students

List of Behaviours	1		2		3		4		5		6		7		8	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	es	No	Yes	
1																
2																
3																
4																
5																
6																
7																
Total																

NOTE : If the desired attainment of behavior of the pupil is displayed above fifty percent, it is considered as 'yes' - positive attainment. If the desired attainment of behavior of the pupil is displayed below fifty percent, it is considered as 'No' - Negative attainment.

Description of the behaviours

(1) Completion of work:

Variety of learning experiences are provided to the pupils, eg,

(a) For Exploratory observation of the displays, with Key questionnaires.

(b) For searching information from the text book, with Questionnaires for self study.

(c) For performing drama.

(d) Arranging Exhibition.

(e) Participating - Academic play.

(f) Writing - Answers of the Questionnaires, Work report and Home work.

(i) Above class work is completed on time.

(ii) Home work is handed over when due.

(iii) Group performance indicates that assignments have been done.

(iv) Things once begun are finished in the form required.

(2) Co-operation with Teacher:

(3) Work harmoniously with classmate:

The pupils -

(a) help teacher when asked (and often when not asked).

(b) maintain proper classroom decorum.

(c) help classmates.

(d) share with classmates.

(4) Interest in learning:

The pupils -

(a) exhibit knowledge not acquired in school.

(b) exhibit curiosity about new things to be learnt.

(c) pay attention to information being presented.

(d) tries to learn about why and how of things rather than just accepting them.

(5) Resource utilization:

The pupils-

(a) uses specific resources on own initiative.

(b) uses specific resources when instructed to do so.

(c) uses resources (including people) teacher, classmate, observer.

(d) uses resources to the best advantage.

(6) Neatness and Organization:

The pupil -

(a) keeps desk and work area organized and neat when not in use. (Stores things neatly).

(b) keeps himself neat.

(c) helps to keep the classroom neat.

(d) organizes work and materials in a systematic way.

(7) Participation:

The pupil -

(a) asks questions in class.

(b) answers questions posed by the teacher.

(c) volunteers for activities.

(d) contributes materials and information to the class and classroom.

3.d. Tools used for the final experiment

The present investigatien was aimed at studying the

effectiveness of the integrated approach to teaching social studies on the performance of the pupils.

For conducting the investigation, the following tools were used:

(a) Integrated syllabus of social studies for the IV standard of Maharashtra State.

(b) Instructional strategy with respect to the integrated syllabus.

(a) Integrated Syllabus:

At present there are two separate syllabi, one for History and Civics and the other for Geography. The integrated syllabus of Social studies was developed by integrating the contents of both the syllabi prescribed for IV Std. Hence it covered all the topics contained in the two current syllabi

(b) Instructional Strategy with respect to the

The instructional strategy specially developed for the implementation of the integrated syllabus includes the following aspects:

(i) Planning for teaching the Unit according to the content of each unit.

(ii) Teaching strategy and teaching aids.

i) Planning for teaching the unit:

Planning for teaching the unit is an effective technique of realizing the objectives of any subject. Hence

plans for teaching the unit covering the entire Integrated syllabus were developed after taking into consideration growth characteristics of the experimental sample. While planning each teaching unit the following points were considered:

(1) Overview of the teaching unit.

(2) Specification of the objectives.

(3) Analysis of teaching content.

(4) Teachers' and pupils' activity and periods allotted to each activity.

(5) Teaching Aids.

(6) Assignment for the pupils.

(7) Evaluation of the unit : Unit Test.

On the basis of these points, a script for each unit was prepared and reviewed by experts in the area of social studies, and then it was finalized .

(ii) <u>Teaching strategy with respect to the integrated syllabus:</u>

Effective organization of learning experiences is that which gives more facilities to the learners for active participation in the teaching learning process. Bearing this in mind, learning experiences were organised in such a way that they would provide ample opportunity to pupils' active participation in the teaching-learning process. This teaching strategy encouraged the learners to learn at their own speed with little help from the teacher.

The present teaching strategy was developed by integrating the elements of different methods. (Details have been given in Chapter IV, 'Development of Teaching Strategy').

The newly adopted teaching strategy consisted of the following seven steps:

Step 1 : Introduction to the new unit.

Step 2 : Exploratory observation of the displays.

Step 3 : Exploratory work ~~of~~ with the printed material.

Step 4 : Discussion among the group.

Step 5 : Activity for the whole class.

Step 6 : Presenting work report.

Step 7 : Evaluation of the unit - Unit Test (written).

New teaching strategy facilitates the pupils to learn at their own speed.

Feed back : Feedback is to be given at the end of step 2 and step 3 for 10 minutes.

Teaching Aids:

In order to make the teaching learning process effective a wide variety of instructional aids is required. The integrated approach encompasses the use of all resources allocations. In the present teaching strategy, therefore the following teaching aids were used:

(1) Visual aids - (a) Different types of maps.
(b) Pictorial charts.
(c) Graphic Charts.

(2) Printed and Cyclostyled materials.

(A detailed description of the tools used for experimentation is given in Chapter IV)

3.4 STATISTICAL TECHNIQUES USED FOR THE ANALYSIS OF DATA

The required data were collected for experimentation by using the developed tools in actual classroom situation. To obtain the results from this collected data the following statistical techniques were used.

The first two objectives of the study viz.,

(1) to develop integrated syllabus.

(2) to develop instructional strategy, did not need any statistical treatment.

For the third objective of the study, viz. 'to find out effectiveness of the strategy in terms of pupils' achievement on the achievement test. The system of the analysis adopted has been specified as follows:

Mean of the gain Scores of the Total Performance

standard deviation and

't' test to test the significance of the difference between two Means of the Total Performance and are reported in Table No.17.

For the fourth objective of the present investigation i.e. to compare the achievement performance in specific objectives namely, knowledge and comprehension, skills and attitudes.

The following statistics were calculated:

Mean of the gain Scores, Standard deviation, to test the significance of the difference between the two means. The 't' test was applied to the above mentioned variables and are reported in table Nos. 18, 19, 20, 21 respectively. The results were also confirmed by the graphical method. The graphs shown on the pages($^{274, 277,}_{280, 283}$) represents for gain scores.

For the unit test the following statistics were calculated.

The Mean scores and standard deviations, for each unit Test were calculated and are reported in Table Nos. 12, 13, 14, 15.

The raw scores on the Unit Test are represented by drawing the Frequency Polygon (Fig. Nos. 5, 6, 7, 8) to represent the frequency distribution. In present study, the matching variables is different than the variables under consideration. The variables under consideration are Total Performance and specific objectives namely, knowledge and comprehension, skill and attitude, whereas matching variable is intelligence. The two groups were matched statistically for mean and standard deviation by administering G.B. Shah's Non Verbal Intelligence Test. Hence to test significance for the difference between the two means the formula[7] used is given below:

$$SE_{DM_1-M_2} = \sigma D = \sqrt{\left(\sigma^2_{Mx_1} + \sigma^2_{Mx_2}\right)\left(1 - r^2_{xy}\right)}$$

Knowing the standard error for difference between the means 't' value was calculated as usual.

Since the present study aimed at only studying the effectiveness of the Integrated Approach very simple statistical technique was applied to test the hypothesis formulated for the third and fourth objectives.

3.5 CONCLUSION

The present chapter entitled "The Procedure" gives a complete picture of the procedure adopted while investigating the answer to the problem under study. It opens with the hypotheses to be tested, gives, explains the reason for selecting the particular sample and describes in detail the experimental design and the tools used for experimentation as well as for evaluation of achievement performance of the pupils and of the total impact of the integrated approach. A question arises at this stage as to how these different tools of experimentation and evaluation were developed. The next chapter, therefore, deals with the development of the tools.

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