# Chapter 3

# Plan and Procedure

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## PLAN AND PROCEDURE

### 3.0 INTRODUCTION

The review of related literature gave a clear vision to the researcher about the research gaps which helped in finalizing the methodology to be adopted for the present study. This chapter gives clear understanding about plan and procedure adopted by the researcher in the present study. The chapter deals in detail about the design of the study, population of the study, selection of sample, sources of data collection, different tools and techniques used in the present study as well as overview of development of an instructional strategy. This is followed by a detailed description of the procedure of data collection and techniques of data analysis used in the present study. The detailed description of the development and implementation of an instructional strategy is described in the following chapter.

### 3.1 DESIGN OF THE STUDY

The research aimed at developing an instructional strategy for comprehension in science and studying effectiveness of the implemented strategy. The research was carried out in the actual context so that, all the variables which are generally operative in teaching learning situations were operative during this study. Although the study was confined to one group with which the developed instructional strategy was experimented for the purpose of comparison control group was employed on the underlying principle that they also will undergo the same course certainly not through developed instructional strategy. The study is experimental type in nature. Because of the practical difficulty and limitation of the field it was not possible for the researcher to go for random assignment to experimental and control group and therefore random assignment of intact groups to treatment was assigned instead of random assignment of individuals. Thus keeping in mind the field realities the quasi experimental design was used for the present study. The pretest post test non equivalent group design was employed for the study. This design is very much like the pretest posttest control group design but the only difference is that it involves random assignment of the intact groups to treatments, not random assignment of individuals. The diagrammatic representation of the research design for the present study is presented below:

$O_1$  X  $O_2$      where $O_1O_3$ are pretests      X is experimental group

$O_3$  C  $O_4$      where $O_2O_4$ are post tests      C is control group

The pretest post test non equivalent group design is often used in the classroom experiments when experimental and control groups are such naturally assembled as intact classes.
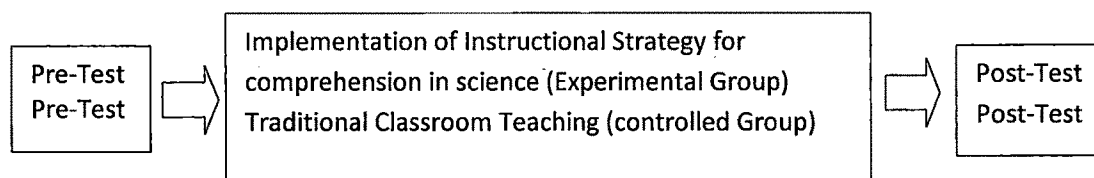
| Pre-Test Pre-Test | ⇨ | Implementation of Instructional Strategy for comprehension in science (Experimental Group) Traditional Classroom Teaching (controlled Group) | ⇨ | Post-Test Post-Test |

**Figure 3.1 Overview of the research design**

Experimental design involves a comparison of the effects of particular treatment with that of different treatment. In the present study the dependent variable is comprehension in science and independent variable is instructional strategy based on learner centered activity based competency dependent inquiry approach.

### 3.1.1 Control to the threats of experimental validity

Any experimental design has threats to its experimental validity that is internal validity and external validity. According to Best and Kahn (2008) in educational experiments a number of extraneous variables are present in the situation or are generated by the experimental design and procedures. These variables influence the results of the experiment in ways difficult to evaluate. In a sense they introduce rival hypotheses that could account for experimental change not attributable to the experimental variables under consideration. Although these extraneous variables usually cannot be completely eliminated, many of them can be identified and possible precautions can be taken to minimize their influence through sound experimental design and execution. The researcher made full efforts to control the threats of experimental validity. Effect of testing and interaction with the control variable were controlled by not revealing to the students of both the groups the purpose of the pre test and not making the groups aware that there is going to be some sort of treatment. Further the two groups selected were geographically located at a distance in two different places and so the students of the two different groups had no interaction with each other. The groups selected were of the same class and there was randomization to the entire group rather than randomization to the individual students but still this took care of maturation because it is assumed that the students who fall under the same age group mature or develop in similar way. According to Creswell (2011), individuals develop or change during the experiment and these changes may affect their scores between pretest and post test. A careful selection of the participants, who

mature or develop in a similar way that is taking individuals at the same grade levels for both the control group and experimental group helps to guard against this problem. The tests used were validated by the experts and the researcher personally administered both the test on both the groups which took care of unstable instrumentation. Also the instructional strategy was implemented in the natural setting of the classroom and thus could control the artificiality of the experimental setting. Both the groups were selected as a whole irrespective of their pretest scores so there was no question about statistical regression. There was no drop out of students in case of experimental as well as controlled group hence the experimental mortality was also taken care of.

## 3.2 PHASES OF THE STUDY

The study was conducted phase wise. The detailed description of different phases is as below:

*Phase I:* **situational analysis of the way the subject science and technology is taught in schools of Vadodara city and development of achievement test based on comprehension in science and science comprehension of story test**

The present study endeavored in developing an instructional strategy and studying its effectiveness for comprehension in science among class VII students. In order to develop an instructional strategy the researcher intended of doing situational analysis of the way science is taught in various schools in Vadodara city. In order to collect data for the said purpose classroom observations, semi structured interview with the teachers teaching the subject science and technology at primary classes specifically seventh class were carried out and field notes were prepared during the classroom observations to note down the interactions taking place in the classroom. In order to do situational analysis for development of the strategy the researcher meet the teachers teaching the subject science and technology at class seven and conducted their interviews during the academic year 2008-2009 and also observed the lessons transacted by the science teachers seeking permission from fifteen school principals to find out the different methods, media, approaches, teaching aids used by them to teach the content of the class VII syllabus. The participation of the students was also observed and the interactions between teacher and students were noted down. The question papers of the examinations conducted in the schools were reviewed and then

instructional strategy was developed by the researcher with major emphasis on science comprehension.

The researcher developed the science comprehension test in the form of stories. Four different stories were developed cutting across the concept of density, concept of solute, solvent and solution, levers simple machine, different fundamental forces. The developed tests were sent to the expert in the relevant field to find out the validity and the modifications suggested were incorporated. The achievement test was also prepared by the researcher based on the six chapters and the test was implemented personally by the researcher on the experimental and control group students in order to find the comprehension in science. The tests were administered on the selected sample and their scientific comprehension was determined.

***Phase II:* Development and implementation of an instructional strategy**

The researcher selected six chapters from standard VII science and technology book and then developed strategy for the science comprehension depending on the result of phase I. On these selected chapters researcher formulated instructional objectives with major focus on comprehension level following action verbs from blooms taxonomy. In order to achieve these instructional objectives different learning experiences were provided to the students incorporating different activities to be implemented in the class room like predict-observe-explain, story based on principles of science, discussion session, project work, showing of animated films, making of toys based on principles of science using waste material or low cost material. The developed instructional strategy was based on learner centered methods of teaching. This developed strategy was send to subject experts to find the suitability of the activity to the content as well as level of the students and the suggestions given by the subject experts were incorporated. The strategy was implemented for pilot study on a group of student other than sample to find out appropriateness of the learning experiences. Then the final strategy was implemented on the selected sample. The overview of the steps undertaken by the researcher in order to develop the instructional strategy is presented in the figure 3.2 on the succeeding page:
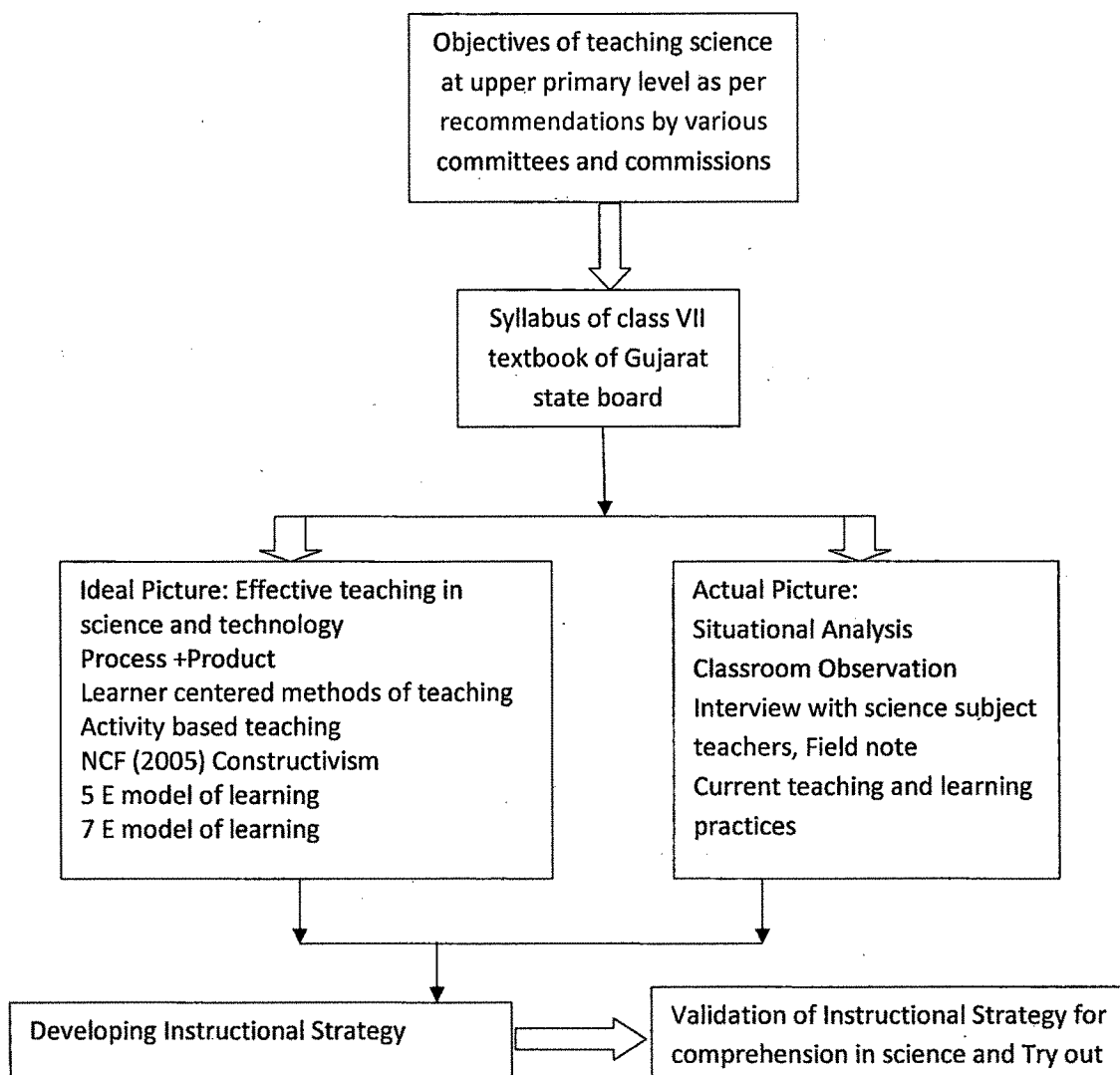
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┌─────────────────────────────────┐
│  Objectives of teaching science │
│  at upper primary level as per  │
│  recommendations by various     │
│  committees and commissions     │
└─────────────────────────────────┘
                │
                ▽
        ┌──────────────────┐
        │ Syllabus of class VII │
        │ textbook of Gujarat   │
        │    state board        │
        └──────────────────┘
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┌────────────────────────────────────┐        ┌────────────────────────────────────┐
│ Ideal Picture: Effective teaching in │        │ Actual Picture:                      │
│ science and technology               │        │ Situational Analysis                 │
│ Process +Product                     │        │ Classroom Observation                │
│ Learner centered methods of teaching │        │ Interview with science subject       │
│ Activity based teaching              │        │ teachers, Field note                 │
│ NCF (2005) Constructivism            │        │ Current teaching and learning        │
│ 5 E model of learning                │        │ practices                            │
│ 7 E model of learning                │        │                                      │
└────────────────────────────────────┘        └────────────────────────────────────┘

┌─────────────────────────────────┐            ┌────────────────────────────────────┐
│ Developing Instructional Strategy │  ═══════▶  │ Validation of Instructional Strategy for │
│                                 │            │ comprehension in science and Try out │
└─────────────────────────────────┘            └────────────────────────────────────┘

**Figure 3.2 Overview of the development of instructional strategy**

### 3.2.1 Instructional Strategy to teach science and technology at class VII

The researcher intended to develop instructional strategy to teach science and study its effectiveness among class VII students. Instructional strategy is inclusive of the sum total of all the learning experiences provided by the researcher in order to achieve the desired educational objectives. The researcher selected six chapters from the textbook of science and technology and designed instructional objectives for the content of the selected chapters. In order to achieve the framed instructional objectives the researcher thought of different learning experiences to be provided to the students. The learning experiences designed were in the form of performing number of activities by the student either in group or individually, demonstrations, making of

toys from trash or low cost material, showing of animated films, powerpoint presentation, making the students predict observe explain by providing different situations. The detailed description of the development of instructional strategy and its implementation is given in the following chapter. The researcher developed instructional strategy based on learner centered activity based competency dependent inquiry approach. The table below gives the schedule of the instructional strategy.

**Table: 3.1**

**Schedule of implementation of an instructional strategy**

| Date | Concepts taught | Learning Experience(s) |
|---|---|---|
| 16.06.2009 | Concept of Muscular Force | Tug of War |
| 17.06.2009 | Concept of magnetic field lines, magnetic force | Experiment using u pin, bar magnet and a plastic scale |
| 18.06.2009 | Concept of magnetic field lines, magnetic force | Activity of getting magnetic field lines using bar magnet |
| 19.06.2009 | Principle of maglev train | Toy made from pencil, CD, slippers and ring magnets |
| 20.06.2009 | Gravitational force | Dropping of objects<br>Activity of stretching the arm horizontally from the shoulder |
| 22.06.2009 | Concept of Electrostatic Force<br><br><br>Concept of Electrostatic Force | Experiment of rubbing plastic scale on hair and taking it near to the pieces of paper<br>Rubbing of inflated balloon with different material and trying to stick it to the wall<br>Rubbing two inflated balloons tied to a string on same material and bringing them together<br>Demonstration of rubbing one straw with wool and bringing it near another straw |
| 23.06.2009 | Frictional force<br>Advantages and Disadvantage of frictional force | Activity of writing on a greased paper<br>Demonstration of lifting roller on inclined plane<br>Activity of pulling a entwined textbook. Discussion after the activities |
| 24.06.2009 | Concept of force and Various effects of force | Demonstration and discussion based on demonstration |
| 29.06.2009 | Concept of motion and types of motion | Demonstration and discussion based on demonstration |
| 30.06.2009 | Concept of speed | Organizing running race and calculating speed keeping distance constant and noting time |

| Date | Concepts taught | Learning Experience(s) |
|---|---|---|
| 27.07.09 | Concept of least count | Drawing beakers of different calibrations on black board and involving students in finding least count for each |
| 28. 07.09 | Measurement of mass<br>Measurement of volume | Measuring mass using spring balance<br>Measuring volume of given regular shaped object using scale |
| 29.07.09 | Measurement of mass<br>Measurement of volume | Measuring mass using spring balance<br>Measuring volume of given regular shaped object using scale |
| 30.07.09 | Measurement of volume of irregular shaped object which is insoluble in water and which sinks in water | Experiment of measuring volume of the given stone using displacement method |
| 31.07.09 | Measurement of volume of irregular shaped object which is insoluble in water and which sinks in water | Experiment of determining volume of the given stone using displacement vessel |
| 1.08.09 | Density | Predict observe explain |
| 20.08.09 | concept of lever | Discussion, showing of realia media |
| 21.08.09 | Classification of lever based on position of load, effort and fulcrum | Fifteen Pictures of 3 types of levers |
| 22.08.09 | Difference between gardners scissors, metal cutter and tailors scissor | Realia media and pictures of three types of scissors |
| 24.08.09 | Candle seesaw | Demonstration of candle see saw |
| 25.08.09 | Concept of principle of lever | Predict observe explain<br>Using spoon with small handle and spoon with longer handle |
| 26.08.09 | Principle of lever | Building a lever using a scale 30 cm long made of wood, two paper cups, pencil and cello tape |
| 27.08.09 | Examples of levers | Power point presentation |
| 6.11.09 | Physical property of water | Demonstration using ghee, wax, test tube and spirit lamp |
| 7.11.09 | Wax is made of carbon and hydrogen | Experiment in small group |
| 9.11.09 | Solute, solvent and solution | Experiment in small group |
| 10.11.09 | Hard water, soft water | Experiment in small group |
| 12.11.09 | Removing temporary hardness of water and methods to purify water | Experiment in small group |
| 13.11.09 | Methods of purification of water | Experiment in small group |

| Date | Concepts taught | Learning Experience(s) |
|---|---|---|
| 15.11.09 | Pollution of water and remedies to prevent pollution of water | Powerpoint presentation |
| 29.12.09 | Forming shadows and making a mirror | Experiment with light source, transparency, coloured paper, over head projector |
| 30.12.09 | Laws of reflection | Experiment to prove laws of reflection using CD and source of light |
| 31.12.09 | Regular reflection | Experiment in small group using rectangular block, aluminum foil and light source<br>Demonstration of regular reflection |
| 02.01.10 | Irregular reflection | Experiment in small group using crinkled aluminum foil, light source and rectangular block |
| 04.01.10 | Characteristics of image in plane mirror | Predict observe explain |
| 06.01.10 | Characteristics of image in plane mirror | Small group activity using a card board just as chess board and placing object at different positions |
| 07.01.10 | Image formed by mirror is behind the mirror | Small group activity using candle, rectangular transparent glass, two lumps of modeling clay and glass filled with water |
| 08.01.10 | Multiple reflection | Experiment in small group using mirrors and object placed between two mirrors at different angle |
| 09.01.10 | Making kaleidoscope | Using 3 rectangular glass, pieces of bangles, thermocol balls |
| 08.02.10 | Curved mirrors | Observing face by folding transparency, steel spoon |
| 09.02.10 | Concave and convex mirrors | Touching the surface of both mirrors and finding the difference<br>Observing image formed in both the mirrors |
| 10.02.10 | Concave mirror as converging mirror | Demonstration followed by discussion |
| 11.02.10 | Convex mirror as diverging mirror | Demonstration followed by discussion |
| 13.02.10 | Concave mirror as converging mirror | Experiment in small group allowing sunlight to fall on concave mirror and burn a paper |
| 15.02.10 | Uses of concave and convex mirror | Discussion |

*Phase III:* **the effectiveness of the developed instructional strategy**

The effectiveness of the developed instructional strategy was determined in terms of difference in the mean gain scores obtained by the students during pretest and post test of the experimental as well as control group and then calculating the t value.

The effectiveness of the instructional strategy was also judged by collecting the relevant and adequate evidences in the process of tryout of the instructional strategy on the experimental group. To get comprehensive feedback of the instructional strategy reaction was taken from the students at the end of the academic year 2009-2010. To study the effectiveness of the instructional strategy on process aspect of science and technology subject field diary was maintained and researcher observed and recorded the changes in the students while undergoing the activities over a period of one academic year either by still photography, video recording and field diary. The effectiveness was also found by calculating the t value on the scores obtained on test of science comprehension of a story

### 3.3 POPULATION

All the sixty five teachers teaching the subject science and technology at class VII English Medium Schools of Vadodara city following syllabus of Gujarat State board of School textbooks, Gandhinagar during the academic year 2008-2009 constituted the population of the study.

The population of the study consisted of all the three thousand and forty eight students of class VII studying in English Medium schools of Vadodara city following syllabus of Gujarat state board of school textbook, Gandhinagar during the academic year 2009-2010.

### 3.4 SAMPLE

List of English Medium schools following syllabus of Gujarat State Board of school textbook in Vadodara city was collected by the researcher from the District Education Officer (Appendix G). Of the total number of English medium schools following syllabus of Gujarat State Board of School Textbook in Vadodara city fifteen schools were randomly selected by the researcher using lottery method. For the requirement of data for objective one the teachers of the fifteen selected schools teaching science and technology at class VII during the academic year 2008-2009 constituted sample.

List of English Medium schools following syllabus of Gujarat State Board of school textbook in Vadodara city was collected by the researcher from the District Education

Officer (Appendix G). Out of the total schools those schools were listed where the principal or the management of the school was ready to allow the researcher to conduct the experiment. Of these schools two schools were randomly chosen following lottery method. All the students studying in class VII of the randomly chosen schools constituted the sample for the present study. One school was randomly chosen as control group and another as experimental group. All the students studying in class VII of the controlled group school and experimental group students were the sample of the study. Thus the technique used for sampling was cluster sampling. The sample as per objectives is presented in the table below:

**Table: 3.2**
**Description of the sample as per the objectives**

| Sr. No. | OBJECTIVE | SAMPLE | ACADEMIC YEAR | SAMPLE SIZE |
|---|---|---|---|---|
| 1 | Objective 1 | 15 school teachers All the students of class VII of these fifteen schools | 2008-2009 | 15 teachers |
| 2 | Objective 2 | Students | 2009-2010 | 52 42 |
| 3 | Objective 3 | Students | 2009-2010 | 52 |
| 4 | Objective 4 | Students | 2009-2010 | 52 42 |

## 3.5 TOOLS AND TECHNIQUES

The tools and techniques used in the present study are described in detail along with the purpose for which it is used.

**3.5.1 Observation:** Observation was used to determine various method, media, approaches, various teaching aids and activities done by the teachers in the classroom to teach science to students of standard VII. The observation was used at two places. Non participant observation was used to observe the lessons transacted by the regular school teachers. Observation was also used while the instructional strategy was implemented on the students of experimental group. The purpose of observation was to note the responses of the students while conducting experiment or activity.

Curriculum gets operationalised in the classroom through its transaction. The classroom observation was the major source for preparing the instructional strategy. The sole purpose of observing the classroom was to find how the teacher conditioned the pupils toward the subject matter. How was the lesson introduced? Was there any scope of conducting the activity? Did the teacher allow the students to interact among

themselves? Whether the class was conducted in the laboratory or field or classroom? Whether any displays were used either by the teacher or by the students? Did the teacher involve the students in preparing certain displays? Were the students asking any questions? What types of examples were cited? Whether the classroom climate allowed the students to express their ideas and opinion?

The classroom observation focused on

- ❏ Interactions between teacher and students as well as student and student (peer interaction if any)
- ❏ Methods of teaching
- ❏ Type of questions raised by the teacher in the classroom
- ❏ Questions raised by students if any
- ❏ Use of media if any during the transaction of the lesson
- ❏ Organization of co-curricular activities
- ❏ Nature of home work, assignments, projects
- ❏ Activities if any done by the teacher
- ❏ Approach used by the teacher
- ❏ Whether group work was being organized

Framework for classroom observation was based on review of literature by Wiles and Bondi (1989). A preliminary set of parameters covering different aspects of evaluation was evolved to systematize the observation and data collection. The framework for classroom observation was evolved by actually listing down the general classroom practices and review of pertinent literature Hawthorne (1992), Goodlad, (1984). The aim of observing the classroom was as follows:

- ❏ To study the transaction of science and technology as a subject in the classroom
- ❏ Finding out how far the objectives of teaching science at primary level are satisfied?

Classroom observations were noted down and presented in field dairy form and are reproduced in the following chapter in the form of episodes (Refer 5.1). This type of observation provides information which cannot be reflected in a check list Goodlad, (1984) and according to Miles and Huberman, (1984) it provides a straight description of concrete happenings as additional information to the researcher. Its description value is greatly enhanced when the case can be located as an instance of a more 'general class of events'. To achieve this researcher treated the case in point as either a representative of or a departure from a particular type. This method gains credibility

when it contains both subjective and objective methods. This form of recording the classroom observation and follow up interviews was followed by the researcher.

**3.5.2 Field Notes:** While the teaching-learning process was going on, the researcher noted down teachers' behaviour and students' behaviour in the classroom situation. The participation of students in the teaching-learning process was also noted down. The field note was also used to note down the responses of the students while implementing the instructional strategy

**3.5.3 Interview Schedule:** A semi-structured Interview schedule was prepared to find out the method, media, approach, various teaching aids used by science teachers to teach subject science and technology at class VII and also clarify as to why a particular method or approach is used by the teacher. The purpose of the interview schedule was to further probe into the matter to get credibility.

**3.5.4 Science Comprehension test in the form of story:** Four stories having basic concepts of science were constructed by the researcher and care was taken to limit the science concepts which the students are expected to learn up to standard VII. Four different stories were developed cutting across the concept of density, levers simple machine, different fundamental forces Appendix (E1 to E4).

The test constituted of questions of different types catering to comprehension level of objectives evaluating different area of learning. A brief description of type of item, level of objective, and evaluating area is presented in the table below:

**Table: 3.3**
**Brief outline of the format for four stories**

| Item No. | Type of Item | Level of Objective | Evaluating Area |
|---|---|---|---|
| 1 | Identify the cause for given effect | Comprehension | Cause & Effect |
| 2 | Identify the cause for given effect | Comprehension | Cause & Effect |
| 3 | Example from the story/Cause and effect | Comprehension | Convergent Thinking |
| 4 | Example out of the story/identify cause for given effect | Application to real life | Divergent Thinking |
| 5 | Example from daily life/story | Extending Knowledge to real life | Divergent thinking |
| 6 | Open-ended Questions Listing scientific principles involved in the story | All possible levels of cognition | Revelation of constructed knowledge |

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The developed tests four stories were sent to the experts Appendix (F) in the field of science for validation and the modifications suggested were incorporated.

**3.5.5 Achievement Test based on comprehension in science:** A test consisting of 50 items was developed by the researcher to determine the comprehension of students in the concepts of the selected chapters. The test consisted of certain activity, pictures, situation based on concepts of science Appendix (D). This test was used as pretest and the same test was used as post test after implementation of the strategy.

The achievement test was prepared by the researcher based on the content of all the selected chapters for the implementation of the strategy for the students of class VII. The basic principle kept in mind while preparing the achievement test were as suggested by Gronlund (1968)

- ☐ Achievement test should measure clearly defined learning outcomes that are in harmony with the instructional objectives.

- ☐ Achievement test should measure an adequate sample of learning outcomes and subject matter included in the instruction.

- ☐ Achievement test should include the type of items which are most appropriate for measuring the desired learning outcomes.

- ☐ Achievement test should be designed to fit the particular uses to be made of the results.

- ☐ Achievement test should be made as valid and reliable as possible and should then be interpreted with caution.

The researcher was of the opinion that multiple choice questions will not be able to measure the actual learning outcomes of the students because of chance of guessing and hence the reliability of the same will be less. Therefore the researcher developed test containing direct question and short answer type of questions. The prepared test was sent to experts in the field of science and science education for validation. The experts validated the test items in terms of the effectiveness and clarity of the instruction as well as clarity of language of the items. The experts also studied whether the items measure comprehension among the students, and whether the items are to the level of the students. The experts suggested adding quantity of kerosene and honey to be added to water in question number five. In question number six there was technical error of writing kilogram instead of kilogram weight for weight of the boys. The suggestion given was to specify whether the weight kept at the end of the three

levers in the diagram in question number seven are of equal weights or varying weights. There was suggestion to modify question number twenty as well as question number twenty five. The experts also suggested to add from where will the students identify which case will require less force in question number thirty four. The suggestions given by the experts were incorporated after discussion with guide. The finally prepared achievement test had in all fifty questions cutting across all the concepts from the selected six chapters. The detail of the questions along with the chapter it belonged to is presented in the table below:

**Table: 3.4**
**Chapter wise details of the questions**

| Name of the chapter | Number of Questions | Total Questions | Total Marks |
|---|---|---|---|
| Motion, Force and Speed | Q.8,Q.9,Q.12,Q.16,Q.17,Q.18,Q.25,Q.31,Q.33, Q.35,Q.38,Q.40 | 12 | 20 |
| Lever | Q.1, Q.2,Q.3,Q.4,Q.6,Q.7 and Q.34 | 7 | 14 |
| Water | Q.5, Q.19,Q.20,Q.26,Q.28,Q.37,Q.43,Q50 | 8 | 12 |
| Measurement | Q.10,Q.11,Q.13,Q.39,Q.41,Q.46,Q.48 | 7 | 9 |
| Reflection of Light | Q.15,Q.21,Q.23,Q.24,Q29,Q.30,Q.32, Q.36,Q.42,Q47 | 10 | 15 |
| Curved Mirrors | Q.14, Q.22, Q.27,Q.44,Q.45,Q49 | 6 | 10 |
| TOTAL | | 50 | 80 |

**3.5.6 Activities related to Science followed by series of questions in the form of worksheets:** Certain activities related to science were developed by the researcher by reviewing related literature and also consulting experts in the field of science education. One of the activities was predict observe explain where in the students were asked to predict what will happen in a particular situation. Then the students were given opportunity to perform the experiment and observe actually what happens. This was followed by providing the students the opportunity to explain. For eg: Take an orange and a lemon and put both one by one in a beaker filled with water. What will be result in each case? Now peel off orange as well as lemon and again put them in the same beaker filled with water. What will be the result? What is the cause?

**3.6 DATA COLLECTION**

The researcher took permission from the principals of all the fifteen schools of Vadodara city. A forwarding letter addressed to the principals was prepared and assurance was given that data collected will be used for research purpose only and

will be kept strictly confidential. The data were collected personally by the researcher in different phases. For the purpose of developing the instructional strategy (doing situational analysis and observation of the classroom) the data was collected in the year 2008-2009 by observing seventy five observations of the classroom. Based on the results obtained by situational analysis instructional strategy was developed by the researcher focusing on learner centered method of teaching (Refer table 4.1). The instructional strategy was implemented in the selected school during the academic year 2009-2010 and the data required while implementation of the strategy were collected personally by the researcher throughout the academic year 2009-2010. The investigator personally administered the pre test and post test in both the schools control as well as experimental school during the academic year 2009-2010.

## 3.7 DATA ANALYSIS

The data collected during situational analysis was analysed using frequency and percentage and using content analysis. The analysis of science comprehension test in the form of story was done using descriptive statistics such as mean, Standard Deviation and also calculating t value for all the four stories. The responses given on question number seven were analyzed by using content analysis. The effectiveness of the instructional strategy was determined by finding out the mean gain score on pre test and post test for both the groups experimental as well as control then on the mean gain score there was t test applied for finding effectiveness of the strategy. Content analysis technique was used to analyze data collected through field note and observation.

The present chapter elucidated a detailed description of the plan and procedure used during the study. The following chapter describes in detail the development and implementation of an instructional strategy to teach science at class VII.