Chapter-3
Research Design
Chapter-3
Research Design

3.0 Introduction
3.1 Origin of the Problem
3.2 Population of Research
3.3 Variables of Research
3.4 Research Field
3.5 Type of Research
3.6 Research Method
3.7 Planning of Research
3.8 Construction of Tool
3.9 Construction of Time Table
3.10 Selection of Transition Period
3.11 Planning for Accidental Situation
3.12 Planning of Experiment
3.13 Data Collection
3.14 Analysis of Data
3.15 Validity of Experiment
3.16 Experiences of Researcher during Experiment
3.17 Conclusion
3.0 Introduction

Planning is very useful when an individual wants to work systematically, methodically and with well organized manner. Any professional like engineer, director, teacher, traveler, businessman, lawyer, artist or even housewife plans for the work mentally and then they apply the plan to achieve the goal. Each and every activities of the life must be well planned. If the importance has been given to the planning to each and every activity of the life and profession, one should think seriously for the planning in research too because research should be done ethically, seriously and systematically. The research without planning is like a ship in the river without any direction.

According to Shree P. R. Dubhashi

“Planning is well organized system for the future”¹

The planning of the research includes many basic question of the research work like which should be the objectives of the research? How to achieve the objectives of the research? How much help would be needed to achieve the goal of the research? How to remove the obstacle to achieve the goal of the research? The researcher needs to reflect on the basics of the research and should probe into the fundaments of the research before undertaking any research work. Thus, the systematic, well organizes and methodical technique of the thinking is called the planning of the research. It can be both in mental and written form. The researcher can use it whenever it becomes important.

According to Ramu Pandit

“Planning is an instrument to bring the change into the environment or social frame for the achievement of the goal and is the critical use of the natural resources available to mankind”

Any research should be passed from some key processes. The more accurate the planning, the least weaker the research work will be. In the research, many important steps like population, sampling, the process of sampling, variables, construction of the group, research tool, method of data collection, technique of data analysis and interpretation are important. If the planning done by the teacher is sound,
more accurate, favorable and exact finding can be achieved by the researcher. Thus, the researcher must have planning of the research to decrease the efforts and avail the maximum outputs of the research. The research should have clear mental design to overcome the future challenges and how to use the maximum resources available to the researcher. The research work with preplan leads it to success and achievement of the objectives. Thus, the successful research work depends upon the skilled, accurate and sound preplanning by the researcher. Proper planning is needed for the objectives, hypotheses, research sample, method, tool and time of the research. Thus, the research is scientific, systematic, expertise, well-organized, logical process which depends upon the sound, skilled and systematic preplanning of the researcher.

3.1 Origin of the Problem

In any field of the knowledge, the active individuals feel the need of the change or improvement by their constant reflection and thinking. The origin of the research lies in the realization of the need or the problem in the specific field.

Researcher herself is the lecturer of the Gujarati language. As a result, researcher used to visit the schools for the observation of the lessons of trainees. During the visits to the school, the researcher talked and discussed with the school teachers who were teaching Gujarati at school level. There were certain questions arose in the mind of the researcher. These questions motivated the researcher to undertake the research in the present field. Many teachers worried that many students were unable to reflect in the Gujarati language and especially in the Gujarati grammar. The students lacked logical reasoning in the Gujarati grammar and Gujarati language too.

The researcher had studied various teaching models during the teaching at B. Ed level. Various subjects can be taught based on the presentation with the reference to different teaching model. There are many methods and techniques available for the teachers to teach the Gujarati language and grammar of Gujarati Language. In the present era, how to make the students learn with different techniques and methods is the pivotal question. Moreover, the teacher must adopt the innovative techniques and methods to teach the students so that the retention of the students can become the life long process.
The researches regarding the concept attainment model have been undertaken by many researchers in many universities on many subjects. Most of the researches have been undertaken on science and mathematics by the researchers. So, keeping in mind that factor, the researcher had selected the concept of six types of adverbs from Gujarati language grammar. The researcher has constructed the concept attainment model for the teaching of six types of adverbs of Gujarati language. The researcher has constructed the model and aimed to assess the educational or academic achievement of the students.

3.2. Population of Research

Population is the group of people whose characteristics are same in one or all manner. Population is the salient characteristics. In the research terminology, it can be said that population is the group of the people on which the findings achieved by the researcher will generalized. Till the population has not been defined, the findings carried from the sample cannot be possible. Thus, the population is an important part of the research.

According to Arthur Bertrand,

“Population generally means all the members of well-defined group or incidents or all members of the thing”3

According to Dipika Bhadresh Shah,

Population is a whole unit for whom the research was aimed or undertaken; or the findings which aimed to be generalized the group”4

In short, the population can be understood by keeping in mind following aspects.

• Total numbers of unit for which the information is expected with reference to the research.
• The unit of group to which findings of the research generalized or aimed to.
• A group or unit of people, incidents or things for whom the findings of the research generalized.
• A group or unit from which the researcher selects with an appropriate technique small representative sample.
• A group or unit of people, incidents or things for which and on which the researcher undertake the research.

In short, a unit or group of people, incidents or things from which small representative part has been selected and the findings achieved from that small portion applied and generalized to the larger whole is called the population in the research terms.

In the present research, the students of 9th standard who are studying in the academic year 2009-10 of Mehsana district was selected as a sample of the research. The students were studying in the Gujarati medium secondary school.

3.3 Variables of Research

When a research has been undertaken in any field of the knowledge, many factors and aspects affects the research problem. The sample or person on which the research has been undertaken is also affected by many factors and aspects. Thus, the work of the educational research is to study the effect of those variables on other variables of the research. This, the research has been affected by many factors. Some factors should be applied or operated while some variables should be controlled. These affective factors are called the research variable of the study in the research terminology.

Variable=stimuli of change or reformers.

It can be said that variable is a characteristic which has different values. In other words, variable is that which varies in different situation. It’s a characteristic or a factor of an individual, group, incident or thing which can be changed. It is called a variable of the research. Examples of variables are gender, area, intelligence, IQ, age, achievement, height, weight, qualification, experience etc.

Type of Variable

Types of the variable are as under given below.

1. Independent Variable

Independent Variable = stimulus, input
Independent variable is a factor or aspect which is selected, applied, measured or regulated by the researcher to establish its relationship with the factor, incident or experiment under observation. An example of it is ‘an effect of teaching method on the academic achievement of the students’ In this research problem, teaching method/s would be the independent variable of the research.

2. Dependent Variable

Dependent Variable = Response, Output

Dependent variable is a responsive or output variable. Dependent variable is a factor or aspect on which the effect of independent variable has been measured, observed or regulated. Thus, dependent variable is affected variable while independent variable is an effective variable. Dependent variable is affected by independent variable. An example of it is ‘an effect of teaching methods on the academic achievement of the students.’ Here academic achievement of the students will become dependent variable with the reference to research terminology.

3. Moderator Variable

Moderator Variable = special variable, sub-independent variable

Moderator variable mentions and describes the special sub-independent variable. The intervening variable word accepts that it has been selected for the research to act as sub-independent variable in the research.

The intervening variable is that type of factor which has been selected, applied and measured by the researcher to trace or measure the change in the relationship between the independent variable and dependent variable.

For example:

To study the effectiveness of Teaching Method on the academic achievement of male and female students. Here

- Independent variable (X) would be teaching methods.
- Moderator variable (Z) would be gender which is dichotomous variable whose two levels are male and female students.
• Dependent variable (Y) would be academic achievement.

4. Controlled Variable

Controlled variable = neutral variable = affectless variable

Each and every variable of individual, group, incident or thing cannot be studied at the single time or research. So, there are some variables in the research which should be controlled or made affectless or neutral. The aim of making the variable controlled helps the researcher to remove the effect of it on the dependent variable. Thus, the reliability and validity of the research can be sound. This way, the variables which are made neutral or affectless are called the controlled variable in the research terminology. Especially in the experimental research, it is very important for the researcher to identify the controlled variable and making it affectless or neutral in the research.

5. Intervening Variable

Intervening variable = neutral variable = conceptual variable

Independent variable, dependent variable, controlled variable and moderator variable are the concrete variable. It means that they can be observed and measured. Independent, dependent, moderator and controlled variables can be regulated and controlled. The effect of these entire variables can be observed and measured too. But, there are some variables whose effect on the dependent variable would be imaginative or conceptual. The researcher can only assume that there are some variables whose effect would be on the dependent variable, but those variables cannot be seen, observed or measured because they are abstract variables. These variables are called the intervening variables in the research terminology.

Intervening variable is that of factor in the research which effect the incident under the observation, but it cannot be seen, measured, controlled or regulated. The researcher can only assume or imagine the effect of it on the dependent variable. So, it has been called the intervening variable with the reference to research terminology.

The relationship between different variables of the research has been mentioned in the figure no 3.1 as given under.
In each and every research, the clarity of the variable is the most important aspect. By the clarity of the variables, research design and hypotheses becomes transparent and clear. In the present research, the researcher had clarified the variables of the research. The classification of the research has been mentioned in the table no 3.1.

**Table – 3.1**

**Variables Included in Research**

<table>
<thead>
<tr>
<th>No</th>
<th>Type of Variable</th>
<th>Variable</th>
<th>No</th>
<th>Which level</th>
<th>Instrument of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Independent</td>
<td>Teaching Method</td>
<td>2</td>
<td>(1) Teaching by Concept Attainment</td>
<td>Self-constructed test</td>
</tr>
<tr>
<td></td>
<td>Variable</td>
<td></td>
<td></td>
<td>Teaching Model</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2) Teaching by Traditional Method</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rural and Urban</td>
<td>General Information</td>
</tr>
<tr>
<td>2</td>
<td>Moderator</td>
<td>Area</td>
<td>2</td>
<td>Male and Female Students</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Variable</td>
<td>Gender</td>
<td></td>
<td></td>
<td>Self-constructed test</td>
</tr>
<tr>
<td>3</td>
<td>Dependent</td>
<td>Academic</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Variable</td>
<td>Achievement</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4 Intervening Variable

Innovations of Teaching Method
Interaction between the groups like intelligence, attitude, personality etc.

5 Controlled Variable

School climate
Time of learning
Numbers of Period
Standard of Study
Content, Intelligence
Obtained Marks of Gujarati Subject in First Exam

3.4 Research Field

There are many fields of the research problem. Generally, the problem of the research has not been selected from only one field of the research. The selection of the problem deals with the solution of many problem of the field in which the research has been undertaken. It gives new direction to the education.

In the present research, the researcher has applied the concept attainment model and studied its effect on the academic achievement of the students. Thus, the field of the research was teaching-learning process and educational technology.

In the present research, the researcher has selected the students of 9th standard studying in the Gujarati medium school. Thus, the field of the research can also be considered as secondary education field.

In the present research, the researcher has measured the academic achievement of the students. So, it can also be said that the field of the research is psychological testing.
3.5 Type of Research

The researches in the broader sense can be classified into three types. These are as given under.

1. Classical Research
2. Applied Research
3. Action Research

Classical researches are the fundamental and pure research. Classical research deals with an abstract question. As a result of classical research, new principles and theories can be formatted or created. Classical research mainly deals with the scientific field or laboratory studies. The problem which is related with the application of any concept, thought or strategy would be dealt with the applied research field. It is the research which shows the ways of the application of the principles and theories which are already constructed. It is related with the analysis or synthesis of the principles which are already in the existence. The teacher feels many problems with the reference to teaching-learning process as well as many problems with the reference to students’ behavior in day to day environment. To solve such problem, the teacher undertakes the research to solve local problems. It is called action research with the research terminology. The generalization of the research is limited population in the action research.

In the present research, the researcher has undertaken the experiment. The findings of the research have been important to solve the practical problems of the educational field. So, it is the applied research with the reference to type of the research. To understand the applied research, definitions of the applied research have been given here.

“The goal of the applied research is to improve the production or process. Applied research studies or checks the conceptual principles or theories in the problematic present scenario.”

John W. Best
“The central focus or aim of the applied research is to discover the possible solutions of the stressful critical problems experienced by society or a professional institution.”

C. R. Kothari

The pivotal aim or goal of all the researches has been to bring the qualitative change with the reference to problem under observation. The focus of the research is to add new knowledge and understanding in the prevalent scenario. The applied research fulfils this condition with the reference to quality improvement.

3.6 Research Method

The researcher has to select the research method carefully as according to nature of problem, objectives, hypotheses and nature of data collection. The practice undertaken between clarification of the problem and achievement of the findings is called the research method of the research. Research method shows the direction which the researches has to follow.

Research method is the essence of the research. There are mainly three types of research method which have been mentioned here.

1. Historical research method
2. Descriptive (survey) research method
3. Experimental research method

In the present study, the researcher has selected the experimental research design for the research. Experimental research design holds an important place in all the research method because this method uses purely scientific and classical way of the research. The experimental research design also holds certain framework. It is systematic, logical and well organized method of the research. It is the scientific method which is capable of bringing more favorable and sound findings with the reference to educational research field.

There are many key features which differentiate the experimental research with other researches. Researcher regulates variable X to trace whether variable X is responsible for an incident and process or not. For the regulation of the variable X, the researcher decides the presence of X in different levels.
According to John W. Best (1970),

“Experimental research design is the classical method of the scientific laboratory where various aspects are regulated and under observation effects have been controlled. It is a systematic, well-organized, scientific method of the research to discover and develop the knowledge.”

Experimental research design has been more scientific, well-organized and systematic than other researches. The nature of the experimental research design can be mentioned as below.

- Experimental research has been done under the observation. Thus, it is more similar with laboratory research.
- It discovers the relationship between two different aspects under the observation process.
- It tries to study the present scenario with its implications for the future.
- Experimental researcher tries to control all other variable to manipulate the independent variable. Thus, the effect of only independent variable can be seen on the dependent variable.

In the present research, experimental research design has been used by the researcher. The researcher has to study the effectiveness of the concept attainment model in comparison with traditional method of teaching. The comparison between the methods will be calculated with the reference to academic achievement of Gujarati subject. The researcher has undertaken the research work by the experimental research design keeping in mind the objectives of the research.

3.7 Planning of Research

Different types of activities and processes have been done to achieve the goal by the researcher. Moreover which activity should be done when should be reflected by the researcher. The more the thinking would be systematic and scientific, the closer the achievement of the goal will be. The engineer draws a plan before building the house. The engineer also thinks and notes about the material which will be used for making the house. Planning is the most important thing in the industrial field also.
Thus, planning is the most important thing in the life and profession. It gives the direction and way to the work.

Planning is the precondition of the success in any field of the research and knowledge. Research is a deeper and systematic process. The success of any educational research lies in its careful planning. The research method of present research was experimental design in which planning was the most important aspect. The importance of the planning in the research can be clarified as under.

- Research work becomes effective, simple and speedy.
- The direction can be got by the planning of the research.
- Various programmes of the research problems can be clarified.
- The solutions of the mistakes or difficulties which might arise during the research can be planned.
- Waste of time, money and strength can be prevented.
- Pre-plan can be done effectively.

### 3.7.1 Equal Group Construction

First of all, the students of 9th standard were selected with purposive sampling method from the selected school. The students were given the intelligence test prepared by J. H. Shah intelligence test. The t-value of the students was computed by score of the intelligence test and marks of Gujarati subject of the first semester examination. The score was checked at 0.01 level and 0.05 level and it was found out that the students of rural area and the students of urban area were equal with the reference to intelligence quotient level on their score of Gujarati subject.

Thus, from constructed two groups, one group was selected as an experimental group and another group was selected as a controlled group randomly by the researcher. The experimental group was given concept attainment model teaching programme while the controlled group was taught by the traditional teaching method.

### 3.7.2 Selection of Experimental Group with Justice

As a blue print is important for an architect, experimental design has been very important for the researcher. Experimental design gives a map to establish the relationship between the independent variable and dependent variable. It also gives
way to trace the standard error the relationship between the independent variable and dependent variable. It gives design and methods to check the hypotheses of the research.

According to John W. Best

“Experimental design is the blue print of the procedures that enables the researchers to test hypotheses by reaching valid conclusions about relationships between independent and dependent variables.”

There are mainly three types of experimental design in the experimental research. Important research designs have been given under.

Experimental Design

Pre-Experimental Design True Experimental Design Quasi-Experimental Design

1. Single group design 1. Two equivalent group only post-test design 1. Non-randomized controlled group only post-
2. Single group pre-test test design 1. Controlled group pre-
3. Two group static design 3. Solomon four group 4. Factorial design
4. Factorial design

Experimental design is systematic, scientific, logical well-organized process of the research in which the researcher constructs the special design which is important
or necessary for the research. From the experimental research designs mentioned above, the researcher had selected two paired group only post-test experimental design. The presentation of the experimental design has been done in the table – 3.2.

Table – 3.2

Two paired (Equal) Group only Post-test Design

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-test</th>
<th>Treatment</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>--------</td>
<td>Concept Attainment Model</td>
<td>T₂E</td>
</tr>
<tr>
<td>Controlled Group</td>
<td>--------</td>
<td>Traditional Method</td>
<td>T₂C</td>
</tr>
</tbody>
</table>

3.7.3 Process and Size of Sample

Sample is a proportionate part of the population which represents the subjects of total population.

According to K. S. Siddhu,

“A good sample must be as nearly representative of the entire population as possible and ideally it must provide the whole of the information about the population from which the sample has been drawn.”

There are many techniques of selecting the sample. The techniques of the sample can be described as under.
### Techniques of Sample Selection

<table>
<thead>
<tr>
<th>Probability Sampling Method</th>
<th>Non-Probability Sampling Method</th>
<th>Special Sampling Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random sampling</td>
<td>Convenient sampling</td>
<td>Paired sampling</td>
</tr>
<tr>
<td>Stratified sampling</td>
<td>Purposive sampling</td>
<td>Double sampling</td>
</tr>
<tr>
<td>Systematic sampling</td>
<td>Quota sampling</td>
<td>Subsequent sampling</td>
</tr>
<tr>
<td>Cluster sampling</td>
<td></td>
<td>Snowball sampling</td>
</tr>
</tbody>
</table>

From the sampling techniques described above, the researcher has selected the sample by purposive sampling technique. Population of the sample was 285 Gujarati medium secondary schools of Mehsana district. The researcher has selected two secondary schools from rural area and two secondary schools from urban area by purposive sampling technique. Thus, there were four schools selected by the researcher as a sample of the research.

In the present research, 60 students from the rural area secondary school and 60 students from the urban area secondary schools were selected as a sample of the research. Thus, there were 120 students selected in the sample of the research. The students were given an intelligent test constructed by Dr. J. H. Shah. The scores of the students on the test were achieved by the researcher. The researcher had also considered the marks of Gujarati subject of the first semester examination. By computing both the score of the students, the researcher had made both the groups equal with the reference to Intelligent Quotient. One group was considered as an experimental group and another group was considered as a controlled by the researcher. In the rural area, the students of Sheth R. H. Sahu high school and Shree R. C. Patel High school of Meda Adaraj were selected as an experimental group and the students of Nutan Vidyalaya of Karannagar were selected as a controlled group by the researcher. In the urban area, the students P. M. G. Thakar Adarsh Highschool were selected as an experimental group and the students of Sarvavidyalaya were
selected as a controlled group by the researcher. The students of experimental group were given the concept attainment teaching model programme and the students of controlled group were taught by the traditional method of teaching by the researcher.

### Table – 3.3

**Number of Students and Schools Selected in the Sample**

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of School</th>
<th>Area</th>
<th>Gender</th>
<th>Experimental Group</th>
<th>Controlled Group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Meda Adaraj Sec. School</td>
<td>Rural</td>
<td>Male</td>
<td>22</td>
<td>19</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Karannagar Sec. School</td>
<td></td>
<td>Female</td>
<td>08</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Adarsh Kadi Sec. School</td>
<td>Urban</td>
<td>Male</td>
<td>23</td>
<td>19</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Sarvavidyalaya Sec. School</td>
<td></td>
<td>Female</td>
<td>07</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

Total 60 60 120

### 3.7.4 Selection of Experimental Force

The information of how the experimental force was selected in the present research has been given here.

When the researcher undertakes the research, the instrument of data collection is needed for the researcher. That instrument of data collection is called the tool of the research in the research terminology. The professionals of the various fields use the instrument as according to the profession. The same way, the researcher has also to use the instruments as according to need of the research.

“Tool is an instrument by which the data related to the research can be collected by the researcher.”

88
When the researcher selects the research tool for the study, it should be noted that the research tool must be valid and reliable. The researcher can use the research tool constructed by any other researcher or the research tool can be constructed by the researcher and can validate the tool.

In the present research, the researcher has constructed the concept attainment teaching model programme for the students of 9th standard of secondary schools. The researcher has constructed six lesson plans, post-test, answer key and three dimensional table as tools of the research.

Thus, in the present research, the researcher has selected teaching by concept attainment teaching model programme from various teaching models as an experimental force of the research.

3.8 Construction of Tool

In the present research, the researcher has constructed the concept attainment teaching model programme for the students of 9th standard of secondary school for the subject adverbs of Gujarati language. The controlled group was decided to teach by the traditional method of teaching. There were six adverbs: adverbs of place, adverbs of manner, adverbs of sequence, adverbs of proportion, adverbs of probability and adverbs of decision included in the concept attainment teaching model programme. Six lesson plans were made by the researcher.

According to guidance and recommendations of different experts, the researcher had selected syntax of reception-oriented concept attainment teaching model from various method methods of teaching for the construction of the programme. The researcher had constructed six lesson plans of syntax of reception-oriented concept attainment teaching programme including positive and negative examples, teaching points, teacher’s activities and students’ activities of types of adverbs following the guidance and recommendations of the experts. The lesson plans have been attached herewith in the annexure no. 4(A).

The researcher has made six lesson plans of types of adverbs for the students of controlled group. The researcher followed traditional method of teaching and lesson plans for the students of controlled group. The researcher had included specific
objectives, teaching points, teacher’s activities, students’ activities and black board work. The information of the lesson plans for the students of controlled group has been mentioned in the annexure no. 4(B).

The researcher has prepared the slide show of syntax of reception-oriented concept attainment teaching model programme on “types of adverb” for the rural and urban students of 9th standard of the secondary high school of an experimental group. The researcher has constructed the slide show using M. S. Office application power point presentation for the concept attainment teaching model programme.

The information or data can be put into or stored in the computer using different applications of the computer. The information can be retrieved or represented when it is necessary. Various clips, sounds and animations can be added to make the information effective for the audience. Thus, Power point presentation becomes very important application in the educational field.

### 3.8.1 Construction of Post-test

In the present research, the researcher aimed to assess the effect of syntax of reception-oriented concept attainment teaching model programme in comparison with traditional method of teaching with the reference to academic achievement of the students of 9th standard of rural and urban area of the secondary high school. So, the researcher had decided to construct the post-test. The steps of the post-test have been given as under.

### 3.8.2 Selection of Topic

In the present research, the researcher has selected types of adverb from various topics of Gujarati language grammar from the textbook standard 9th. The researcher had given the tool to the experts for the guidance and recommendations. The researcher had made enough changes as suggested by the experts.

### 3.8.3 Content Analysis

The researcher has selected type of adverbs as a content of the syntax of reception-oriented concept attainment teaching model programme. The content
analysis of the content was done. The information of the content analysis of the content has been presented as under.

1. Adverb of Place
2. Adverb of Manner
3. Adverbs of Sequence
4. Adverbs of Proportion
5. Adverb of Probability
6. Adverb of Decision

3.8.4 Construction of Primary Nature of Post-test

The post-test was constructed by the researcher keeping in mind the content of the lesson types of adverb and educational objectives. During the construction of the test, the points which were taken into consideration by the researcher are as under.

(A) Objectives of Test

The constructor of the tool should keep in mind for the objectives of the test. The researcher should make clear that for which reasons the test was going to be prepared. The objectives of the construction of the test are as under.

1. To know pre-knowledge of the students
2. To study the expertise of the students on the certain topic of the content.
3. To survey the academic achievement of the students.

In the present research, the prime objective of the researcher was to know the effectiveness of syntax of reception oriented concept attainment teaching model programme in the comparison with the traditional method of teaching. The researcher wanted to know the academic achievement of the students with the reference to specific method of the teaching. The researcher had to decide the best method of teaching with the reference to Gujarati language grammar portion.

(B) Nature of Test

The researcher has to become clear before the construction of any test. In the present research, the prime objective of the researcher was to know the effectiveness of syntax of reception oriented concept attainment teaching model programme in the
comparison with the traditional method of teaching. Moreover, the normative test has been used to interpret the score of the students with the reference group of the students. So, the researcher had selected normative test as a nature in order to know the achievement of the students.

(C) Planning of Test

Two points should be taken into the consideration to prepare the test as according to planning of the test.

1. Representativeness of points of the content.
2. Learning outputs of the content points.

In the present research, the researcher had taken into consideration the abilities lied in the points of the content. The researcher had prepared the questions as according to each and every teaching point with the reference to study ability of the students. The researcher had attempted carefully observed the representativeness of each every teaching point and inclusion of all the teaching points in the achievement test which would be given to the students to collect the data of the research.

Moreover, the researcher has tried to bring variety with the reference to learning outputs of the students. The researcher has prepared the three-dimensional table for this. The researcher has also prepared the answer key for the test to prevent the subjectivity of the person who assesses the answers of the students. The researcher constructed the primary nature of the test with the reference to objectives and planning of the test. In the table given below, the information of the experts who checked the test and given their valuable suggestions and recommendations as well as the changes made by the researcher have been given.

Table – 3.4

Suggestions of Experts and Changes Made by Researcher

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Expert</th>
<th>Suggestions</th>
<th>Changes</th>
</tr>
</thead>
</table>
| 1   | Dr. M. L. Joshi  
Rt. Lecturer  
Dept of Edu.  
Gujarat Uni. | - Good Work  
- Spelling might be refereed from the dictionary  
- Overall, the research work has been in the right direction | The suggestions had been taken into consideration |
<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Designation</th>
<th>Feedback</th>
<th>Suggestions taken into consideration</th>
</tr>
</thead>
</table>
| 2 | Dr. Pravinchandra Gaur                   | Lecturer                                        | - Lesson plans are made with enough care. You are expected to work as according to lesson plan  
- Variety can be brought into the post-test.  
- Overall, good work | The suggestions were taken into consideration. |
| 3 | Nileshbhai R. Patel                       | Principal                                       | - Think about the characteristics of adverbs.  
- In the first step, interaction with the students can be interpreted with more clarification.  
- Good selection of topic. | The suggestions were taken into consideration. |
| 4 | Ashokbhai Parmar                          | Lecturer                                        | - Print mistakes have been seen at many places, rectify it.  
- Hard work can be seen.  
- Refer related researches to avoid obstacles in advance.  
- Clarify the negative examples. | The suggestions were taken into consideration. |
| 5 | Patel Mital J.                            | Lecturer                                        | - Work has been systematically done.  
- Mention the cognition field objectives of the lecture.  
- The students will participate in the Gujarati language grammar with interest. | The suggestions were taken into consideration. |
| 6 | Dr. Sitaram Deshmukh                     | College of Education                             | - Construction of concept attainment model is nice.  
- It will be effective in the measurement of the academic achievement of the students.  
- There is some language mistakes suggested to you. Rectify it. | The suggestions were taken into consideration. |
| 7 | Sandipbhai Patel                          | Teacher                                          | - Avoid the spelling mistakes.  
- Work has been done methodically.  
- Examples of adverbs are appropriate.  
- Rectification should be done in the characteristics as suggested. | The suggestions were taken into consideration. |
| 8 | Dr. Vashrambhai J. Parmar                 | Principal                                        | - Teachings are as according to the steps.  
- The students should be told to note down the examples during the learning. | The suggestions were taken into consideration. |
| 9 | Dr. Nanubhai Donga                       | Rt. Professor                                    | - Presentation in the first step of the model is not much clear  
- Examples should be rectified in the first step of the teaching model.  
- in the first step of the model, you should think about system of negative examples. | The suggestions were taken into consideration. |
3.8.5 Opinions of Experts on Primary Nature of Tool

The researcher has given the concept attainment teaching model programme on types of adverbs of Gujarati language grammar and achievement test to the experts for their opinions and recommendations. Both the tools have been given to experts of methodical expertise and Gujarati language expertise. After the consideration of recommendations and opinions of experts, the researcher had constructed the final nature of both concept attainment achievement programme and achievement test.

In the final nature of the achievement test of types of adverbs of Gujarati language, there were four main questions kept and included by the researcher. The information regarding the number of questions, types of question, nature of questions and marks of the questions have been mentioned in the table – 3.5.

**Table – 3.5**

**Number, Type, Nature of Questions and Marks**

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Number of Sub-questions</th>
<th>Type of Questions</th>
<th>Nature of Questions</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>Short Answer</td>
<td>Definitions</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>Action Type</td>
<td>Search the adverbs from the sentences given below</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>MCQ</td>
<td>Choose and write the right option in alphabet in the given bracket</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>True-False Statements</td>
<td>Put the sign true or false in the bracket</td>
<td>6</td>
</tr>
</tbody>
</table>

The final test for the students was prepared of 25 marks. The time of taking the test was kept 35 minutes. The copy of the test and three dimensional table has been attached in the annexure no. 4(C).
3.8.6 Design of Marking

The design of marking has been prepared by the researcher to tag the marks to the answers of the test. To increase the reliability of the test, the researcher has prepared design of marking as given below.

Question – 1 Give Definition

In the first question, there are 7 sub-questions have been given in the test. The students have to attempt all the questions. The students would get 1 mark each for the right answer.

Question – 2 Action Type

In the present question, there are 6 sub-questions have been given. The students have to search the adverb from the given sentence and trace its type. The students would get 1 mark each for the right answer.

Question – 3 MCQ

In the present question, six multiple choice questions have been given to the students. The students have been given three options for the question. The students have to select the most appropriate answer for the question. The students would get 1 mark each for the right answer.

Question – 4 True-False Statements

There were six true-false type statements have been given to the students. The students have to do sign of right and wrong to the related statements. The students would get 1 mark each for the right answer.

3.9 Construction of Time Table

In the present research, the researcher has selected the students of Sheth R. H. High School and R. C. Patel High School of Meda Adraj as an experimental group and Nutan Vidyalaya, Karannagar as a controlled group from rural area. The presentation of time table of the teaching, post-test and retention test has been mentioned as under in the table – 3.6.
### Table - 3.6

**Time Table of Teaching at Sheth R. H. High School and R. C. Patel High School Meda Adraj and Nutan Vidyalaya, Karannagar**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Date</th>
<th>Day</th>
<th>Topic</th>
<th>R. C. Patel High School, Meda Adraj</th>
<th>Nutan Vidyalaya, Karannagar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>R. C. Patel High School, Meda Adraj</td>
<td>Nutan Vidyalaya, Karannagar</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Experimental Group</td>
<td>Controlled Group</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>30/11/09</td>
<td>Monday</td>
<td>Adverb of Place</td>
<td>3 12:10 to 12:50</td>
<td>6 03:40 to 04:20</td>
</tr>
<tr>
<td>2</td>
<td>01/12/09</td>
<td>Tuesday</td>
<td>Adverb of Manner</td>
<td>3 12:10 to 12:50</td>
<td>6 03:40 to 04:20</td>
</tr>
<tr>
<td>3</td>
<td>02/12/09</td>
<td>Wednesday</td>
<td>Adverbs of Sequence</td>
<td>3 12:10 to 12:50</td>
<td>6 03:40 to 04:20</td>
</tr>
<tr>
<td>4</td>
<td>03/12/09</td>
<td>Thursday</td>
<td>Adverbs of Proportion</td>
<td>3 12:10 to 12:50</td>
<td>6 03:40 to 04:20</td>
</tr>
<tr>
<td>5</td>
<td>04/12/09</td>
<td>Friday</td>
<td>Adverb of Probability</td>
<td>3 12:10 to 12:50</td>
<td>6 03:40 to 04:20</td>
</tr>
<tr>
<td>6</td>
<td>05/12/09</td>
<td>Saturday</td>
<td>Adverb of Decision</td>
<td>1 07:30 to 08:10</td>
<td>5 02:30 to 03:10</td>
</tr>
<tr>
<td>7</td>
<td>07/12/09</td>
<td>Monday</td>
<td>Post-Test</td>
<td>1 7:30 to 08:10</td>
<td>6 03:40 to 04:20</td>
</tr>
<tr>
<td>8</td>
<td>22/12/09</td>
<td>Tuesday</td>
<td>Retention Test</td>
<td>2 08:35 to 09:15</td>
<td>6 03:40 to 04:20</td>
</tr>
</tbody>
</table>

In the present research, the researcher has selected the students of P. M. G. Thakar Adarsh High School, Kadi as an experimental group and Sarva Vidyalaya High School, Kadi as a controlled group from rural area. The presentation of time table of the teaching, post-test and retention test has been mentioned as under in the table – 3.7.
### Table - 3.7

**Time Table of Teaching at P. M. G. Thakar Adarsh High School, Kadi and Sarva Vidyalaya High School, Kadi**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Date</th>
<th>Day</th>
<th>Topic</th>
<th>R. C. Patel High School, Medradaj</th>
<th>Nutan Vidyalaya, Karannagar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Experimental Group</td>
<td>Controlled Group</td>
</tr>
<tr>
<td>1</td>
<td>07/12/09</td>
<td>Monday</td>
<td>Adverb of Place</td>
<td>3 12:50 to 01:30</td>
<td>2 08:35 to 09:15</td>
</tr>
<tr>
<td>2</td>
<td>08/12/09</td>
<td>Tuesday</td>
<td>Adverb of Manner</td>
<td>6 03:10 to 03:50</td>
<td>2 08:35 to 09:15</td>
</tr>
<tr>
<td>3</td>
<td>09/12/09</td>
<td>Wednesday</td>
<td>Adverbs of Sequence</td>
<td>5 02:30 to 03:10</td>
<td>2 08:35 to 09:15</td>
</tr>
<tr>
<td>4</td>
<td>10/12/09</td>
<td>Thursday</td>
<td>Adverbs of Proportion</td>
<td>5 02:30 to 03:10</td>
<td>2 08:35 to 09:15</td>
</tr>
<tr>
<td>5</td>
<td>11/12/09</td>
<td>Friday</td>
<td>Adverb of Probability</td>
<td>6 03:10 to 03:50</td>
<td>2 08:35 to 09:15</td>
</tr>
<tr>
<td>6</td>
<td>12/12/09</td>
<td>Saturday</td>
<td>Adverb of Decision</td>
<td>1 07:30 to 08:10</td>
<td>3 09:15 to 09:45</td>
</tr>
<tr>
<td>7</td>
<td>14/12/09</td>
<td>Monday</td>
<td>Post-Test</td>
<td>6 03:10 to 03:50</td>
<td>2 08:35 to 09:15</td>
</tr>
<tr>
<td>8</td>
<td>29/12/09</td>
<td>Tuesday</td>
<td>Retention Test</td>
<td>3 12:50 to 01:30</td>
<td>2 08:35 to 09:15</td>
</tr>
</tbody>
</table>

#### 3.10 Selection of Transition Period

In the general sense, the period which has been given to the students after the teaching for the study is called transition period with the reference to the research terminology. The evaluation of the learning has been done after the completion of the transition period by the students.
With the reference to rural area, the students of Sheth R. H. High School and Shree R. C. Patel high school of Meda Adral has been selected as an experimental group of the research and Nutan Vidyalaya, Karannagar was selected as a controlled group of the research. The students of experimental group were taught by the concept attainment teaching model programme and the students of controlled group were taught by the traditional method of teaching during 30/11/09 to 05/12/09. After the application of the programme, the students of both the group were given the time of one day for the study and revision at the home. Thus, the post-test was taken on 07/12/09 one day after the completion of the programme.

With the reference to urban area in the present research, the students of P. M. G. Thakar Adarsh High School, Kadi were selected as an experimental group of the research and the students of SarvaVidyalaya High School, Kadi were selected the students of the controlled group. The students of experimental group were taught by the concept attainment teaching model programme and the students of controlled group were taught by the traditional method of teaching during 07/12/09 to 12/12/09. After the application of the programme, the students of both the group were given the time of one day for the study and revision at the home. Thus, the post-test was taken on 14/12/09 one day after the completion of the programme.

Thus, in the present research, one day after the completion of the programme for the students of both the rural area and the urban area was selected as a transition period for the students for the retention and revision of the content.

3.11 Planning for Accidental Situation

In the present research, the researcher had made the planning of what to do when the accidental situation arise. The information regarding the pre-plan of the accidental situation has been as under.

- The students who were selected in the sample of the research were made familiar with the intention of the researcher and they were advised to remain present in the school to avoid their absence in the experiment.
- If the students yet remain absent in the class, they were advised to remain present by telephonic instruction.
• The students of the experimental group were taught the content by using M. S. Power Point presentation and LCD Projector. The researcher had kept the Laptop with to avoid the problem of electricity cut.
• The researcher had kept laptop with her to avoid the deficiencies in the computer sets of the school.
• The students who were selected in the sample of the research were advised to remain present in the post-test and retention test which were to be organized after the completion of the programme.

3.12 Planning of Experiment

In the present research, the researcher first of all visited all four schools selected in the sample. The researcher completed the legal procedure of the permission of the experiment meeting the principals of the respected schools. After that, the researcher had given the Intelligent Test constructed by J. H. Shah to the students and achieved the score of the students. The researcher had also got the marks of Gujarati Language of last semester end examination of the students. The researcher prepared the frequency distribution on the achieved scores of the students and t-value was computed by the researcher. Thus, the students were distributed to the experimental group and controlled group randomly by the researcher after making them equal with the reference to intelligence quotient. The application of the experimental design has been done as given below.
In the schools of rural and urban area, one school was selected as an experimental group of the research and another group was selected as a controlled
group of the research. The students of experimental group were taught by the syntax of reception-oriented concept attainment teaching model programme and controlled group was taught by the traditional method of the teaching.

The researcher had kept following care while teaching the students of both experimental group and controlled group.

1. The researcher had undertaken the experiment first in the schools of rural area and then in the schools of urban area.
2. The students of the experimental group were taught by the L. C. D. projector and the students of controlled group were taught by the traditional method of the teaching.
3. The researcher has applied the concept attainment teaching programme for six days both in the schools of rural area and in the schools of urban area. The detail of the time table has been given in the table no 3.6 and 3.7.
4. The students of both the experimental group and controlled group were given the post-test after the completion of the teaching programme.
5. The time of periods of both the experimental group and controlled group was kept the same. It was of 40 minutes.

3.12.1 Application of Programme

The educational programme was applied after the completion of the construction of concept attainment teaching model programme and preparation of lesson plans as according to the content.

In the present research, there were 120 students of 9th standard of rural area and urban area was distributed randomly to experimental group and controlled group of the research.

Rural and urban students of the experimental group were taught by the concept attainment teaching model programme and the students both rural and urban area of controlled group were taught by the traditional method of teaching. The topic of the teaching was kept same for both the group. The topic of the teaching was types of adverbs.
3.12.2 Detailed Information of Application of Experiment

The researcher visited the schools selected in the sample, met the principal and got the permission for the experiment before the application of the experiment. The researcher gave the information about the research to the principal, director and teachers Gujarati language of the 9th standard of the school. The researcher asked for the permission to get their support in the research work. Afterwards, the researcher gave the students J. H. Shah intelligence test and got the score on the test. The researcher had also taken into consideration the marks of Gujarati language of the first semester. The researcher had made two groups of the students as according their score on the intelligence test and marks of the Gujarati language of the first semester. The students were randomly distributed to the experimental group and controlled group randomly by the researcher. The researcher had followed the time table which had been mentioned in the table no. 3.6 and 3.7.

In the present research, the same time period was kept for both the students of experimental group and the controlled group.

The researcher had used the computer room of the school for the teaching of concept attainment teaching model programme. The researcher had taught the concept attainment teaching model with the help of L. C. D. Projector and computer application M. S. Office Power Point programme. The researcher had taken the permission from the governing body of the school.

The researcher had used the class room of the school for the teaching by the traditional method of teaching.

The teaching has been done to both the experimental group and controlled group as according to pre-decided time, periods and dates. The detail of it has been given in the table no. 3.6 and 3.7.

3.12 Application of Post-Test and Retention Test

The researcher had given the students post-test after the one day of transition period having completed the programme. The students both the experimental group and controlled of the rural area were given the post test on 07/12/09. The retention test of students of both the experimental group and controlled group of rural area was
taken on 22/12/09. The students both the experimental group and controlled of the urban area were given the post test on 14/12/09. The retention test of students of both the experimental group and controlled group of urban area was taken on 29/12/09. The researcher had provided satisfactory information about how to write the answer in the test. The researcher had given the retention test to the student to know the retention of the students in the types of adverbs of Gujarati language. The retention test was kept for both the students of rural area and urban area after the 15 days of the completion of the programme. Both the post-test and the retention test was kept the same for both the students of experimental group and the controlled group.

3.13 Data Collection

In the present research, the researcher had visited the principal of the schools of both the rural area and urban area. The researcher had got the permission of the data collection from the principal of the schools. The researcher had given the students of 9th standard the intelligence test constructed by Dr. J. H. Shah. The data was collected by the researcher and data were collected in the form of the scores on the intelligence test.

The researcher taught the students of experimental group of both the rural area and urban area by the concept attainment teaching model programme and the students of controlled group of both the rural area and urban area were taught by the traditional method of teaching for six days. The researcher had given all the students the post test constructed by the researcher after doing proper seating arrangement. The students of both the rural area and urban area were given retention test 14 days after the completion of the programme. The researcher had got the data in the form of the score on the test. Thus, the data of the research has been collected three fold: intelligent test, post-test and retention test.

3.14 Analysis of Data

Helen Walker, explaining the importance of the data analysis, says that

“The conclusion seems inescapable that some aspects of statistical thinking which were once assumed to belong in rather specified technical causes must now be cultural education”

103
After the collection of the data, the researcher distributed the scores of the students according to area and gender. The researcher had also prepared the frequency distribution of the scores of the students. The researcher computed mean, standard deviation, standard error and t-value with the help of computer programme. The detailed presentation of the data analysis with related tables and graphs has been given in the chapter-4.

3.15 Validity of Experiment

If the experiment is valid and reliable, the generalization and interpretation of the experiment can be done. Campbell and Sanely (1966) has mentioned two types of validity of the experiment.

1. Internal validity
2. External validity

The internal validity and external validity of the present research experiment has been presented as under.

3.15.1 Internal Validity of Experiment

Internal validity deals with the effect of independent variable on the dependent variable. It specifies that the result got by the researcher is the effect of only independent variable or not. Thus, internal validity of the research can be checked. If the dependent variable is the result of other variable except the independent variable, the internal validity of the research would be at a risk. The internal validity of the present research has been mentioned as under.

1. Concurrent Validity

When the researcher has been undertaking the research work and some another variables or incidents affects the independent variable which results the change in the dependent variable, it is called the concurrent validity in the terms of experimental research.

In the present research, there were no any other incident occurred during the concept attainment teaching model programme which was resulted the change in the dependent variable. Thus, this factor was controlled by the researcher.
2. **Maturity**

Maturity means the process of physical growth or mental development which can be seen in the sample of the research due to long time of experiment. The effect of it might be seen on the scoring of the sample.

In the present research, the researcher has kept the time of the research of only 6 days. Thus, there was no change noted of increase or change in the attitude, intelligence, aptitude or personality of the students included in the sample. Moreover, the age group of the students of the sample was same. Thus, if it happens, it will be affect all the students of the sample. Thus, this effect can be nullified.

3. **Pre-test**

Pretest in many researches has been used to know the pre-knowledge of the sample with the reference to special variable of the study. The pretests in this type of research can be worked as a effective characteristics to increase the scoring on the post-test. Thus, the validity of the research would be at a risk.

In the present research, the pre-test was not taken.

4. **Unstable Instrumental**

Unreliable instruments or techniques used to describe and measure aspects of behavior are threats to the validity of an experiment. If tests used as an instruments of observation are not accurate or consistent, a serious element of error is introduced. If observers are used to describe behavior changes in subjects, changes in observers or in their standards due to fatigue, increased insight, or skills or changes in criteria of judgments over a period of time – all these are likely to introduce an error.

In the present research, the researcher had used only the post-test. So, it can be said that this effect could be controlled by the researcher.

5. **Selection Bias**

If the students selected in the sample of the research have difference with the reference to the variables of the study, it is called the difference in the sampling. In
other words, if the subjects of experimental group are different with the reference to ability or skills with controlled group, it is called the difference in the sampling.

In the present research, the researcher had made the equal groups by giving the students an intelligence test and considering the marks of last semester examination. So, there was a least chance of difference in the sampling.

6. Decrease in the Sample (Experimental Mortality)

If the students of the research leave the experiment during the programme or the subjects of the experiment decrease during the research, it is called the phenomenon of decrease in the sample. It can affect the result of the research.

In the present research, the subjects of the experimental group were not decreased. So, this factor was controlled by the researcher.

7. Statistical Regression

Statistical regression, also known as regression to the mean, is a phenomenon that sometimes operates when the subjects are selected on the bias of extremely high or extremely low pre-test scores and when the measurement device is not totally reliable, a situation which is common. Subjects who score very high, near the ceiling, on the pre-test will most likely to score lower on subsequent testing. Subjects who score very low, near the floor, on a pre-test will most likely score higher on the subsequent testing, with or without anything testing pertinent to their performance occurring to the meantime.

In the present research, there was only post-test based on the equivalent group taken by the researcher. So, it can be said this threat was controlled by the researcher.

8. Interaction between Variables

The subjects of the sample has been the same with the reference to the scores of the pretest, but if they are different with the reference other variables, it called the interaction between the variables of the study. The interaction between the variables affects the findings of the research.
In the present research, to avoid the effect of it, the researcher had controlled the variable of the research.

9. **John Henry Effect**

When the students of the controlled group feel that they are kept in the controlled group and they are in the competition with the experimental group, they work more than their capabilities. The effect of it can be seen on the findings of the research.

In the present research, the students of experimental group and controlled group were from different schools. So, there was no possibility of the factor on the results of the research.

Thus, the researcher has tried to decrease the effect of the factors which may create risk with the reference to internal validity of the research.

3.15.2 **External Validity of Experiment**

The external validity of the research deals with the generalization of the experiment. It means that the relation of the independent variable with the dependent variable can be established in which other ways confirms the external validity of the research.

The generalization of the experiment should be known by the researcher in the experimental research. So, the external validity of the experiment becomes the most important factor for the researcher.

External validity means the generalization of the interaction between the variables of the study. It deals with broader use of the design or programme which has been once created by the researcher. The programme should be generalized to the students of other sample with the reference to difference in the place or theme.

1. **Interaction between Pre-test and Independent Variable**

The subjects of the research become aware of the treatment given to them. It is called the interaction between pre-test and independent variable.
In the present research, there was no pre-test kept. So, there was no possibility of this threat to the research.

2. Interaction between Subject Selection and Independent Variable

If the sample which has been selected by the researcher do not represents the subjects of the population, the findings of the research cannot generalize to the population of the research. Thus, the representative sample should be selected by the researcher to control this threat.

In the present research, though the researcher had selected the sample with the purposive method, the subjects of both the group were attempted to make equal by following certain process. Thus, the researcher had attempted to overcome this threat.

3. Interaction between Experimental Procedures

The difference in the experimental procedures attracts the subjects of the research. It threatens the effect of the research.

In the present research, the researcher had applied the teaching by concept attainment teaching model programme. The aim of the researcher was to know the effectiveness of concept attainment teaching model programme in comparison with the traditional method of teaching. So, this threat, interaction between the experimental procedures, could not be controlled by the researcher.

4. Measurement of Dependent Variable

The dependent variable has been measured by the pre-test and post-test of the research. The measurement has been based on the type of the measurement instrument used by the researcher. The test is generally comprised of different types of nature and format having different forms of the questions. It threats the external validity of the research.

In the present research, the researcher had used objective type self-constructed test to measure the academic achievement of the students. Thus, it was not possible for the researcher to overcome this threat.
5. Hawthorn Effect

The subjects of the experimental group become aware that they are participated in the experiment. They participate with more zest and interest. Sometimes, it also happens that the researcher pays more attention to the subjects of experimental group than the subjects of controlled group. It is called the Hawthorn effect.

In the present research, the researcher had provided the natural environment to decrease the effect of the present factor which affects the external validity of the experiment.

6. Absolute Description of Experimental Treatment

Sometimes, the researcher does not give the absolute description of the procedure of an experiment. As a result of it, other researchers cannot use the same experiment for the future purpose. Moreover, the teachers cannot use the experiment in the classroom surroundings. Thus, the external validity of the research decreases.

In the present research, the researcher attempted to give the absolute description of the experiment, concept attainment teaching model programme to decrease the threat of this factor.

7. Effect of Experimenter

The experimenter (researcher) also affects the treatment of the experiment. Age, gender, cast, clothing, style and behavior of the researcher affects the outputs of the experiment widely.

In the present research, the researcher had attempted to keep simple and natural behavior to decrease the effect of the present threat.

8. Obstacle of Experimental Procedure

When the researcher applies the subsequent treatment (X₁, X₂, X₃ etc) on the subjects of the research, the effect of one treatment affects the achievement of subsequent treatments.
In the present research, the researcher has applied the single treatment to the subjects of the experiment. Thus, there was no possibility of the present threat on the students of the experiment.

9. Innovations and Obstacle Effect

The innovative treatment by the researcher affects the behavior of the students. The effects of the innovative treatment decrease if it has been used frequently by the experimenter. Thus, the external validity of the experiment becomes likely to be threatened.

Moreover, the students have been learning from the traditional method of teaching and if suddenly they were initiated to teach by the innovative methods and techniques, it disturbs their routine learning. Thus, obstacle has been created with the reference to the experiment. As a result of it, the external validity of the experiment decreases.

The experimenter should give the students practice of innovative method by using it frequently in the teaching. The researcher could not do it because of the time limit of the research. Thus, this threaten could not be overcome by the researcher.

10. Interaction between Post-test and Independent Variable

Many times, the test can provide the learning experiences. The subjects of the experimental group who did not get treatment can learn many new things and concepts when they are giving the responses during the post-test. As a result of the external validity threats deal with the experimental group only.

In the present research, the researcher had only used the post-test. So, the researcher had attempted to avoid this threat during the construction of the test.

11. Interaction between History and Independent Variable

The generalization of the findings is not possible beyond the time of the experiment. It is possible that there are some occurrences beyond the time of an experiment. It results in the decrease of the generalization of an experiment.
Each and every research should be undertaken with the limitation of the time. So, the present research could be excluded from this. So, this threat could not be overcome by the researcher.

12. Interaction between Measurement Time and Independent Variable

The post-test has been taken sharply after the completion of the experiment or after a specific time of the experiment effect the result and finding of the research. It changes the results or findings of the research.

In the present research, the post-test was taken one day after the completion of the experiment. Thus, the researcher had tried to control the threat.

3.16 Experiences of Researcher during Experiment

In the present research, the experiences which the researcher experienced have been given as under.

- The present research is the experimental type research in which the students of 9th standard of rural and urban area were taken as a sample of the research. The students of experimental group were taught by the concept attainment teaching model programme and the students of controlled group were taught by the traditional method of teaching. The students of an experimental group were taught by making the presentation on M. S. Office Power Point presentation application. The researcher had got the support from the principals, administrators, teachers and students of all the schools included in the sample. Thus, the researcher had experienced the support of all the human resources with whom dealing had taken place.

- The students of both area and both the schools thought that new teachers had come to teach them and they were very supportive and worked with the interest, zest and curiosity. It must be said that the students were really obligate and enthusiastic in their learning.

- During the teaching to the students of an experimental group, their interest, curiosity and willingness to learn was noted by the researcher. If the students
are taught using the different method, they always pay their attention more frequently than the traditional method of teaching.

• During the teaching to the students of controlled group, the curiosity and interest was seen in the students. They were also very supportive and eager to learn the topic.

• It was also an occasion to know the individual difference between the students during the application of the experiment.

• The researcher had also experienced their variety of questions for the learning. The researcher had tried to give them the satisfactory answer of the questions asked by them.

• The students were become very familiar with the steps of the concept attainment teaching model after two days. The researcher needed not to explain the steps to the students after the teaching of two days.

• The students became more respondent and interested in the learning by concept attainment teaching model.

• The students could make the assumptions for the topic of the content. It was observed by the researcher.

• The students attempted to find out the difference between the positive and negative examples provided to them by the researcher.

• The students were noting the assumptions made by them and the characteristics provided to them.

• The students became able to give their own example with the reference to concepts attained by them.

• It was observed by the researcher that if the students have been taught with the help of concept attainment teaching model, the students can learn meaningfully the concept which aimed to teach them.

• The researcher had also got the joy and satisfaction of the teaching to the students during the experiment.

3.17 Conclusion

In the present research, the researcher has tried to provide the gist of the nature of the research. The researcher had probed into origin of the problem, population, variables included in the research, field of research, type and design of research,
sample and sampling process, construction of the tool, planning of experiment, application of an experiment, data collection, method of data analysis, validity of the research and experiences of the researcher during an experiment. In the next chapter, the researcher has presented organization, analysis and interpretation of the information.
Reference


Uchat, D. A. Sanshodhan Darshan, Rajkot, Saurashtra University, Pg. No. 9.


