# Chapter-3: RESEARCH DESIGN AND METHODOLOGY

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3.1 Introduction

Research methodology is a way to systematically solve the research problems. “The techniques of investigation used by a particular academic discipline” (Kent). It may be understood as a science of study, how the research is done systematically. Research design and various aspects of research are discussed in this chapter. Research methodology has many dimensions. It deals various research methods as well as the logic behind the methods used in the context of the research study.

3.2 Population

The population of the present study consists of the students who were taught English as a second language. The students of polytechnic colleges of Gujarat State were included in the population.

3.3 Sample Selection

The present study was experimental in nature. The experiment was to be conducted for prolonged time and some facilities were needed for the experiment. Atmiya Institute Junagadh was selected. There was a class of diploma engineering. Thirty boys were selected as a convenient experimental sample in which fifteen boys students were belonged to rural area and other fifteen boys students belonged to urban area. The experiment of the present study was conducted on the boys. The size of the samples was kept medium because the responses of the students got individually. During the experiment, individual practice was to be provided.
### 3.4 Research Design

The selection of the research design is an important step in the entire research process. It has been compared with the architect’s plan for the structure of a building. In these regards the investigator has to be very careful in selecting the research design. David J. Luck and Ronald S. Rubin defines research design as

> the determination and statement of the general research approach or strategy adopted/or the particular project. It is the heart of planning. If the design adheres to the research objective, it will ensure that the client's needs will be served.

According to Kerlinger "Research design in the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance." According to Green and Tull

> A research design is the specification of methods and procedures for acquiring the information needed. It is the over-all operational pattern or framework of the project that stipulates what information is to be collected from which source by what procedures.

The second definition includes three important terms - plan, structure and strategy. The plan is the outline of the research scheme on which the researcher is to work. The structure of the research work is a more specific scheme and the strategy suggests how the research will be carried out i.e. methods to be used for the collection and analysis of data. In brief, research design is the blueprint of research. It is the specification
of methods and procedures for acquiring the information needed for solving the problem. Questionnaires, forms and samples for investigation are decided while framing research design. Finally, the research design enables the researcher to arrive at certain meaningful conclusions at the end of proposed study.

Research designs are concerned with turning the research question into a testing project. The best design depends on your research questions. Every design has its positive and negative sides. The research design has been considered as a "blueprint" for research, dealing with at least four problems: what questions to study, what data are relevant, what data to collect, and how to analyze the results.

Research design can be divided into fixed and flexible research designs (Robson). Others have referred to this distinction with ‘quantitative research designs’ and ‘qualitative research designs’. However, fixed designs need not be quantitative, and flexible design need not be qualitative. In fixed designs the design of the study is fixed before the main stage of data collection takes place. Fixed designs are normally theory-driven; otherwise it’s impossible to know in advance which variables need to be controlled and measured. Often these variables are quantitative. Flexible designs allow for more freedom during the data collection. One reason for using a flexible research design can be that the variable of interest is not quantitatively measurable, such as culture. In other cases, theory might not be available before one starts the research.

**Descriptive Research:**

Although some people dismiss descriptive research as ‘mere description’, good description is fundamental to the research enterprise
and it has added immeasurably to our knowledge of the shape and nature of our society. Descriptive research encompasses much government sponsored research including the population census, the collection of a wide range of social indicators and economic information such as household expenditure patterns, time use studies, employment and crime statistics and the like.

Descriptions can be concrete or abstract. A relatively concrete description might describe the ethnic mix of a community, the changing age profile of a population or the gender mix of a workplace. Alternatively the description might ask more abstract questions such as ‘Is the level of social inequality increasing or declining?’, ‘How secular is society?’ or ‘How much poverty is there in this community?’

Accurate descriptions of the level of unemployment or poverty have historically played a key role in social policy reforms (Marsh, 1982). By demonstrating the existence of social problems, competent description can challenge accepted assumptions about the way things are and can provoke action.

Good description provokes the ‘why’ questions of explanatory research. If we detect greater social polarization over the last 20 years (i.e. the rich are getting richer and the poor are getting poorer) we are forced to ask ‘Why is this happening?’ But before asking ‘why?’ we must be sure about the fact and dimensions of the phenomenon of increasing polarization. It is all very well to develop elaborate theories as to why society might be more polarized now than in the recent past, but if the basic premise is wrong (i.e. society is not becoming more polarized) then attempts to explain a non-existent phenomenon are silly.
Of course description can degenerate to mindless fact gathering or what C.W. Mills called ‘abstracted empiricism’. There are plenty of examples of unfocused surveys and case studies that report trivial information and fail to provoke any ‘why’ questions or provide any basis for generalization. However, this is a function of inconsequential descriptions rather than an indictment of descriptive research itself.

**Explanatory Research:**

Explanatory research focuses on why questions. For example, it is one thing to describe the crime rate in a country, to examine trends over time or to compare the rates in different countries. It is quite a different thing to develop explanations about why the crime rate is as high as it is, why some types of crime are increasing or why the rate is higher in some countries than in others.

The way in which researchers develop research designs is fundamentally affected by whether the research question is descriptive or explanatory. It affects what information is collected. For example, if we want to explain why some people are more likely to be apprehended and convicted of crimes we need to have hunches about why this is so. We may have many possibly incompatible hunches and will need to collect information that enables us to see which hunches work best empirically.

Answering the ‘why’ questions involves developing causal explanations. Causal explanations argue that phenomenon Y (e.g. income level) is affected by factor X (e.g. gender). Some causal explanations will be simple while others will be more complex. For example, we might argue that there is a direct effect of gender on income (i.e. simple gender discrimination). We might argue for a causal chain, such as that gender
affects occupational options, which are linked to opportunities for promotion, which in turn affect income level. Or we could posit a more complex model involving a number of interrelated causal chains.

<table>
<thead>
<tr>
<th>Quantitative Research Designs</th>
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<tbody>
<tr>
<td><strong>Descriptive</strong></td>
</tr>
<tr>
<td>- Describe phenomena as they exist.</td>
</tr>
<tr>
<td>- Descriptive studies generally take raw data and summarize it in a usable form.</td>
</tr>
<tr>
<td>- Can also be qualitative in nature if the sample size is small and data are collected from questionnaires, interviews or observations.</td>
</tr>
<tr>
<td><strong>Experimenta</strong></td>
</tr>
<tr>
<td>- The art of planning and implementing an experiment in which the research has control over some of the conditions where the study takes place and control over some aspects of the independent variable(s) (presumed cause or variable used to predict another variable)</td>
</tr>
<tr>
<td><strong>Quasi-experimental</strong></td>
</tr>
<tr>
<td>- A form of experimental research. One in which the researcher cannot control at least one of the three elements of an experimental design:</td>
</tr>
<tr>
<td>- Environment</td>
</tr>
<tr>
<td>- Intervention (program or practice)</td>
</tr>
<tr>
<td>- Assignment to experimental and control groups</td>
</tr>
</tbody>
</table>
Qualitative Research Designs

| Historical | Collection and evaluation of data related to past events that are used to describe causes, effects and trends that may explain present or future events. Data are often archival.  
|            | Data includes interviews. |
| Ethnographic | The collection of extensive narrative data over an extended period of time in natural settings to gain insights about other types of research.  
|            | Data are collected through observations at particular points of time over a sustained period.  
|            | Data include observations, records and interpretations of what is seen. |
| Case Studies | An in-depth study of an individual group, institution, organization or program.  
|            | Data include interviews, field notes of observations, archival data and biographical data. |

Looking at the need of the present study, experimental design is selected.

3.4.1 Experimental Design

When the investigator wants to observe the effects of an independent variable on depended variables within certain situation experimental method is preferred. The investigator selected the experimental design for the present study.
The one group Pre-test Post-test design was employed during the experiment. The experiment was conducted on thirty purposively selected boys of rural and urban areas. During experiment different kind of audio visual aids have been used and emphasized on listening and speaking skill improvement of them.

Theoretically, experiment method is found the most suitable method. Experimental method deals with the future. That means it tries to predict what will happen in the future by studying the relationship between the variables under study. It makes a cause and effect relationship among the variables. The causal variable is called independent variable and effect is called dependent variable because it depends on independent variable. Then investigator studies the relationship between dependent variable and independent variable. And how an investigator manipulates the independent variable and observes then changes happening in the dependent variable due to the change in independent variable. From that observation investigator can make a cause and effect relationship between independent variable and dependent variable.

According to Campbell experimental designs can be described into three broad categories (Best).

1. Pre-experimental designs
2. True-experimental designs
3. Quasi- experimental designs
Pre-experimental Designs

This type of design provides little or no control of extraneous variables. They are generally used for ‘one shot case study’ or action research type work. There are two types of pre-experimental designs.

1. One group pre-test-post-test design
2. Two groups static design

True-experimental Designs

True experimental design is regarded as the most accurate form of experimental research, in that it tries to prove or disprove a hypothesis mathematically, with statistical analysis. Martyn Shuttleworth has written about this design that for some of the physical sciences, such as physics, chemistry and geology; they are standard and commonly used. For social sciences, psychology and biology, they can be a little more difficult to set up. For an experiment to be classed as a true experimental design, it must fit all of the following criteria.

- The sample groups must be assigned randomly.
- There must be a viable control group.
- Only one variable can be manipulated and tested. It is possible to test more than one, but such experiments and their statistical analysis tend to be cumbersome and difficult.
- The tested subjects must be randomly assigned to either control or experimental groups.
3.4.2 Quasi-experimental Designs

Quasi-experimental design is a form of experimental research used extensively in the social sciences and psychology. Martyn Shuttleworth in 2008 has written about this design that whilst regarded as unscientific and unreliable, by physical and biological scientists, the method is nevertheless a very useful method for measuring social variables. The inherent weaknesses in the methodology do not undermine the validity of the data, as long as they are recognized and allowed for during the whole experimental process. Quasi experiments resemble quantitative and qualitative experiment, but lack random allocation of groups or proper controls, so firm statistical analysis can be very difficult. Quasi experimental design involves selecting groups, upon which a variable is tested, without any random pre-selection processes. For example, to perform an educational experiment, a class might be arbitrarily divided by alphabetical selection or by seating arrangement. The division is often convenient and, especially in an educational situation, causes as little disruption as possible. There are five main types of quasi experimental designs.

1. Pre-test and post-test non equivalent groups design.
2. Counter-balanced design.
3. The time-series design.
4. The equivalent time-samples design.
5. The equivalent materials, pre-test and post-test design.

After this selection, the experiment proceeds in a very similar way to any other experiment, with a variable being compared between different groups or over a period of time.
3.4.3 One Group Pre-test Post-test Design

In this design only one group has been used. As in the pre-test-post-test group design, analysis of covariance may be used with the pre-test as the covariate. Because this design may be the only feasible one, the comparison is justifiable, but, as in all quasi-experimental studies, the result should be interpreted cautiously.

The investigator wanted to compare the effectiveness of the pre-test and post-test. Audio visual aids have been used to improve their listening and speaking skills. The investigator wanted to compare the effectiveness of the two groups of fifteen students, rural students and urban students compared.

3.4.4 A Graphical Presentation of the Research Design of Experiment

Pre-test | Audio-Visual Aids | Post-test
---|---|---

\[ T_{1B} \]

Effectiveness of the experiment to improve listening – speaking skills through audio visual aids = \( T_{2B} - T_{1B} \) (\( T_{2B} > T_{1B} \)).

3.5 Tool Construction

A tool for the data collection of the present study was constructed. The aim of the present study was to find out the effectiveness of audio visual aids to improve listening and speaking skill in English language in which the students find difficulties. So the lessons are planned based on audio visual material. The investigator has prepared pre-test and post-test
to test students’ achievement in English. For the experiment she used audio visual material which is related to listening and speaking skills.

3.5.1 Collection of Audio Visual Material

The collection of the various types of audio visual aids was done with the help of the BBC books “Keep Up Your English”, Getting on in English” which are used to teach English language. IELTS tests, animated movies, pictures, textbooks of English were also used. Total fifteen lessons were planned.

3.6 Procedure of the Study

Following steps were followed in the procedure of the study:

- Construction of pre-test and post-test.
- Preparation of teaching lessons based on pre-test and post-test.
- Administration of the pre-test.
- Treatment of 15 lessons related to audio visual aids emphasized on listening and speaking skills improvement in English.
- Administration of the post-test.
- Testing the effectiveness of the experiment.
- Replication of the entire experiment.
### Experimental Programme

<table>
<thead>
<tr>
<th>Date</th>
<th>Material</th>
<th>Skill</th>
<th>Teaching Aid</th>
<th>Kind of Work Individual/Pair/Group work</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-08-2011</td>
<td>Pre-test</td>
<td>Listening</td>
<td>Tape recorder</td>
<td>Individual</td>
</tr>
<tr>
<td>25-08-2011</td>
<td>Pre-test</td>
<td>Speaking</td>
<td>Pictures, and Cue card</td>
<td>Individual</td>
</tr>
<tr>
<td>26-08-2011</td>
<td>Conversation : &quot;Keep Up Your English&quot; (BBC)</td>
<td>Listening , speaking</td>
<td>CD, Computer</td>
<td>Pair</td>
</tr>
<tr>
<td>27-08-2011</td>
<td>Picture narration of natural scenery</td>
<td>Speaking</td>
<td>Pictures</td>
<td>Group</td>
</tr>
<tr>
<td>28-08-2011</td>
<td>Conversation: Getting on in English (BBC)</td>
<td>Listening, speaking</td>
<td>CD, Laptop</td>
<td>Pair</td>
</tr>
<tr>
<td>29-08-2011</td>
<td>Charts explanation /wrappers</td>
<td>Speaking</td>
<td>Handouts/ wrappers</td>
<td>Pair</td>
</tr>
<tr>
<td>31-08-2011</td>
<td>GD “Education-English Medium v/s Gujarati Medium”</td>
<td>Speaking</td>
<td>Black Board</td>
<td>Group</td>
</tr>
<tr>
<td>01-09-2011</td>
<td>poem “You didn’t need to do it” and “To be alone” (BBC)</td>
<td>Listening and speaking</td>
<td>CD, Laptop</td>
<td>Individual /pair</td>
</tr>
<tr>
<td>02-09-2011</td>
<td>Conversations (IELTS)</td>
<td>listening</td>
<td>Computer</td>
<td>Individual</td>
</tr>
<tr>
<td>03-09-2011</td>
<td>poem “Your Bright Eyes” and “My garden” (BBC)</td>
<td>listening</td>
<td>CD, Laptop</td>
<td>Individual</td>
</tr>
<tr>
<td>Date</td>
<td>Activity</td>
<td>Activity Type</td>
<td>Resource</td>
<td>Group Type</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------</td>
<td>-----------------</td>
<td>----------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>04-09-2011</td>
<td>“Kung Fu Panda” movie half part</td>
<td>Listening and Speaking</td>
<td>TV, CD</td>
<td>Individual / pair</td>
</tr>
<tr>
<td>05-09-2011</td>
<td>“Kung Fu Panda” movie half part</td>
<td>Listening and Speaking</td>
<td>TV, CD</td>
<td>Individual / pair</td>
</tr>
<tr>
<td>07-09-2011</td>
<td>Conversation (BBC)</td>
<td>Listening and Speaking</td>
<td>Laptop</td>
<td>Individual / Pair</td>
</tr>
<tr>
<td></td>
<td>“Keep Up Your English”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08-09-2011</td>
<td>Post-test</td>
<td>Listening</td>
<td>Tape recorder</td>
<td>Individual</td>
</tr>
<tr>
<td>09-09-2011</td>
<td>Post-test</td>
<td>Speaking</td>
<td>Pictures, and Cue card</td>
<td>Individual</td>
</tr>
</tbody>
</table>

### 3.8 Effectiveness of the Experimental Programme

After the experimental programme was over, the effectiveness of the experimental programme was to be checked, the phase of post testing was to be introduced. The same test as a present was used. The process which was followed during pre-testing was entirely followed while post-testing. The obtained marks of experimental programme were scored out. The same scoring pattern was followed as it was followed in finding the weakness in listening and speaking skills during pre-testing.

Significant difference of .05 levels in mean pronunciation scores of post-testing and pre-testing was considered as effectiveness of the experimental programme. Mean score, SD, SED and DF were found out of post-test and pre-test. The difference between mean scores was checked by applying t-test. As research hypothesis regarding the
effectiveness of the programme was directional, the significant levels were treated as one tail test.

3.9 Calculation of Data

Statistically calculations on the data were done on CASIO fx-3600 PV PROGRAMME FX scientific calculator. Mean and SD were found with the help of the calculator using raw scores of the data. ‘t’ test was used for the analysis and interpretation.

3.10 Diagrammatical Presentation of the Research

The research work for the present study was carried out through various stages. The discussion of each stage has been presented. The details from planning and proposal of this study to the analysis and interpretation of data is presented diagrammatically through the figure 3.1
Figure 3.1 Work plan of the Research

WORK PLAN OF THE STUDY
↓
PLANNING RESEARCH DESIGN
↓
REVIEW OF RELATED LITERATURE
↓
PREPARATION FOR THE EXPERIMENT
↓
PLANNING AND MATERIAL PREPARATION FOR LISTENING AND SPEAKING SKILLS
↓
CONSTRUCTION OF PRE-TEST
↓
ADMINISTRATION OF PRE-TEST
↓
TREATMENT
↓
ADMINISTRATION OF POST-TEST
↓
COLLECTION OF DATA
↓
ANALYSIS AND INTERPRETATION OF DATA
↓
FINDINGS AND SUGGESTION OF THE STUDY


