

CHAPTER III

RESEARCH METHODOLOGY

3.1 INTRODUCTION

Research methodology is the specific procedures or techniques used to identify, select, process, and analyze information about a topic. In a research paper, the methodology section allows the reader to critically evaluate a study's overall validity and reliability. The methodology section answers two main questions: How was the data collected or generated? How was it analyzed?

In this study, quantitative methodology was used to collect and analyze the data obtained from all the respondents.

3.2 ORIGIN OF THE STUDY

Initially researcher had gone for literature reviews related to learning outcomes and visited e-content of various university libraries as well as libraries of education departments; Internet resources also provide wide range of the subject. For the study of effectiveness of learning outcomes, researcher was advised to work with ICT integrated teaching approach which rely upon learning outcomes development. Researcher had studied ICT integrated teaching approach in his Master's in Education as a part of curriculum and find it interesting and helpful for achieving learning outcomes. Guide of the researcher suggested that better to work on topic you are most interested. Researcher had also completed masters in Physics so it is better to apply knowledge and understanding of Physics with illumination of ICT integrated teaching strategy. Force and laws of motion is a very important basic topic at elementary level science. Force and laws of motion is included in Central Board of Secondary Education (CBSE), National Council of Educational Research and Training (NCERT) and many other State Board's text books including in the sample school taken in the present study. The topic is also included at bachelor and master levels in Physical Sciences in higher education. So, the researcher had decided to apply ICT integrated teaching approach to teach about the force and its laws in science class of grade 9th.

3.3 POPULATION

Population is well defined small portion of Universe. In this study, the population were the school students of the grade 9th of Bhopal.

3.4 SAMPLE

Sample is a small representative portion of a population selected for observation and analysis. In this study, the researcher purposively selected the students of grade 9th of **Demonstration Multipurpose School (DMS), Bhopal**.

3.4.1 SAMPLE SIZE

Researcher randomly selected 40 students of grade 9th of Demonstration Multipurpose School (DMS), Bhopal, out of which 20 students of the section-A were selected for control group and 20 students of the section-B were selected for experimental group. Thus, the sample size was 40 students of this class.

3.5 VARIABLES OF THE STUDY

- **Independent variable:** - Method of Teaching (i.e. ICT Integrated Teaching and Traditional Teaching Methods)
- **Dependent variables:** - Achievement scores in Physics
- **Intervening variables:** -Time of teaching, self -study, intelligence of students, stress, interest, family background, noise outside the classroom, attitude, socio-economic status etc.
- **Controlled variables:** - Time of teaching, class size, classroom condition, presence of observer etc.
- **Uncontrolled variables:** - Intelligence of students, socio-economic status, family background, self- study habits etc.

3.6 RESEARCH DESIGN

Experimental Research Design is used for the present study. Experimental research designs are concerned with examination of the effect of independent variable on the dependent variable, where the independent variable is manipulated through treatment or intervention(s), and the effect of these interventions is observed on the dependent variables. In this study the effect of ICT integrated teaching (Independent variable) was observed on the achievement test in Physics (Dependent variable), where the ICT integrated teaching was manipulated through treatment or intervention, and the effect of these interventions were observed on achievement test in Physics.

In this study, the researcher used **Quasi Experimental Research Design**. Quasi experimental research design involves the manipulation of independent variable to observe the effect on dependent variables. Quasi Experimental Research Design simply refers that participants are not randomly assigned. In this study effectiveness of methods of teaching (independent variables): (1) ICT integrated teaching method (2) Traditional teaching method was required to be checked on dependent variable (achievement), thus the researcher decided to use ‘Post-test only Control Group Design’.

3.7 DEVELOPMENT OF INSTRUCTIONAL MATERIAL

Tools are nothing but the instruments that help researcher to gather data. Naturally the type of information depends upon the kind of tools used for the purpose. The selection of tools depends upon the objectives and design of the study, and the type of respondents intended to cover. In order to draw any conclusion from the research, tools used for the measurement of variables should be reliable and valid. This requirement is usually met by employing standardized test.

The aim of the program was to prepare a model for teaching of the chapter “Force and Laws of Motion”. To fulfill this aim, a lesson plan is developed on the same chapter with ICT integrated teaching and Traditional teaching approach of teaching and learning. Before preparing the ICT program, first the researcher discussed it with the subject expert and got some ideas and their suggestions.

3.7.1 IMPLEMENTATION OF TRADITIONAL TEACHING MODEL

The 20 students of section-A of grade 9th were taught the topics of “Force and Laws of Motion” by traditional teaching method. Traditional teaching program was applied to control group students as per the regular timetable of the school. Traditional teaching program included Classroom teaching and demonstration in the classroom. The classroom teaching was discussion and questioning based.

3.7.2 IMPLEMENTATION OF ICT BASED TEACHING MODEL

Videos have the capability of making a class lively and enhancing the visual memory of learners. Video provides an excellent means of interactive instruction. It is a very flexible medium in teaching new concepts. With these facts in mind, the investigator thought of preparing a video

that would cater to the needs of students in the routine classroom setup. It was prepared explicitly relating to the concepts of force and its laws. Visuals from the internet which portrayed the detailed concept of force were also used.

The investigator gained an insight on the experience and opinion of physics teachers in teaching the concept of force and found that the concepts were difficult for the students to learn. The concepts were varied and the students were confused in differentiating each concept. With this in mind, the investigator felt the need to create a Computer Assisted Instruction package on the concepts of force. The Computer Assisted Instruction comprised of a “Power Point Presentation” that was a slide show with interactive sessions. The investigator has also used simulation and animation for the CAI to provide instruction on the selected content.

The Video and Computer Assisted Instruction were carefully piloted and tested for ensuring accuracy, good vocabulary, and relevance. Flaws were detected and eliminated in this process of testing. Improvements were incorporated wherever necessary. It was also checked that the presentation in the Video and Computer Assisted Instruction package was logically sequenced. The help of subject experts, teacher educators and experienced science teachers was obtained in the process of editing.

3.8 DEVELOPMENT OF RESEARCH TOOL

In the present study, to study the learning outcomes by ICT integrated and traditional teaching model, the researcher measured the achievement of learners with the help of **achievement test** after completion of the chapter. In this regard, the researcher developed an achievement test on the topic Force and Laws of Motion. To prepare the test, the researcher followed the points such as:

- (1) Deciding the objective of the test,
- (2) Content Analysis,
- (3) Preparing blue print,
- (4) Writing of the test items,
- (5) Expert opinions on the test.

The achievement test was comprised of 40 marks. The questions were based on knowledge, understanding, application, analysis and evaluation. The questions were written in English

language. The test was consisted of fill in the blanks, match the columns, multiple choice questions, true or false, answer in one word/sentence and numerical type questions. The achievement test is given in the Appendix.

3.9 PROCEDURE OF DATA COLLECTION

The researcher collected the data by administering the achievement test. For this, the researcher first visited the selected school and asked the permission from the head of the school to attempt the field work. The researcher, then was able to meet with the students of grade 9th and after establishing a rapport with the pupils, the researcher assigned section A of the class as control group and section B as experimental in design where controlled group was taught the chapter “Force and Laws of Motion” with traditional teaching method while experimental group was taught the same chapter by ICT integrated teaching method. The researcher has taken 5 classes and performed the research as per the respective methods mentioned above.

After providing the intervention, achievement test was conducted to saw the learning outcomes in Physics in both the sections of grade 9th. The test was administered parallel to both the groups and evaluated by the researcher. The marks were given to each answer paper and the data was collected.

3.10 STATISTICS FOR DATA ANALYSIS

Statistic is a body of Mathematical techniques or processes for gathering, organizing, analyzing and interpreting numerical data. Because most research yields such quantitative data, statistic is a basic tool for measuring and evaluating the research. Statistical technique helps the researcher to systematize the observations, description of the characteristics or events for the purpose of discovering the relationships between variables. The various statistical techniques such as mean, standard deviation and T test are employed in the study.