# Chapter 2
## Methodology

This chapter presents the research methodology employed for the study. It is experimental research. In this chapter experimental design, population, sample, tools and techniques of data collection, development of an educational programme on data analysis techniques for M.Ed. students through cooperative learning techniques, data collection and data analysis techniques are presented.

### 2.1 Experimental Design of the Study

Pre-Test Post-Test Experimental Control Group design has been used. There were two groups namely Experimental Group and Control Group. The investigator has managed to take the experimental group students to learn with the data analysis techniques through cooperative strategy, whereas, the control group was taught through traditional approach. The following variables have been considered for this study:

**Independent variable:** Cooperative learning strategy

**Dependent variables:** Achievement through scores on Achievement test

and

Reactions of M.Ed. students (in terms of six elements of cooperative learning)

| | | |
|---|---|---|
| O1  X  O2 | O1, O3  Pre – Test | X: Intervention on Experimental group |
| O3  C  O4 | O2, O4  Post – Test | C: No intervention on Control group |

### 2.2 Population and Sample

The population for the study consisted of all the students perusing M.Ed. degree course during 2015-2016 in India. There were 229 colleges in India where M.Ed. course was running. Out of these two colleges were selected purposely for this study. Since 2015, M.Ed. program was of two years instead of one year. Many M.Ed. colleges faced difficulties in getting sufficient enrolment. Hence two institutions, namely, Department of Education (CASE), Faculty of Education and

Psychology, The Maharaja Sayajirao University of Baroda, Vadodara and Regional institute of Education, Bhopal agreed for this study where reasonable numbers of students were enrolled. The two intact groups were considered as samples for the study. One group was treated as a control group and another group as an experimental group for the study.

In the academic year 2015-16 at Department of Education (CASE), The Maharaja Sayajirao University of Baroda there were 36 students admitted in M.Ed. degree course. But after one month one student left this course because of some personal reason and one student met with an accident and therefore dropped of this course for one year. So researcher was left with 34 students in this group but at the end of intervention programme one student honestly denied to give information as she remain absent in almost all the sessions. Hence researcher was left with an effective sample size of 33 students. This group was treated as an experimental group in the study.

In this same academic year at RIE Bhopal there were 13 students admitted in M.Ed. degree course and all 13 were considered for control group of the study.


**2.3 Tools of data collection:**

There were three tools used for data collection. Details for each tool are given below:

**i. Entry level check on statistical data analysis techniques:** In order to know the entry behavior of both the groups i.e. experimental and control groups an Achievement test was constructed and administered by the investigator on M.Ed. students. There were 40 items in this test. Each question carries one mark. The scores obtained on this achievement test were considered as covariates while doing hypothesis testing. This tool is based on four components. These four components were:

  i.    Frequency distribution
  ii.   Diagrammatic and graphical representation of data
  iii.  Measures of central tendency
  iv.   Measures of dispersion

This tool was validated by my Ph. D. guide and five other experts, namely, three subject experts, one psychology expert and one language expert. Suggestions by the experts were incorporated. Then the tool was administered on both the groups of the students. (Appendix – I)

**ii. Post Achievement Test on data analysis techniques:** An achievement test was constructed to study objective-2. This tool includes multiple choice questions. Each question carries one mark. Question in this tool were on the selected data analysis techniques only. This tool was also validated by my Ph.D. guide and other five experts namely, three subject experts, one psychology expert and one language expert. Suggestions of the experts were incorporated. There were 70 statements in this test. This achievement test was administered on both the experimental and control groups. The scores obtained on this achievement test were considered as "the test scores of experimental group" and "the test scores of control group", respectively. (Appendix – II)

**iii. Reaction Scale on Cooperative Learning:** A reaction scale was constructed by the investigator which was used for knowing the impact of cooperative learning of data analysis techniques on M.Ed. students. The reaction scale was filled by experimental group of M.Ed. students at the end of implementing educational program. This tool consisted of 61 statements on six major components of cooperative learning (positive interdependence, equal participation, individual accountability, face to face promotive interaction, appropriate use of collaborative skills and group processing). This rating scale was validated by my Ph. D. guide and two subject experts, one language expert and one psychology expert. (Appendix – III)

List of experts for tools validation is attached in Appendix. (Appendix – IV)

**2.4 Programme of the study:**

❖ **Pre-requisites of the Programme:**

i. In the beginning only students were briefed about the expected behavior and the way of conduct required for the cooperative classroom. Following instructions were given by the researcher to the students:

- This subject is very interesting and we will learn it in groups.
- In group every member will help each other.
- In group every member needs to participate.
- Here you have to give chance to others as well as take opportunities to participate.
- Try to understand others ways of thinking and defend your stand too.
- Involve yourself in healthy educational discussions.

- Don't ever use harsh or bad words for others.

- In a group task either you all swim together or you all sink together. Therefore all members of your group should have complete understanding about the task.

- Give chance to maximum members from your group to present the task.

- Every time you will be in a different group. So every member is your guide and teacher too.

ii. Every class (session) was of 90 minutes (45 + 45 minutes).

iii. The programme consisted of basic units of 5 or 6 students in each group. Each group was heterogeneous in terms of their disciplines and achievements of pre-test scores. The group formation of these 5 or 6 students was done through randomization.

❖ **Programme:**

- **Announcement of Topic:** Three days prior, the investigator announced the topic inside the class. Relevant references were also informed to the students.(Appendix-VI)

- **Distribution of Task:** Students read from various resources about the topics. According to their friend circle, students form groups and distributed their tasks among themselves and then interacted. Here informal group exchange of information took place.

- **Individual or grouped learning of students:** Sometimes students read the topic in group and sometimes they prepared individually also.

- **Orientation to Topic by the investigator:** Here investigator used dialogue approach and major teaching points of the stated topic were shared in the classroom. (Appendix – VII)

- **Creation of groups:** Here groups of 5 or 6 students were created randomly using calling number technique or selection cum randomization technique. Now every group of students was asked to sit in circular way. So that every member could see and interact with the every other member in the group.

- **Allocation of classroom assignment:** Here different problems related to concerned data analysis technique were provided to different group of students. Generally one problem is provided to two groups. Since there were usually five or six groups, the

researcher provided three different problems. And 25 to 30 minutes were given to complete this task. Students interacted, discussed, distributed tasks among themselves and worked out solutions to those assigned problems.

- **Within group and between group interactions:** When students were able to solve the assigned problem within group. They presented their solution but if one group failed to solve their problem then the other group who was addressing the same problem helped the other group. In case both groups failed to solve their problem then other groups who worked on similar problem helped them. In some situations the investigator facilitated them.

- **Presentation of assignment:** Here one student randomly selected from their group presented the solution of the assigned problem on the black board. When so ever some additional inputs were given by other group of students they added at the end of presentation. Usually, 5 to 7 minutes were allotted for each presentation.

- **Summarizing the topic:** This task was carried by the investigator where major teaching points under the topic were recapitalized by the investigator.

- **Allotment of Home Assignment:** For practice the investigator assigned home assignment to the students. This assignment was common for all students. All students performed their assignment individually. (Appendix – VIII)

- **Announcement of a new topic:** At the end a new topic was announced for the next class and relevant references were also shared with the students.

**2.5 Data Collection:**

The study was conducted in the following manner and the data were collected in the following phases:

**Phase 1: Designing of Lessons**

The lessons for each selected topic were designed by the investigator and then showed to my Ph.D. guide. The lesson plans were modified. The dialogue approach and cooperative strategy were used in the designing of lesson plans. There were total 26 lessons designed, in which 12 were on Descriptive Statistics, 4 were on Basics Concepts of Inferential Statistics, 7 were on Parametric Test and 3 were on Non-Parametric Tests. These lessons were designed keeping in mind the six basic components of Cooperative learning namely, Positive Interdependence, Equal

participation, Individual Accountability, Face to Face Promotive Interaction, Appropriate Use of Collaborative Skills and Group Processing. Every lesson was consist of four basic components namely, *Comprehension of Available Information (Data), Identification of Appropriate Data Analysis Technique (i.e. Suitable to Data and can Respond to the Query of Data Analyst), Use of Data Analysis Technique, Interpretation of obtained Results.* (Appendix – VII)

**Phase 2: Seeking Permissions**

The investigator sought permissions from the Heads of both the institutions, namely, Prof. S.C Panigrahi, Head of the Department of Education (CASE), Faculty of Education and Psychology, The Maharaja Sayajirao University of Baroda, Vadodara and from Prof. H. Senapaty, Principal, Regional Institute of Education, Bhopal for conducting study in these institutions. (Appendix – X)

**Phase 3: Testing for Entry Level of M.Ed. students**

Entry level checks on statistical data analysis techniques tool were constructed and administered by the investigator on both the experimental and control groups and scores were obtained from them.

**Phase 4: Conducting Classes**

For each selected topic of data analysis techniques class were engaged by the investigator on experimental group of students. Each topic was treated through cooperative learning strategy. (Appendix – V, IX)

**Phase 5: Construction and administration of Achievement test on data analysis techniques**

An achievement test was constructed by the investigator based on the content analysis for the selected topics of Statistical data analysis techniques. Each item was related to the specific instructional objective. The test was validated by two subject experts, one language expert and one psychology expert. This achievement test was administered on all the M.Ed. students of both the groups, that is, experimental and control group. Hence, achievement scores of both the groups of students were obtained.

**Phase 6: Construction and Administration of Reaction Scale**

A reaction scale was constructed and administered on only experimental group of M.Ed. students to study the impact of Cooperative learning of data analysis techniques on them. Students were asked to give their reactions against each statement and then the completed reaction scale was collected back by the investigator.

## 2.6 Data Analysis Techniques Employed:

In this study following data analysis techniques were used with respect to each objective:

Table 2.1: Data Analysis Techniques With Respect to Research Objectives

| Sl. No | Objectives | Techniques |
|:---:|:---:|---|
| 1 | i | Nil |
| 2 | ii | **Scatter plot:** To check linearity in dependent (post achievement test score) and covariates (entry level check on statistics data analysis techniques) of both groups (experimental group and control group). **ANOVA:** To check statistically, to test the hypothesis: There is no significant interaction between the treatment (post achievement test scores) and covariates (entry level check on statistics data analysis techniques). **Levene's Test of equality of error variance:** Testing for homogeneity of variance. **ANCOVA:** To test the significant difference between the mean scores of post test achievement scores of the two groups (experimental group and control group). |
| 3 | iii | **Cronbatch's Alpha:** To check reliability of the reactions made by Experimental group of students through the administered reaction scale on them. **Scatter Plot and correlation coefficient:** Scatter Plot of Cooperative Scores Vs Achievement Scores and the respective correlation coefficient. **Frequency distribution:** frequency distribution of the reactions made by Experimental group of students through the administered reaction scale on them. **Chi-square test:** There will be no significant difference in the observed frequencies and the expected equally distributed frequencies. |