CHAPTER III
RESEARCH METHODOLOGY

3.1 Introduction:

This chapter describes in detail the manner in which the researcher conducted his study. This chapter is categorised under the following sub headings.

3.1 Introduction

3.2 Design of the study

3.3 Variables of the study

3.4 Sample and sampling techniques

3.5 Tools of data collection

3.6 Standardisation of tools

3.7 Procedure of data collection

3.8 Precautions, constraints and difficulties

3.9 Data analysis

3.10 Statistical tools and techniques of data analysis
A human culture is getting developed by his needs. Human knowledge enables him to understand, explain, control, predict or cope up with given situation. To satisfy personal and social needs man tries to use his knowledge. There are various problems in each field. When a person used his knowledge to solve the problems of educational field it is called as educational research. In research the researcher study his problems by using scientific methods. Research is considered as more structured and systematic process of carrying on a scientific method of analysis that is directed towards discovery and development of an organised body of knowledge. Hence educational research refers to a better understanding of the educational process to increase its efficiency.

The preparation of a research proposal is an important step of any research. The research proposal helps the researcher to conduct research systematically. Hence research proposal is called as soul of the research. With the help of research proposal researcher can complete his work within time period.

3.2 **Design of the study:**

A system that comprises of the principles practices and procedures that are applied to a particular branch of knowledge is called as methodology. Methodology includes the ways and techniques and procedures that are used to collect and analyze the data.

The research methods are categorised under three groups based on the existence of the research problem and the method of data collection.
1. **Historical research**
2. **Descriptive research**
3. **Experimental research**

Application of scientific procedures to describe and analyze the past events is called as historical research. Application of scientific procedures to describe and analyze the present events is called as descriptive research.

**Experimental Research:**

Experimental research is based on scientific method and experiment is a characteristic of this method. Experimental method establishes a systematic and logical association between manipulated factors and observed factors. In experimental research the researcher controls all the factors except the independent variable and studies its effects on other variables.

In the present research the researcher used experimental method. As stated in the statement of the problem the researcher wants to find out the effect of cooperative learning strategy STAD on adjustment and attitudes of B.Ed. college trainees hence experimental method is best suitable for the present study.

Experimental design is the blue print of the procedures that enables the researcher to test hypotheses by reaching valid conclusions about relationships between independent and dependent variables (Best & Kahn, 2011). Selection of a design is based on the purpose of experiment, the type of variables to be manipulated and the conditions or limiting factors under which it is conducted. For the present research the researcher used *quasi*
**Reasons of using quasi experimental pretest-post test non equivalent design:**

In many experimental conditions it is not possible for the experimenter to assign subjects randomly to groups or exercise full controlling over the scheduling of experimental conditions. In such conditions the experimenter used quasi experimental design. In the present research the researcher used quasi experimental non randomised pretest-posttest design because it is practically not possible to disturb the class schedule for data collection. Another reason was that uncertainty of student’s regular attendance in the college. Glassman, Phyllis (1989), Orlando, Joseph (1991), Abu Rosini (1997), Akinyemi Akinbobola (2009) also used quasi experimental pretest-post test design to study the effects of cooperative learning strategy on achievement and attitudes of the respective samples.

Description of design of the study and phases of the study are shown in Table 3.1 and Table 3.2 respectively.
### Table 3.1

**Design of the study**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pretest</th>
<th>Independent variable</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group (C)</td>
<td>T₁</td>
<td>No intervention</td>
<td>T₃</td>
</tr>
<tr>
<td>Experimental group (E)</td>
<td>T₂</td>
<td>Teaching through CL</td>
<td>T₄</td>
</tr>
<tr>
<td></td>
<td></td>
<td>strategy i.e. STAD</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3.2

**Phases of the study**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control group</td>
</tr>
<tr>
<td></td>
<td>Experimental group</td>
</tr>
<tr>
<td>Pre testing</td>
<td>Measurement of</td>
</tr>
<tr>
<td></td>
<td>1. Attitudes of B.Ed. trainees</td>
</tr>
<tr>
<td></td>
<td>2. Adjustment of B.Ed. trainees</td>
</tr>
<tr>
<td>Treatment</td>
<td>Teaching I.D. through traditional methods</td>
</tr>
<tr>
<td></td>
<td>Teaching I.D. through CL strategy i.e. STAD</td>
</tr>
<tr>
<td>Post-testing</td>
<td>Measurement of</td>
</tr>
<tr>
<td></td>
<td>1. Attitudes of B.Ed. trainees</td>
</tr>
<tr>
<td></td>
<td>2. Adjustment of B.Ed. trainees</td>
</tr>
</tbody>
</table>
3.3 Variables of the study:

A variable is a characteristic that takes on two or more values. It is something that varies. It is a characteristic that is common to a number of individuals, groups, events, objects, etc.

In the present research the researcher studied the effect of cooperative learning strategy i.e. STAD on attitudes and adjustment of B.Ed. trainees. The independent variable in the present study is cooperative learning strategy i.e. STAD. Cooperative learning strategy i.e. STAD was independent variable because it is the presumed cause of the dependent variable i.e. presumed effect. The change in methods of teaching results change in dependent variable. Hence cooperative learning strategy i.e. STAD and traditional methods of teaching are the independent variables for the present research.

In the present research the dependent variables are attitudes and adjustments of B.Ed. trainees because change in teaching methods affects on it. Cooperative learning strategy i.e. STAD and traditional methods of teaching affects both adjustment and attitudes of B.Ed. trainees. Attitudes and adjustment are taken as dependent variables and measured twice during the research i.e. before applying experimental treatment (at the pretest stage) and after completing the experimental treatment (at the post test stage).

Intervening variables have their effect on dependent and independent variables. It includes nature of college, grade level, intelligence, subject to be taught, etc. The intervening variables were controlled by the researcher.

The researcher selected B.Ed. colleges from the same area i.e. from Satpur, Nashik and both colleges are non granted. Grade level was constant
i.e. B.Ed. throughout the whole study. The researcher herself taught both the groups to avoid any variation. Both the groups were taught the same unit i.e. instructional strategies and models from subject Instructional Designs of Savitribai Phule Pune University.

3.4 Sample of the study:

A sample is a small proportion of the population which is selected for observation and analysis. Researcher can make certain conclusions about the characteristics of the population with the help of proper sample from the same population. It is not possible to test, interview or observe each unit of the population. Sampling is the process by which a relatively small number of individuals or measures of individuals, objects or events is selected and analysed in order to find out something about the entire population from which it was selected. It helps the researcher to save time, money and energy.

The population of the present study is trainees of B.Ed. colleges affiliated to Savitribai Phule Pune University in the academic year 2014-2015 of Marathi medium.

Researcher selects each unit in a specified way to obtain a representative sample from the population. This process is called as sampling. There are two methods of sampling.

1. Non probability sampling
2. Probability sampling
   1. Non probability sampling:

   In this method the units are selected at the discretion of the researcher. Such samples have no theoretical basis for estimating population
characteristics. Educational researchers use this method to avoid administrative difficulties.

2. Probability sampling:

In this method the units are selected by using certain procedures which ensure that every unit of a population will have the probability of being selected in the sample. Various methods such as simple random sampling, lottery method, random numbers method, stratified random sampling, systematic sampling, cluster sampling, multi stage sampling, multi phase sampling are included in the probability sampling method.

**Reasons of using purposive sampling method:**

In the present research the researcher selected the *non probability sampling* method. The researcher used *purposive sampling* method as she was studying the effect of cooperative learning strategy on attitudes and adjustment of B.Ed. trainees. Those colleges who assured to cooperate the researcher during the study were included in the present research. The researcher selected Samarth College of Education and New College of Education. Both colleges are in the same region i.e. Satpur, Nashik. Both these colleges are of Marathi medium. The trainees of Samarth College of Education, Nashik were selected as control group and the trainees of New College of Education as experimental group. As the researcher is working in New College of Education and teach the subject Instructional designs hence placed the trainees in experimental group.

In the present research 50 regular trainees in control group and 50 trainees in experimental group were selected. The sample was heterogeneous. Table 3.3 is showing the description of sample.
### Table 3.3

**Description of sample**

<table>
<thead>
<tr>
<th>Group</th>
<th>Total sample</th>
<th>Gender</th>
<th>Region</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td>Rural</td>
</tr>
<tr>
<td>Control</td>
<td>50</td>
<td>22</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>Experimental</td>
<td>50</td>
<td>23</td>
<td>27</td>
<td>21</td>
</tr>
</tbody>
</table>

The sample used in the present study was no doubt small but a small sample is used for experimental study. The sample is not smaller than 30. In the present research the researcher studied the effect of cooperative learning strategy on attitudes and adjustment of B.Ed. trainees. Experimental studies of this nature are worked effectively when the sample used is small. The Fourth Survey of Research in Education (1991) justifies use of small samples to facilitate deeper knowledge of problem. To observe the nature of interactions of the cooperative groups it is necessary to use small group.

Lang (1983), Watson (1996), Armstrong (1997), Whicker, Bol and Nunnery (1997), Wichadee (2006), Hornby (2009), Scott Johnsen (2009), Geetha (2009), Yurdabakan (2010), Zakaria (2010), Naseer (2014), conducted their experiments on small number of samples in some cases only 16. The experiment will be effective when the sample is small in cooperative learning.
1.5 Tools of the study:

The researcher collects various types of information related to his subject. Various tools are used for collection of data. The researcher selects the tools according to the objectives and by knowing the merits and limitations of the tools. The data may be qualitative or quantitative. The tools are classified into following categories.

1. Observation
2. Interview
3. By asking questions and collecting information in written forms: Questionnaire, Check list, Rating scale and Opinionnaire
4. Sociometric techniques
5. Psychological tests: Achievement tests, Intelligence tests, Interest test, Attitude scales, Adjustment inventory, Aptitude tests

The researcher constructed attitude scale and adjustment inventory. For supporting the effectiveness of cooperative learning strategy (countercheck) the researcher also prepared questionnaire and interview.

3.3.1 Attitude Scale:

The researcher studied the effect of cooperative learning strategy on attitude of B.Ed. college trainees hence an attitude scale towards the subject Instructional Design was prepared by the researcher.

The attitude scale was self reporting inventory. It was a five point rating scale prepared by using Likert method. The attitude scale has three components viz. Cognitive, affective and behaviourl (psychomotor) (Baysal. 1981 and Wenden 1991). The scale consists of 30 positive and negative statements about the attitudes of trainees towards the subject
Instructional Designs. Out of 30 statements 17 statements were positive while remaining 13 statements were negative. Each component i.e. cognitive, affective and behavioural had 10 statements respectively. The rating for positive statements is from 1 to 5 and for negative statements is 5 to 1. The description of rating for attitude scale is shown in Table 3.4.

**Table 3.4**

**Description of Rating of Attitude Scale**

<table>
<thead>
<tr>
<th>Options</th>
<th>Rating for positive sentences</th>
<th>Rating for negative sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree SA)</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Agree (A)</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Undecided (UD)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Disagree (D)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Strongly disagree (SD)</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

The lowest score for attitude scale is 30 and the highest score is 150. The present tool is enclosed in Annexure B. The reliability of tool was done by using test-retest method and it was found 0.91. The attitude scale appears to have content validity and the method of selecting items supports its suppositions.
3.3.2 Adjustment Inventory:

To collect information about adjustment of B.Ed. college trainees the researcher constructed and standardise the adjustment inventory. The adjustment inventory is self reporting scale. The adjustment inventory is constructed by using Likert method. The adjustment inventory had three components viz. Personal, social and educational. The inventory consists of 30 items or statements. Out of 30 statements 15 are negative and remaining 15 are positive. It had 10 personal, 8 social, and 12 educational statements. The rating for positive statements is from 1 to 5 and for negative statements is 5 to 1. The description of rating for adjustment inventory is shown in Table 3.5.

Table 3.5
Description of Rating of Adjustment Inventory

<table>
<thead>
<tr>
<th>Options</th>
<th>Rating for positive sentences</th>
<th>Rating for negative sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree SA)</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Agree (A)</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Undecided (UD)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Disagree (D)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Strongly disagree (SD)</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

The lowest score for adjustment inventory is 30 and the highest score is 150. The present tool is enclosed in Annexure C. The reliability of tool is
done by using test-retest method and it was found 0.83, 0.87 and 0.92 for personal, educational and social adjustment respectively. The attitude scale appears to have content validity and the method of selecting items supports its suppositions.

For collecting qualitative information deep interview of some representative trainees was conducted by the researcher.

3.6 Standardisation of Research Tools:

The researcher prepared attitude scale and adjustment inventory for the present research to collect information related to the attitudes and adjustment of B.Ed. trainees. The tools are standardised under the guidance of guide, subject experts and language experts. Standardisation of tools consists of following steps.

1. Planning of tests:

In this step the components of the test were considered. For attitude scale the components cognitive, affective and behavioural and for adjustment inventory educational, personal and social components were decided. At first the researcher constructed 75 and 70 items for attitude and adjustment inventory respectively. But the guide selected only 50 items for both tools. Then the tools were given to the four subject experts in the field of education. They withdrawal some repeated and unnecessary items from the tools. Now the tool had 35 and 40 items for attitude scale and adjustment inventory.
2. Pilot study:

After selection of 35 and 40 statements for attitude scale and adjustment inventory respectively the researcher conducted pilot testing on 30 B.Ed. trainees of Samarth College of Education, Nashik in November, 2013. The researcher oriented the trainees about her experiment and how to fill the tools. There was no time limit but the trainees were told that they will fill the tool as early as possible. If the trainees had any doubts they were clarified by the researcher. After a gap of one month the same tools were again administered to the same trainees. Rating of each response was done with the help of norms described in the tool. The data collected was then used for further calculations for selection of items.

3. Item selection:

Item selection was done by using following steps.

i. The tool was arranged in descending order from highest score at the top and lowest score at the bottom.

ii. Then the response sheets were divided into three groups-upper 27% response sheets with highest score, lower 27% response sheets with lowest score and remaining sheets were included in middle group.

iii. After forming groups the numbers of correct responses were tabulated in each group. Item difficulty was calculated by determining the percentage of trainees who answered them correctly (at proper levels). The percentage was converted into proportions. The average of proportion of correct responses in each item in the three groups was used to calculate difficulty level of that item. The difficulty level of each item was calculated by using following formula.
\[
dv = \frac{Pu + Pm + Pl}{3}
\]
Where \(dv\) - Difficulty level of item

- **Pu** – Proportion of correct responses to the item from the upper group
- **Pm** – Proportion of correct responses to the item from middle group
- **Pl** – Proportion of correct responses to the item from the lower group

iv. Internal consistency discrimination index (rb):

The relation between total scores obtained from a test and item scores i.e. discrimination index was calculated by using following formula.

\[
rb = Pu - Pl
\]
Where \(rb\) – Internal consistency discrimination index

- **Pu** – Proportion of correct responses to the item for upper group
- **Pl** – Proportion of correct responses to the item for lower group

v. Difficulty value:

Final selection of items was calculated by using difficulty value. The items which had internal consistency discrimination index value above 0.25 and below 0.80 were retained in the final draft of the attitude scale and adjustment inventory and other items were discarded from the test. Finally 30 items in each tool i.e. Attitude scale and Adjustment inventory were retained.

4. **Standardisation of tools:**
The final tools i.e. Attitude scale and Adjustment inventory were selected for standardisation.

i. Reliability of tests:

   It was measured by test-retest method. The coefficient of reliability for attitude scale was 0.91. The coefficient of reliability for adjustment inventory was also done by test-retest method. The coefficient was found 0.83, 0.87 and 0.92 for personal, educational and social components respectively.

ii. Validity of tests:

   The experts from Education faculty indicated that both the tests had content validity.

2.4.4 Questionnaire:

   The effectiveness of cooperative learning was studied by using the questionnaire prepared by the researcher. The questionnaire was again a three point Likert scale of ten items. The items are about trainee’s opinion about cooperative learning strategy/environment. It is attached in Annexure D. Deep interview has question related to trainee’s experience about cooperative learning strategy.

3.7 Procedure of Data Collection:

   The tool was finalized from the experts from Education field and literature. The researcher took permission from the principals of both the colleges i.e. New College of Education and Samarth College of Education, Nashik. Procedure of experiment comprised two main stages - selection of sample and conducting experiment.
Stage I – Selection of sample:

The sample consists of 100 B.Ed. trainees distributed 50 +50 in both control and experimental groups respectively from Samarth College of Education and New College of Education from Nashik city.

Selection of control group:

Samarth College of Education was selected as control group. It comprises 50 trainees and they were taught through traditional methods of instruction.

Selection of experimental group:

The B.Ed. trainees of New College of Education were placed in experimental group as the researcher herself is working in the college and principal can adjust the schedule for experiment. The trainees were taught through STAD strategy of cooperative learning.

Stage II – Conducting the experiment:

The experiment was conducted in three phases.

Phase I Administration of pre test

Phase II - Implementing instructional programme

Phase III - Administration of pre test

Phase I - Administration of post test

In the first phase the researcher interact with the sample. The researcher oriented the experimental sample for cooperative learning by showing video clippings of how to work in cooperative groups. This phase
involves administration of Attitude scale and Adjustment inventory to both the trainees from control and experimental group. The researcher assured the trainees that the information given by them is used only for research purpose. The researcher instructed the trainees to fill the information without any prejudice. The teacher educators from both the colleges helped the researcher to administer the tests. The response sheets were scored individually by using scoring keys.

**Phase II Implementing Instructional programme:**

In the present research effect of independent variable i.e. cooperative learning strategy STAD was applied to study its effect on attitudes and adjustment of B.Ed. trainees.

The instructional treatment i.e. STAD was given for 25 days which included one unit- Instructional strategies and models from the subject Instructional designs. The experimental group was taught through STAD approach while control group through traditional methods of instruction. The experimental group was oriented by the researcher about cooperative learning.

**Steps of Instructional Treatment:**

The cooperative learning strategy STAD was applied in following manner.

Teach – Team study – Test – Scoring - Team recognition
1. **Teach:**

The unit was sub divided into sub units by the teacher. The unit was presented by the teacher i.e. researcher sometimes with the help of audio-visual aids.

2. **Team study:**

Students work in their teams to master the content.

   a) **Formation of groups:**

   Before conducting team study researcher divided trainees in their groups. There were 50 students in the experimental sample. STAD group comprises five students in each group hence researcher formulated 10 cooperative groups. Selection of team members was based on objectives of the study i.e. in each group there must be students from rural and urban area, boys and girls, and from Arts Science and in some groups Commerce faculty (as per the objectives). Hence the groups were heterogeneous. These groups worked together for 5 days or till completion of sub unit. The groups were again changed and formed by above procedure.

   b) **Working in groups:**

   After formation of groups the classroom arrangement was changed. The teacher was at the centre of the class and the benches were arranged face to face around the teacher. Hence teacher could observe the trainees and their interactions. Before working all the team members were instructed as:

   i. When trainees were given a problem all the trainees must work on the same problem. If anybody could not get/missed the problem it is the responsibility of other trainees to help him/her to master the problem.
ii. If there is an argument which cannot be resolved by the group then only team should ask the teacher for help.

iii. Trainees should finish their work only when each member from group understand the problem and solved the problem.

iv. When anybody has doubt first asks your teammates and if problem is not solved then ask your teacher.

v. Encourage and praise your teammates (especially weaker members) from time to time.

vi. Do not hesitate to ask any question to your team members.

vii. If anybody from your team is gossiping or chattering stop them or inform teacher.

viii. Be patient to explain the concept to weaker trainees. Encourage them to participate in work.

While trainees were working in their teams the teacher observed everybody and note down information about trainees work, praised teams, praised team members and clarify the doubts if anybody. When trainees worked on worksheets, presented the content in front of the class.

3. Test:

On each sub unit the teacher conducted test. The test was solved individually. During test trainees did not help each other.

4. Scoring:

Each trainees test was scored individually by the teacher. The score of each individual was added to the score of respective team. Trainees’ tests were scored by the teacher. Team scoring was based on the improvement of individual team members who were awarded points based on their test scores compared to their base scores. Similar pattern was
followed to calculate base scores of each team respectively belonged to STAD.

5. Team recognition:

After scoring the teams were given recognition certificate or displayed their names on bulletin board.

After completing one sub unit or 5 days after the groups were dissolved and new sub unit was started by forming another groups. (Sample STAD lesson plans are included in Annexure A).

**Phase III Administration of post test:**

After completing instructional treatment the trainees were again administered with the attitude scale and adjustment inventory. The test was administered to both the groups.

To know the qualitative information about cooperative learning strategy STAD the investigator conducted deep interview of some representative trainees from experimental group.

Procedure of experimental schedule is shown in Table 3.6.
Table 3.6
Time Schedule of Experimental procedure

<table>
<thead>
<tr>
<th>Date</th>
<th>Periods</th>
<th>Total</th>
<th>Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.12.14</td>
<td>1-3</td>
<td>2</td>
<td>Administration of pre tests Attitude scale, Adjustment inventory</td>
</tr>
<tr>
<td>02.01.2015 to</td>
<td>3-5</td>
<td>2</td>
<td>Orientation of trainees about working in STAD cooperative groups</td>
</tr>
<tr>
<td>03.01.2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.01.2015 to</td>
<td>6-8</td>
<td>2</td>
<td>Instructional strategy and self instruction material- Concept, importance, advantages and limitations</td>
</tr>
<tr>
<td>10.01.2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.01.2015 to</td>
<td>9-12</td>
<td>3</td>
<td>Programmed instruction- Concept, characteristics, steps, advantages and limitations, preparation of program</td>
</tr>
<tr>
<td>14.01.2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.01.2015 to</td>
<td>13-17</td>
<td>4</td>
<td>Computer Assisted Instruction- Concept, characteristics, steps, advantages, limitations ad preparation of CAI material</td>
</tr>
<tr>
<td>22.01.2015</td>
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</tr>
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<td>27.01.2015 to</td>
<td>18-20</td>
<td>2</td>
<td>Instructional models – Mastery Learning Model – Concept, steps, advantages and limitations</td>
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<td>28.01.2015</td>
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</tr>
<tr>
<td>30.01.2015 to</td>
<td>21-22</td>
<td>2</td>
<td>Synectic Model - Concept, steps, advantages and limitations</td>
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<td>02.02.2015 to</td>
<td>23-25</td>
<td>2</td>
<td>Online learning – Concept, steps</td>
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<tr>
<td>03.02.2015</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
3.8 Precautions, Constraints and Difficulties During Conducting Experiment:

Following precautions were taken to conduct the experiment effectively.

- Experiment was conducted in natural environment without any stress.
- Both the groups were taught by the researcher.
- The content was not previously taught to both the groups.
- During conducting the experiment no extra work was given to the trainees in both the groups because experiment was conducted after internship program of both colleges. Hence there was no stress of any practical work.
- Proper sitting arrangement was maintained during experiment.
- Teaching periods of 50 minutes was allotted during experiment and no time will be wasted.
- Experiment was conducted only after orientation of cooperative learning strategy STAD.
- Care was taken that trainees should not dominate each other during experiment. All should work in cooperative environment.
Following constraints and difficulties were faced by the researcher during experiment.

- Sometimes group members were absent in groups.
- Some trainees were doing their personal other work.
- Few trainees were not working properly because they do not understand instructions properly. But after a few days they worked effectively when they were encouraged by the researcher and the group members.
- Few trainees do not have patience and they bored for waiting other weaker team members.
- Few trainees try to dominate the other teammates.
- Cooperative learning strategy required more time as compared to traditional methods of teaching because some trainees get tired due to college schedule and need to encourage them. Weaker trainees need extra time for explanation.

3.9 Data Analysis:

The researcher solves the educational problems by analysing the data. In the present research the researcher studied the effect of cooperative learning strategy on attitudes and adjustment of B.Ed. college trainees. The data is categories into following categories as:

1. According to attitudes of B.Ed. college trainees-
   In the present study researcher find out the effect of cooperative learning strategy on attitudes of B.Ed. trainees.

2. According to adjustment of B.Ed. college trainees-
   In the present study researcher find out effect of cooperative learning strategy on adjustment of B.Ed. trainees.

3. According to gender of the trainees-
The data is categorised into two categories according to their gender as the objectives of the study are to compare the attitudes and adjustment of B.Ed. trainees.

i. Attitude scores of boy trainees
ii. Attitude scores of girl trainees
iii. Adjustment scores of boy trainees
iv. Adjustment scores of girl trainees

4. According to geographical area of the trainees-

   The data is categorised into two categories according to their geographical area as the objectives of the study is to compare the attitudes and adjustment of B.Ed. trainees.

   i. Attitude scores of rural trainees
   ii. Attitude scores of urban trainees
   iii. Adjustment scores of rural trainees
   iv. Adjustment scores of urban trainees

5. According to faculty of the trainees-

   The data is categorised into three categories according to their faculties i.e. Arts, commerce and Science as the objectives of the study is to compare the attitudes and adjustment of B.Ed. trainees.

   i. Attitude scores of Arts trainees
   ii. Attitude scores of Commerce trainees
   iii. Attitude scores of Science trainees
   iv. Adjustment scores of Arts trainees
   v. Adjustment scores of Commerce trainees
   vi. Adjustment scores of Science trainees
3.10 Statistical Techniques:

Statistical tools are used for analysis of data. In the present research following statistical techniques are used.

A. Descriptive analysis:

Following statistical techniques are used in the present research.

i. Measures of central tendency: Mean, median and mode.

ii. Measures of variability: Standard deviation, skewness and kurtosis.

iii. Graph method: Frequency polygon and histogram

iv. Percentage: Analysis of responses given by the trainees in the questionnaire

For qualitative analysis the researcher used interview technique and questionnaire.

B. Inferential Analysis:

In the present research following statistical techniques are used.

i. t-test:

In the present research the attitudes and adjustment scores of pretest and post test are compared by using t-test. t-test is also used for comparison of attitudes and adjustment scores of boys and girls, rural and urban trainees, of experimental and control groups.

ii. Standardise t-test:

In the present research the attitudes and adjustment scores of pretest and post test are compared by using standard t-test. Standard t-test is also used for comparison of attitudes and adjustment scores of boys and girls, rural and urban trainees, of experimental and control groups.
iii. **Analysis of variance (ANOVA):**

In the present research the pre and post test scores of attitudes and adjustment of experimental and control group Arts, Commerce and Science trainees are compared by using ANOVA.