CHAPTER – III

METHODOLOGY OF THE STUDY

3.1 INTRODUCTION

This chapter discusses the variables used in the study, design of the study, sampling procedure, description of the samples, selection of teaching contents, instruments used, procedural details and statistical techniques used for analysis.

3.2 DESIGN OF THE STUDY

The present investigation was carried out to study the effectiveness of the critical pedagogical approach in social studies. The design adopted in the study is quasi-experimental, which is different from true experimental designs in two ways; Firstly, the participants are not randomly selected from the specific population and secondly, the participants are not randomly assigned to experiment and control groups. Nevertheless, Quasi-experimental designs provide a relatively high degree of experimental control in natural settings and it clearly represent a set-up from pre experimental designs because they enable the researchers to compare the performance of the experimental group with that of a control group. In other words, quasi-experimental designs enable researchers to move their experimentation out of the laboratory and into a natural setting or context (Martella, 1999). “Often in educational research, it is simply not possible for investigation to undertake true experiments ….” (Cohen, 2007, p. 282). Quasi-experimental design is applied to much educational research where the random assignment of schools and classroom is quite impracticable (Kerlinger, 1970).
Non-equivalent control group design was employed for the present study, which is similar to the pre-post test control group design except for the absence of the random selection of the participants from a population and the random assignment of participants to groups. This design is similar to the static group comparison design except that both groups are given a pre-test, which can be used to determine whether two groups are equivalent, even though they have not been formed by random assignment. This design is represented by following diagram:

```
Experimental          O X O
------------------------
Control                O  O
```

Here, X represents experimental treatment, O represents the pre-test or post-test measurement of dependent variable and broken line indicates that the experimental and control groups are not randomly formed (Campbell & Stanley, 1963).

This design begins with the identification of naturally assembled experimental and control groups. The naturally occurring experimental and control groups should be as similar as possible and the assignment to one group or the other is assumed to be random. “When random assignment of students in the classroom is not possible, investigators opt for non-equivalent design” (Cohen, 2007, p.283). This design was found to be appropriate in the present study in order to examine the effect of Critical pedagogical approach on learners’ learning of social studies in the natural setting without disturbing classroom climate by either controlling or manipulating the variables.
This design takes care of the threats to internal validity i.e. maturation, selection – maturation interaction, mortality, instrumentation, testing and history that result in changes in the performance of the experimental groups. The non equivalent control group design does not control the statistical regression that can result in changes in the performance of the experimental group. The four threats to internal validity i.e. experimental treatment, diffusion, compensatory rivalry by the control group and resentful demoralization of the control group that result in the changes in the performance of the control group are controlled by giving an equally desirable and alternative intervention to the control group students. The primary threat to the internal validity of this design in the possibility that difference on the post-test scores of experimental and control group are the result of initial differences rather than the effects of the independent variable. Hence ANCOVA was used to control initial difference between the experimental and control groups by statistically adjusting the pre-test means of the groups.
ANCOVA, which is done after post-test is given, achieves the same results as matching without discarding of shifting any subjects. The experimenter selects two intact groups, administers the experimental treatment and then adjusts pre-test means to compensate for the lack of equivalency between the two groups. When the assumptions underlying ANCOVA can be met, this is the most desirable tool to employ for this design (Dalen & Meyer, 1966).

A summary of the design is represented in the table.

**Table 3.1: Design of the study**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Experimental group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>• Achievement Test in Social Studies&lt;br&gt;• Critical Thinking Ability Test&lt;br&gt;• Value Preference Scale</td>
<td>• Achievement Test in Social Studies&lt;br&gt;• Critical Thinking Ability Test&lt;br&gt;• Value Preference Scale</td>
</tr>
<tr>
<td>Experimentation (6 months)</td>
<td>• Teaching Social Studies using Critical pedagogic Approach</td>
<td>• Teaching Social Studies using conventional method</td>
</tr>
<tr>
<td>Post-test</td>
<td>• Achievement Test in Social Studies&lt;br&gt;• Critical Thinking Ability Test&lt;br&gt;• Value Preference Scale</td>
<td>• Achievement Test in Social Studies&lt;br&gt;• Critical Thinking Ability Test&lt;br&gt;• Value Preference Scale</td>
</tr>
<tr>
<td>Class</td>
<td>IX GHSS, Kumbala</td>
<td>IX GHSS, Mogral</td>
</tr>
<tr>
<td>Total number of students</td>
<td>39</td>
<td>39</td>
</tr>
</tbody>
</table>

3.3 VARIABLES OF THE STUDY

The independent variable, dependent variables and the control variables used in the present study are as follows.

3.3.1 Independent Variable

An independent variable is the variable that has been manipulated. In this experimental study the approach to teaching has been considered as manipulated
to find out what kind of effect it can produce on the dependent variables. Unlike a true experiment which is done on inanimate objects (the independent variable is under the control of the investigator) where it is able to measure, but in subjects of Education, the measuring of independent variables becomes less accurate. In this study the critical pedagogical approach in teaching social studies was taken as independent variable.

3.3.2 Dependent Variables

A dependent variable is the measured or observed variable. By observing the dependent variable the effect of the independent variable can be seen. It is to be tested whether the independent variable critical pedagogical approach in teaching social studies would have an effect on achievement in social studies, critical thinking ability and value preference of students. These dependent variables were observed and measured to determine whether the independent variables had any effect.

3.3.3 Intervening Controlled Variables

Control variable is a variable that has the potential to impact the dependent variable as well as the independent variable but its effects are removed or controlled by research design or statistical manipulation. The variables that were controlled for the experiment to get homogeneous groups were: classes chosen for the experimental treatment, contents selected, and features of the school, size of the sample and age of the students. For the statistical analysis the pre-test scores were used as covariance to control their effects on the outcome.

3.3.4 Intervening Uncontrolled Variables

Variables that have an unpredictable or unexpected impact on the dependent variable were unable to control. Some of these variables are fatigue,
absence of some students during experiment, motivation, anxiety, interest of the students, socio-economic status, family environment, previous exposure to teaching strategies, present teaching in other subjects, physical resources of the students, education of parents, study habits, academic ability in the subjects, teacher competence in a particular treatment, enthusiasm and others. These variables remained uncontrolled during the experiment.

### 3.3.5 Situational variables

Situational variables like time, duration of treatment, type of management, subjects to be taught etc, were controlled administratively and through selection of sample and equating the time interval.

Variables of the present study and the type of control employed are given in the following table.

| **Table 3.2: Variables of the study and type of controls employed** |
|------------------|-----------------|-----------------|----------------|
| **Independent variable** | **Dependent variable** | **Type of control** | **Details of intervention** |
| Critical pedagogical approach | 1. Achievement in Social Studies  
2. Critical thinking ability  
3. Value preference | 1. Classes to be Taught | Only ninth standard was taken for the study |
|  |  | 2. Academic subject to be taught in treatment | Only social studies lessons were used in the treatment |
|  |  | 3. Size of the sample | Classes had nearly equal number of subjects |
|  |  | 4. Average age of the sample | All the students were of the age between 13 and 14 years. |
|  |  | 5. Situational Variable  
i) Period of treatment  
ii) Duration of treatment | i) The treatment was administered for a period of six months.  
ii) Experimental group was taught for 60 periods of 40-45 minutes. |
3.4 SAMPLING PROCEDURE

The population of the study consisted of pupils of secondary level schools in Kerala state. Purposive sampling technique also known as judgement sampling was used wherein the unit of sample is selected at the discretion of the researcher, wherein he/she may exercise his/her own judgement based on experience or expert judgement (Kalton, 1983) for including a given student in the sample. Such a sample is arbitrarily selected because there is good evidence that it is a representative of the total population (Kaul, 1984). “Where matching is not possible, the researcher as advised to use samples from the same population or samples that are as alike as possible” (Kerlinger, 1970). The class as a whole in its natural settings was considered for implementing the study. The sample was drawn from the two intact divisions of standard ninth of Government HSS, Kumbala and ninth of Government HSS, Mogral as experimental and control group respectively. The students belonged to the age group of 13-14 years.

Students of Standard ninth were chosen for various reasons: the government had planned to revise the text books of standard ninth in a phased manner. So before the revision of the text book the investigator intended to study the effectiveness of critical pedagogical approach in the existing text book of standard ninth. Besides the above factor, it was easy to get permission and cooperation from the headmaster/headmistress and the teachers for ninth standard when compared to tenth standards. Hence ninth standard was considered to be the suitable class from both the academic and administrative points of view for conducting the experiment.
In order to present a picture of the schools that were selected for the present study, some of its features are listed below:

- The Curriculum prescribed by the SCERT, Kerala (State Council of Educational Research and Training) was followed in the schools.
- The schools were under the administration of Kerala Government Education department.
- Both schools are Government schools
- Both schools have same pattern of examination conducted by SCERT, Kerala.
- Both schools have similar infrastructure facilities.
- Admissions criteria and procedures followed are same in both the schools.
- Both the schools have trained social studies teachers. The recruitment of teachers is carried out by conducting tests in the particular subject area which is followed by interviews.
- The students were from rural area.
- Students of both the schools were from almost same socio-economic background, belonging to Hindu, and Muslim communities and economically middle class background.
- The teachers in both the schools were exposed to various training programmes conducted by SCERT and DIET (District Institute of Education and Training).

3.5 SAMPLE OF THE STUDY

The intact groups of 43 students in experimental and 41 students in control group were initially taken for the study. Later four students from experimental group and 2 students from control group were eliminated from the sample due to their absence in the pre or post-test. Finally the sample comprises of
78 ninth standard students including both experimental and control group. The sample included 42 boys and 39 girls in total. The details of the distribution of sample are given in the table.

Table 3.3: Details of the distribution of the sample

<table>
<thead>
<tr>
<th>Sample Group</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>21</td>
<td>18</td>
<td>39</td>
</tr>
<tr>
<td>Control Group</td>
<td>20</td>
<td>19</td>
<td>39</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>37</td>
<td>78</td>
</tr>
</tbody>
</table>

The experimental group (Government HSS, Kumbala, Kerala) consisted of 39 sixth standard students, of which included 21 boys and 19 girls and the control group (Government GHSS, Mogral, Kerala) consisted of 39 ninth standard students, which included 20 boys and 19 girls.

Randomisation in selection of the sample condition of a true experimental design has not been met, as reshuffling of the students would have disturbed the regular schedule and intactness of the class. Moreover a true experimental study could be envisaged only in large educational projects. Added to this, making the children conscious of the control too can affect learning conditions. Thus, the class as a whole (intact) was considered without any stringent measures of exercising control over them.

3.6 PROCEDURAL DETAILS OF THE STUDY

The study was carried out in the following two stages:

3.6.1 Stage I – Preliminary Stage

3.6.2 Stage II – Implementation Stage
In the Stage-I of this study, lesson plans based on critical pedagogical approach was developed and the tools for measuring the variables were constructed/ selected. In the Stage II of this study, the pre-tests were administered to the experimental and the control groups, followed by interventions in teaching of social studies. At the end of the interventions, post-tests were administered to both the experimental and control groups.

3.6.1 Preliminary Stage

Following activities were carried out in the preliminary stage of this study:

3.6.1.1 Content Analysis

3.6.1.2 Development of unit plans in social studies

3.6.1.3 Development of lesson plans in social studies using critical pedagogical approach

3.6.1.4 Development and standardisation of the instruments.

3.6.1.1 Content Analysis

The topics for the experimental treatment were selected from the social studies text book prescribed for the ninth standard students of Kerala state. Before the selection of the topics, the curriculum and the text book prescribed for ninth standard were analysed for the content and its categories such as facts, concepts, and major issues/themes, generalizations and values. In addition to this, experts and teachers were also consulted to discuss about the programme and get their opinions about students’ understanding levels, suitability of the topics.

The Social Studies textbook of ninth standard consisted of two parts with eighteen units. But for the purpose of experimental treatment in the study, only seven units were selected. The details of the units are given below.
Table 3.4: Details of the units selected for the experimental study

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Unit No.</th>
<th>Name of the Unit</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unit 1</td>
<td>Food Gathering To Food Production</td>
<td>History</td>
</tr>
<tr>
<td>2</td>
<td>Unit 2</td>
<td>Invention Of Bronze</td>
<td>History</td>
</tr>
<tr>
<td>3</td>
<td>Unit 7</td>
<td>The Heritage Of Kerala</td>
<td>History</td>
</tr>
<tr>
<td>4</td>
<td>Unit 1</td>
<td>Our Atmosphere</td>
<td>Geography</td>
</tr>
<tr>
<td>5</td>
<td>Unit 2</td>
<td>The Earth Which Supports Man</td>
<td>Geography</td>
</tr>
<tr>
<td>6</td>
<td>Unit 3</td>
<td>Water The Elixir Of Life</td>
<td>Geography</td>
</tr>
<tr>
<td>7</td>
<td>Unit 6</td>
<td>Production And Factors Of Production</td>
<td>Economics</td>
</tr>
</tbody>
</table>

These seven units were analysed to identify the major concepts and values and core issues/themes. The units and their major concepts and values are given in the table.

Table 3.5: Units selected and their major themes/concepts and values

<table>
<thead>
<tr>
<th>Unit No.</th>
<th>Major Concepts</th>
<th>Values</th>
<th>Core issues/themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I</td>
<td>Stone age, Palaeolithic age, Mesolithic age, Neolithic age, origin of agriculture, invention of wheels, arts and rituals, discovery of fire</td>
<td>Concern for environment, preservation of our culture and past, Respect for food, Cooperation, Justice, National Consciousness, Appreciation of ancient things, Co-operation, Patriotism, Concern for others, Peace, Non-violence, Tolerance, Solidarity of mankind</td>
<td>Human being and animals, agriculture and its transition, compare the transport and industry of present with past, inability to see agriculture as a part of culture</td>
</tr>
<tr>
<td>Unit 1</td>
<td>Bronze age, river valley civilisation, Egyptian civilisation, Mesopotamian civilisation, Harappa civilisation</td>
<td>Concern for others, Fellow feeling., Dignity of labour preservation of our culture and past, Justice, National Consciousness, Appreciation of ancient things, Co-operation, Patriotism, Concern for others, Peace, Non-violence, Tolerance, Solidarity of mankind</td>
<td>Urbanisation and its effects, significance of river valley civilisation, lack of eco-friendly industrialisation and urbanization</td>
</tr>
<tr>
<td>Unit No.</td>
<td>Major Concepts</td>
<td>Values</td>
<td>Core issues/themes</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Unit 7</td>
<td>Ancient culture of Kerala, caste system in Kerala, ritual arts and temple arts, forms of power, commerce, foreign trade, science and literature</td>
<td>Dignity of labour, International understanding, Sense of social responsibility, Duty consciousness, International understanding, Justice, National Consciousness, Appreciation of ancient things, Co-operation, Patriotism, Concern for others, Peace, Non-violence, Tolerance, Solidarity of mankind</td>
<td>Lack of understanding of the specificities of cultural identity and its need to develop freely, inability to see agriculture as a part of culture, caste system in Kerala, locale history and its significance, religious intolerance</td>
</tr>
<tr>
<td>Part II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 1</td>
<td>Composition of atmosphere, structure of atmosphere, atmospheric pollution, temperature, global warming</td>
<td>Conservation of environment, concern of environment, Scientific temper, Co-operation, Concern for others, Equality, National integration</td>
<td>Lack of a scientific approach to health and public health, lack of eco-friendly industrialisation and urbanization, pollution and its problems</td>
</tr>
<tr>
<td>Unit 2</td>
<td>Interior of earth, moving plates, natural phenomena, forces of earth, formation of forms,</td>
<td>Concern of environment, Scientific temper, Co-operation, Concern for others, Equality, National integration, Conservation of environment,</td>
<td>Natural phenomena and man kind,</td>
</tr>
<tr>
<td>Unit 3</td>
<td>Water cycle, forms of water, water pollution, market for water, rain water harvesting</td>
<td>Conservation of environment, concern of environment, Scientific temper, Co-operation, Concern for others, Equality, National integration,</td>
<td>Lack of scientific management of land and water, water pollution and its effects to man kind</td>
</tr>
<tr>
<td>Unit 6</td>
<td>Production, factors of production, production and human wants</td>
<td>Democratic decision making, cooperation, professional attitude</td>
<td>Stands against the tendencies of a consumerist culture,</td>
</tr>
</tbody>
</table>

Sixty lesson plans in social studies were prepared for seventy instructional hours with the time duration of 40-45 minutes.

3.6.1.2 Development of Unit Plans

Planning of a unit include major concepts, learning objectives, major issues/theme, teaching-learning process, learning resources, activities and assessment. Concept maps and unit wise analysis of seven units selected for the study were done. They are given as follows.
Figure 3.2: Concept map of Unit 1 (Part – I)

Unit 1 – From Food Gathering to Food Production

- Animals
- Human Being
- Divisions of the Stone age
  - Paleolithic Age
  - Mesolithic Age
  - Neolithic Age
  - Invention of Wheels
  - Vehicles and Animals
  - Arts and Rituals
  - Art and Ritual Performance

- First tools used by Man
  - Stone Slivers
  - Pieces of bone
  - Discovery of Fire
  - Pieces of wood

- Origin of Agriculture
- Implements of Stone age
  - Chopper
  - Hand Axe
  - Flake
  - Cleaver

- Pieces of stones
Unit 1: From Food Gathering to Food Production

Major Concepts

- Stone age
- Palaeolithic age, Mesolithic age, Neolithic age
- Origin of agriculture
- Invention of wheels, arts and rituals, discovery of fire

Major issues/themes

- Lack of understanding of the world culture and its role on human development
- Absence of a vision of universal humanism
- Human being and animals,
- Agriculture and its transition,
- Compare the transport and industry of present with past,
- Inability to see agriculture as a part of culture

Learning objectives

The students

- Analyse human habitation in early times
- List out features of human and animals
- List out the tools used by animals and humans
- Examine the lives of primitive man
- List out the main implements of stone age
- Analyse the specialties of cave paintings and its specialties
- Explain the origin of agriculture
- Analyse the factors influencing agriculture in early days
- Examine the changes happened in human life after discovery of fire
- Analyse the invention of wheel which revolutionized transport and industry
- Examine the major features of different ages

Teaching-Learning process

i. Discussion about human habitation (open response).
ii. Divide the class into learning groups and is asked to classify features of human and animals.

iii. Discussion on changes happened in human life after discovery of fire

iv. Discussion on tools used by animals and humans.

v. Discussion on the invention of wheels

vi. Plan questions for group discussion and for assignment such as; discuss the origin of agriculture in Kerala.

vii. Plan materials for the learning activities that contain the questions for discussion.

**Learning resources**

- Power point presentation on different ages, video on invention of wheels,
- Pictures of various agricultural equipments (plough, tractor etc.), collecting pictures on tools and other implements in different ages

**Activities**

i. Group discussion on the features of animals and humans and what type of tools used for gathering food in early times.

ii. Group work on preparing concept map on stone age

iii. Group activity to classify the animal and man kind

iv. Discussion on the invention of wheels

v. Discussion on changes happened in human life after discovery of fire

**Assessment**

i. Assessment of reports of the students on the group discussion,

ii. Learner’s participation during the group discussion on different activities are assessed through Observation Schedule.

iii. Evaluation of worksheets on factors influencing agriculture.

iv. Self-assessment sheets of individual and group work are assessed.
Figure 3.3: Concept map of Unit 2 (Part – I)

Unit 2 – The Invention of Bronze

Bronze Age

River Valley Civilization

- Egyptian Civilization
  - 3000 – 1780 BC
  - Gift of Nile
  - Hieroglyphics
  - Pyramids
  - Building temples, Construction of idols

- Mesopotamian Civilization
  - 3200 – 1200 BC
  - Sumer
  - Ziggurats

- Babylon Civilization
  - 1800 BC
  - Hammurabi
  - Handicrafts
  - Cuneiform writing

- Chinese Civilization
  - 3000 – 1600 BC
  - Chinese Culture
  - Handicrafts
  - Legal Code of Hammurabi
  - Emergence of Strong govt.

- Harappa Civilization
  - 3000 BC
  - Harappa and Mohenjodaro
  - Logic of the Name
  - Chinese Script
  - Harappan Script
  - Harappan Trade and commerce
  - End of Harappan civilization
Unit 2: Invention of Bronze

Major Concepts

- Bronze age,
- River ally civilization,
- Egyptian civilization,
- Mesopotamian civilization,
- Harappa civilization

Major issues/themes

- Lack of understanding of the world culture and its role on human development
- Absence of a vision of universal humanism
- Urbanisation in river valley civilisation
- Impact of Harappan civilisation on India development

Learning objectives

The students

- Identify the commonalities in different civilisation
- List out the various activities of Bronze Age.
- Examine the pictures and list out what are the activities that taking place in each picture.
- List out various pictures and script of Harappan civilisation
- Classify differences in river valley civilisation
- Explain the importance pyramid in Egyptian civilisation
- Compare the features of different civilization
- Examine various features of bronze age
- Compare bronze age with stone age
- Map reading on different periods
- Examine the reason for the end of Harappan civilization
- Prepare time line on various civilization
- Prepare a chart on administration, agriculture, trade etc of different culture
- Prepare a concept map on different civilisation
Teaching-Learning process

i. Students are divided into groups for various learning activities
ii. Teacher intervention in between the class when need occurs
iii. Students are divided into two groups and debate on manufacturing of tools and its implication in different fields.
iv. Compare the present world map with old and identify different places in these civilization
v. Group work on Preparing concept map on different civilisations

Learning resources

Video on different river valley civilisations, pictures on different pyramids, internet, world map and map on Egypt and Sumer, etc.

Activities

i. Analyse the history of melting of metals and manufacturing tools in your locality. Prepare report on it
ii. Seminar paper presentation in groups on features difference, similarities on bronze age and stone age.
iii. Map reading on different places in bronze age
iv. Preparation of photo album on river valley civilisation
v. Preparation of slide show on the changes brought about in the society through different civilisation

Assessment

i. Assessment of students’ diary on different work
ii. Continuous assessment of group work through observation.
iii. Peer and self evaluation of various group works
iv. Assessment of photo album prepared by students
Figure 3.4: Concept map of Unit 7 (Part – I)

Unit 7 – The Heritage of Kerala

Ancient Culture of Kerala

Archeologists

Features of Stone Age

Megaliths
Advent of iron
Tinas
Exchange in Tinas
Commerce
Forms of Power
Brahmin

Kurinchi
Mullai
Palai
Marutam
Neithal

Ideas of Buddhism and Jainism

Rules of Perumal

Nadukai
Foreign Trade
Caste System in Kerala

Science and Literature

Saktan Tampuran of Kochi
Sri Sankara
Temple Arts
Ritual arts
Portuguese Domination
Dutch
Venad
Mysore invasion
Unit 7: The Heritage of Kerala

Major Concepts

- Megalithics
- Forms of power
- Caste system in Kerala
- Temple arts and ritual arts
- Advent of iron
- Thinais and nadukal
- Tinais – inhabitants and livelihood
- Rule of perumals
- Ideas of Buddhism and Jainism
- Mysore invasion other foreign domination

Major issues/themes

- Lack of awareness on locale history
- Songs too as a source of history
- Significance of locale history
- Literature and science
- Caste system in Kerala
- Ritual arts and temple arts in your region

Learning objectives

The students

- List out various iron tools from the pictures and name it
- Identify the various megalithic sites that situated in Kerala
- Draw the map of India and locate important industrial places
• Analyse various aspects of tinas and prepare a chart on it

• Collect data on the locale history of your place Kumbala:

<table>
<thead>
<tr>
<th>Origin of the name Kumbala</th>
<th>Economic History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingdom ruled</td>
<td>Present Status of Kumbala</td>
</tr>
<tr>
<td>Religious History</td>
<td>Schools of School Education in Kumbala (Sub)</td>
</tr>
<tr>
<td>Social History</td>
<td>Ritual and Art forms in Kumbala</td>
</tr>
<tr>
<td>Political History</td>
<td>Collect information on experts on history in Kumbala</td>
</tr>
</tbody>
</table>

• Discussion on collected materials on locale history Kumbala

• Bring local experts related to culture and history to class and school of Kumbala

• Analyse the experts opinion on locale history Kumbala

Teaching-Learning process

i. Showing a documentary on Kasargod

ii. Open discussion on the documentary named Kasara

iii. Divides the students into various groups according to the nature of the activity

iv. Seminar on various arts forms of Kerala

v. List out various aspects of local history Kumbala

vi. Prepare time frame for collecting materials on local history Kumbala

vii. Students interaction with different eminent people of Kumbala

Learning resources

Map of Kerala and south India and Atlas to locate important places in megalithics, video on Kasara, Newspaper cuttings, books in library, locale resources like experts in different field.
Activities

i. Discussion on history of Kerala and its origin

ii. Prepare your own locale history

iii. Interview with local people and experts

iv. Field trip on different historical and other places in Kumbala

v. Group work on identify the name of tools in megaliths

vi. Preparation of map of Kerala and locate important megalithic cites of Kerala

vii. Group discussion on human life in primitive period

viii. Classification of Tinais and its features

Assessment

i. Collection of materials on locale history was assessed based on the performance of each group.

ii. The maps prepared by the students are assessed by its precision and the number of places marked.

iii. Individual participation in the group work is assessed using self-assessment form.

iv. Peer evaluation were conducted on different group work.
PART – II

Figure 3.5: Concept map of Unit 1 (Part – II)
Unit 1: Our Atmosphere

Major Concepts

- Atmosphere
- Atmosphere and temperature
- Distribution of temperature on earth surface
- Structure of atmosphere
- Atmospheric pollution
- Global warming
- Acid rain
- Greenhouse effect
- Ozone depletion

Major issue/theme

- Atmospheric pollution and its effects on human being

Learning objectives

The students

- Examine and analyse the differences composition of atmosphere
- Analyse the various factors that affect atmospheric temperature
- Compare and analyse various features of structure of atmosphere
- Analyzing and reflecting on atmospheric pollution (local)
- Identifying local atmospheric pollution problems
- Organize a seminar on atmospheric pollution
- Examine the problems caused by ozone depletion
- Analyse atmospheric pollution on your region
- Discussion on green house effect acid rain and global warming
• Suggest measures to overcome atmospheric pollution.

Teaching-Learning process

i. Teacher promotes every student to participate in the brainstorming session

ii. Teacher facilities the students to participate actively in the debate and interferes in the group activities when required

iii. Reflection on atmospheric pollution and its effect on human being.

iv. Discussion on local atmospheric issue

Learning resources

News paper articles and cartoons, power point presentation, video on global warming, novel enmakaje, documentary on endosulfan.

Activities

i. Group discussion – atmospheric pollution

ii. Classifying various features of structure of atmosphere

iii. Brain storming session – Whether we protect our atmosphere?

iv. Debate – on atmospheric pollution(local)

v. Students interaction with endosulfan affected people

vi. Collection of article from newspaper on endosulfan issue

Assessment

i. Assessment of the album prepared on atmospheric pollution.

ii. Assessment of students’ involvement during brainstorming session on atmosphere

iii. Self-assessment of worksheets on various topics.

iv. Assessment of edition on cooperative sector prepared by students based on its quality.
Figure 3.6: Concept map of Unit 2 (Part – II)
Unit 2: The Earth which Supports Man

Major Concepts

- Interior of earth
- Moving plated
- Earthquakes, tsunami, volcanoes,
- Forces that cause changes on earth surface
- Mountains, plains, plateaus
- Erosion and deposition its types

Major theme/issue

- Volcanoes and man
- Influence of mountain on man
- Earthquake and tsunami

Learning objectives

The students

- Analyse the role of earth in human being
- List out the features on earth interior.
- Identify different types weathering
- Collect data regarding the special features of earth quakes etc.
- Discuss the common features of various erosion and deposition
- Analyse the diversities observed Indo-Gangetic plain
- List out the different plateaus from map

Teaching-Learning process

i. Discussion on earth and its features

ii. Seminar on influence of mountain on man
iii. Discussion on earth quake and tsunami that affect human being

iv. Video on erosion and deposition

v. Various examples have to be provided by teacher at the end of every session

vi. In the beginning of the group activity proper situation are to be given to the students to engage with the problem

vii. Video on volcanoes

viii. Video on earth quake and tsunami

Learning resources

Videos, power point presentation, world map (geographical)

Activities

i. Group discussion – earth quake and tsunami

ii. Preparation of chart on earthquakes that shook the world.

iii. Classification of table on different plateaus and plains from map

iv. Project work – earth quake and tsunami

v. Group activity on different works related to erosion and deposition

Assessment

i. Assessment of the project work on earth quake and tsunami

ii. Assessment of the reports of the group discussion using observation schedule.

iii. Evaluation of worksheets of group work.
Figure 3.7: Concept map of Unit 3 (Part – II)
Unit 3: Water – The Elixir of Life

Major Concepts

- Water cycle
- Surface water
- Under ground water
- Water scarcity
- Water pollution
- Market for water
- Rain water harvesting
- Indus water treaty

Major theme/issue

- Water scarcity
- Water pollution
- War for water
- Water conservation
- People participation in distribution of drinking water

Learning objectives

The students

- Discuss the importance of water in planet
- List out and analyse total water resource on earth
- Analyse the implication of water cycle
- Discussion on factors influencing surface water
- Infer the causes for water scarcity and water pollution
- Role of man in polluting water
• Discuss about rain water harvesting

• Importance of rain water harvesting

Teaching-Learning process

i. Discussion on water in earth and its use by human being

ii. Seminar on water scarcity and water pollution

iii. Appropriate guidelines are to be provided in the process of project work.

iv. Debate on war for water

Learning resources

Video on water cycle, picture on water scarcity and pollution

Activities

i. Group discussion – on water scarcity and water pollution

ii. Project work on water conservation in your area

Assessment

i. Assessment of project work on water conservation in your area

ii. Involvement of students seminar and debate on water pollution

iii. Assessment of the students’ learning process during quiz competition.
Figure 3.8: Concept map of Unit 6 (Part – II)
Unit 6: Factors of Production

Major Concepts

- Production
- Factors of production
- Land, labour, capital, organization
- Capital formation
- Division of labour

Major theme/issue

- Production and human wants
- Production activity and in its impact on nature

Learning objectives

The students

- Analyse the reasons for the goods and services we use in our daily life
- List out various steps in paddy cultivation
- Analyse the role of land in factors of production
- Collect information on different uses of land in your area
- Analyse the human intervention on land which upset the ecological balance
- Prepare a table on capital intensive and labour intensive production

Teaching-Learning process

i. Motivation is given to the students to write questions for the interview

ii. Various examples have to be provided by teacher at the end of every session

iii. In the beginning of the group activity proper situation are to be given to the students to engage with the problem
Learning resources

Internet, Power point presentation, interaction with a local business man

Activities

• Group discussion – for finding out the reasons for the goods and services we use in our daily life
• Completion of table – Functions of land
• Preparation of table on mental and physical labour.
• Interview with the local entrepreneur on his business.
• Classification of table on wages for different job
• Prepare a table showing various type of paddy cultivation

Assessment

i. Assessment of different work sheet related to factors of production.
ii. Assessment of the reports of the group discussion using observation schedule.
iii. Assessment of interview questions prepared by students based on its content and relevance.
iv. Evaluation of worksheets of group work.

3.6.1.3 Development of Lesson Plans

Lesson plans were planned for each selected units in which the critical pedagogical approach was applied. The content in the lessons were organized based on the background knowledge and experience of the students following the principles of critical pedagogy. Sixty lesson plans were prepared from the selected units, which are summarized in the table.
There were several common steps can be found from the different format of critical pedagogical approach. They are Problem posing, reflecting on the problem, dialogical lecture, interim class evaluation, integrating materials, solutions, alternatives and projects. Through this framework, there were different strategies like: discussions, debate, inquiry, community-based activities, role-play etc will be employed. And also different assessment techniques like: peer assessment, self assessment and group assessment etc will be employed. In the present study, the subject matter was developed in three different levels/phases. They are Generative themes, Topical themes and Academic themes and finally creative action phase. These were the guidelines for a critical pedagogical classroom. The detailed explanation of critical pedagogical approach in the present study is as follows.

<table>
<thead>
<tr>
<th>Unit No.</th>
<th>Name of the Unit</th>
<th>No. of Lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part – I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit-1</td>
<td>Food Gathering to Food Production</td>
<td>6</td>
</tr>
<tr>
<td>Unit-2</td>
<td>Invention of Bronze</td>
<td>10</td>
</tr>
<tr>
<td>Unit-7</td>
<td>The Heritage of Kerala</td>
<td>12</td>
</tr>
<tr>
<td>Part – II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit-1</td>
<td>Our Atmosphere</td>
<td>6</td>
</tr>
<tr>
<td>Unit-2</td>
<td>The Earth</td>
<td>11</td>
</tr>
<tr>
<td>Unit-3</td>
<td>Water – The Elixir of Life</td>
<td>10</td>
</tr>
<tr>
<td>Unit 6</td>
<td>Production and Factors of Production</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>60</td>
</tr>
</tbody>
</table>
### Table 3.7: Phases of Critical Pedagogical Approach

<table>
<thead>
<tr>
<th>Phases</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generative themes</strong></td>
<td>Generative themes are “provocative themes discovered as unresolved social problems in the community, good for generating discussion in class on the relation of personal life to larger issues” (Shor, 1992). Freire called these generative themes because “they contain the possibility of unfolding into again as many themes, which in their turn call for new tasks to be fulfilled,” new avenues of study, reflection, and action to be explored (1997). Shor clarifies that generative themes are to be found “in the unsettled intersections of personal life and society” (1992). Generative themes are contextual, drawn from the everyday lives of students. Such is one of their main strengths for a critical pedagogy, as generative themes serve as “student-centered foundations for problem-posing” (Shor, 1992).</td>
</tr>
<tr>
<td>Teachers role</td>
<td>• To provide adequate experience that generates critical dialogue in the class through video, newspaper, story etc on a theme.</td>
</tr>
<tr>
<td></td>
<td>• Contextualize the theme with everyday life of students through probing questions</td>
</tr>
<tr>
<td>Students role</td>
<td>• Free and open reflection on the theme that leads to students centered foundations for problem-posing</td>
</tr>
<tr>
<td><strong>Topical themes and academic themes</strong></td>
<td>Topical themes are “social question(s) of key importance locally, nationally, or globally” (Shor, 1992). Topical themes are not generated by student discussion in class. The teacher brings topical themes to the students. They then, all together, discuss the particular topical theme and how it impacts their lives and the subject matter of the class itself. The idiom in which it is introduced needs to be something the students can grasp. Unlike generative themes, topical themes often bring students to uncharted territory—uncharted by the students that is (Actually a more apt metaphor is that of topical themes bringing the uncharted territory to the students.) Generative themes, on the other hand, add “critical discussion about things students already know and talk about uncritically every day” (Shor, 1992). Academic themes are also introduced in class by the teacher. Academic themes are what we as students are most used to being exposed to in schools. The academic theme is “a scholastic, professional, or technical body of knowledge which the teacher wants to introduce or has to introduce as a requirement” (Shor, 1992). Academic themes are structured knowledge in specific academic disciplines. Their political import may not be apparent. And any possible political significance may not be the guiding reason teachers introduce academic themes in class. Nevertheless, a creative, critical teacher can tie together academic and topical themes.</td>
</tr>
<tr>
<td>Teachers role</td>
<td>Judiciously introduce the academic content through various activities.</td>
</tr>
<tr>
<td>Students role</td>
<td>Link specific academic knowledge with their own life.</td>
</tr>
<tr>
<td><strong>Creative action phase</strong></td>
<td>This is the action phase of learning. Where students take the new knowledge or theory and use it to improve the life of the community and the move of learning from the classroom to the real world of the students. This may in the form of creative work done by the students, community participation in different context, addressing some issues that are prevailing in the society, suggesting solutions for problems they faced in life and society etc.</td>
</tr>
<tr>
<td>Teachers role</td>
<td>As a reflective practitioner promote transformation of learning through exposure of student participation in different context in a meaningful way.</td>
</tr>
<tr>
<td>Students role</td>
<td>Experience and suggest solutions for different problems and critically conscious about their role in the society.</td>
</tr>
</tbody>
</table>
The lesson plans were prepared, by careful analysis and it consists of learning objectives, key questions, learning strategy/activities, resources, and assessment. An example of lesson plan is given in the table and another copy is given in the Appendix.

Table 3.8: Sample Lesson Plan

Unit 2: The Earth which Supports Man

Topic: Tsunami

<table>
<thead>
<tr>
<th>Major theme/issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Consequences of tsunami on man and others</td>
</tr>
<tr>
<td>• Precautions taken to reduce calamities</td>
</tr>
</tbody>
</table>

Learning Objectives

1. To critical reflection on tsunami based on the video and how it affects man kind and others.
2. To examine about the causes/characteristics of Tsunami
3. To infer the consequences of Tsunami
4. To understand about the precautions of Tsunami.
5. To examine the tsunami happened in Kerala

Key questions that enhance dialogue/reflection

• What are the examples of tsunami in different parts of the world and how it affects the life of the people?
• What are the consequences of tsunami on man?
• What are the Precautions will take to reduce the effect calamities?

Learning strategy and activities

Discussion
Paper cuttings
Showing video on tsunami
Map reading

Learning resources

Paper cuttings of Tsunami, video on Tsunami, map and globe Indira point, Andaman Nicobar islands, Sumatra, Burma plates.
<table>
<thead>
<tr>
<th>Content and Activities</th>
<th>Response</th>
</tr>
</thead>
</table>
| **Generating theme**  | Students free response paper cutting  
Teacher shows paper cuttings related to Tsunami says that we discussed the different effects of earthquake then ask the students to reflect on the theme in paper cuttings. Simultaneously a video on tsunami shown to generate more discussion and dialogue on tsunami and how it affects human being within their group.  

**Academic theme/topical theme**  
Teacher asks the students to form group and teacher shows the paper cuttings and give the information regarding December 26, 2004, and asks the students to prepare a report. Then teachers ask them to present it in the class. Then teacher – conclude the activity by saying that the Tsunami that took origin in the neighboring Tamil Nadu and in the Indian Ocean on 26<sup>th</sup> December 2004 causes wide spread devastation of the nearby area.  

You all are mere familiar with the word Tsunami. Do you know its meaning? Yes, it is a Japanese word meaning Harbour, Waves, Yes, sea-waves which can be very high are called Tsunami. Do you know its Characteristics? All of you notice in the TV? Didn’t you? It have great speed is about 800 km/hr and rise up to 80 mtrs high. Can you imagine it? Tsunami waves are travel thousands of Kilometers in the sea without causing any harm cause widespread devastation when they reach and hit the shore. These waves are gigantic and powerful  

Teacher discussed the students on Tsunami occurred in Japan. All of you heard and read about the Tsunami occurred in Japan? Now we are discussing more about Tsunami, its characteristics cause’s effects and its precautions.  

Teacher asks the students in discussing the effects of Tsunami. And asked them to present it. major effects of Tsunami are  

1) Loss of life  
2) Destruction of building, roads etc  
3) Disappearance of small islands  

Eg: Indira Point in Andaman  

**Creative action phase**  
Do you have any suggestion to control/reduce the destruction due to calamities?  
Then teacher reflect on it  
1) Construction of embankment a long coast.  
2) Establishment of Tsunami warning centres.  

**Assignment**  
1. Collect pictures regarding Tsunami and make picture album.
3.6.1.4 Development and Standardisation of the Instruments used in the Study

Seven instruments were used to gather data for this study: (i) Achievement Test in Social Studies (ATSS), (ii) Critical Thinking Ability Test (CTAT), (iii) Value Preference Scale (VPS). The details of the instruments used for the study are given as follows.

Table 3.9: Details of the instruments used for the study

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the instruments</th>
<th>Author</th>
<th>Variable Measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Achievement Test in Social Studies (ATSS)</td>
<td>Investigator</td>
<td>Pre-test and post-test scores of achievement in social studies</td>
</tr>
<tr>
<td>2.</td>
<td>Critical Thinking Ability Test (CTAT)</td>
<td>Investigator</td>
<td>Pre-test and post-test scores of critical thinking ability</td>
</tr>
<tr>
<td>3.</td>
<td>Value Preference Scale (VPS)</td>
<td>Investigator</td>
<td>Pre-test and post-test scores of value preference</td>
</tr>
</tbody>
</table>

The descriptions of the above tools are given below.

3.7 ACHIEVEMENT TEST IN SOCIAL STUDIES

To test the pre and post achievement levels of students of experimental and control group’s an achievement test in Social Studies was designed by the investigator. The details of construction of Achievement Test in Social Studies are as follows.

During the preparation of lesson plans, the concepts, issues/themes, academic points and learning objectives were listed out. The revised taxonomy of Benjamin Bloom proposed by Lorin Anderson et al., (2001) was used in planning the objective. Bloom’s original cognitive taxonomy was in a one-dimensional form. With the addition of products, the Revised Bloom’s Taxonomy takes the form of two-dimensions (Knowledge and Cognitive process dimensions).
Knowledge Dimension indicates the kind of knowledge to be learned while Cognitive Process Dimension indicates the process used to learn. The knowledge dimension consists of factual, conceptual, procedural and the metacognitive categories. The cognitive process dimensions are Remembering, Understanding, Applying, Analysing Evaluating, Creating. Based on this the questions were constructed under different categories using the action verbs as illustrated in the revised taxonomy of objectives.

3.7.1 Item Pooling

The items were pooled based on the objectives framed. Appropriate weightages were given to cognitive process dimensions, content and the types of questions. The assessment was objective based and the test planned included both closed and open ended questions.

The investigator framed 44 items including, fill in the blanks, and short answer questions and essay type questions were included. The test items thus framed were further scrutinized and edited by the investigator from the point of view of language suitability, ambiguity and comprehensibility. Number of items prepared in the test in the initial stage and weightage given to cognitive processes, content and form of questions are given in the following tables.

Table 3.10: Weightage given to cognitive processes dimensions before try out

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Cognitive processes dimensions</th>
<th>No. of items</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remembering</td>
<td>8</td>
<td>12</td>
<td>12%</td>
</tr>
<tr>
<td>2</td>
<td>Understanding</td>
<td>10</td>
<td>22</td>
<td>22%</td>
</tr>
<tr>
<td>3</td>
<td>Applying</td>
<td>7</td>
<td>20</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>Analysing</td>
<td>8</td>
<td>18</td>
<td>18%</td>
</tr>
<tr>
<td>5</td>
<td>Evaluating</td>
<td>6</td>
<td>14</td>
<td>14%</td>
</tr>
<tr>
<td>6</td>
<td>Creating</td>
<td>5</td>
<td>14</td>
<td>14%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>44</strong></td>
<td><strong>100</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Table 3.11: Weightage given to content before try out

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Content</th>
<th>No. of items</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>From Food Gathering to Food Production</td>
<td>5</td>
<td>10</td>
<td>10%</td>
</tr>
<tr>
<td>2</td>
<td>The Invention of Bronze</td>
<td>6</td>
<td>16</td>
<td>16%</td>
</tr>
<tr>
<td>3</td>
<td>The heritage of Kerala</td>
<td>7</td>
<td>18</td>
<td>18%</td>
</tr>
<tr>
<td>4</td>
<td>Our Atmosphere</td>
<td>7</td>
<td>16</td>
<td>16%</td>
</tr>
<tr>
<td>5</td>
<td>The Earth Which Supports Man</td>
<td>8</td>
<td>20</td>
<td>20%</td>
</tr>
<tr>
<td>6</td>
<td>Water-the Elixir of Life</td>
<td>6</td>
<td>14</td>
<td>14%</td>
</tr>
<tr>
<td>7</td>
<td>Production and Factors of Production</td>
<td>5</td>
<td>12</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>44</td>
<td>100</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3.12: Weightage given to form of questions before try out

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Form of items</th>
<th>No. of items</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fill in the blanks</td>
<td>16</td>
<td>16</td>
<td>16%</td>
</tr>
<tr>
<td>3</td>
<td>Short answer questions</td>
<td>22</td>
<td>49</td>
<td>49%</td>
</tr>
<tr>
<td>4</td>
<td>Essay</td>
<td>6</td>
<td>35</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>44</td>
<td>100</td>
<td>100%</td>
</tr>
</tbody>
</table>

The test consisting of 44 questions was given to experts from social studies background. They scrutinized and studied the items of the test in terms of their sampling individual units and ensuring coverage of cognitive process comprising of Remembering, understanding, Applying, Analysing, Evaluating and Creating. Twelve items were deleted from the achievement test before try out. On the basis of their suggestions, appropriate modifications were made and a total number of 32 items were selected for the achievement test for try out.

3.7.2 Initial Try Out

The achievement test in social studies was administered to a small group of 25 students who were about in the beginning of their tenth standard of dale view school Thiruvananthapuram following the state syllabus of Kerala. This was done
to know the clarity of items and to understand the words that are difficult to follow. The items were modified based on the results obtained from these students who participated in the initial try out.

3.7.3 Final Try Out

The test items were subjected to a formal try out on a sample of hundred students in three divisions of tenth standard from Dale View School, Katakada. The tenth standard students were selected for the tryout of achievement test as they have already learnt the ninth standard syllabus and their performance on the tool will help in deciding upon the items difficulty. Before the administration of the test, the purpose of the test was made clear to the students. All the necessary guidelines about the test and additional information needed were given. All the hundred response sheets were scored with the help of answer key.

Final try out was performed in order to identify weak or defective items to make further improvement, identify ambiguous and intermediate implausible distracters, very difficult and easy items, determine the difficulty level of each individual test item and lastly to determine the number of test items to be included in the final test. A schedule was drawn after having consultation with the Principals/headmistress/headmasters of selected institutions. The students were told about the purpose of the administration of the test. They were given both general and specific instructions regarding the test and were asked to answer the items in the question paper itself. All the precautionary measures were taken to avoid mutual help and to avoid unfair means in answering the questions. The average time taken by the students to answer the achievement test was three hours.
3.7.4 Item Analysis of the Test

The answer scripts were corrected with the help of scoring key prepared. Item analysis was carried out to find out the difficulty value and discriminative index, as the test was content oriented. Among the various procedures of item analysis the method advocated by Ebel (1966) in the book “Measuring Educational Achievement” was followed. The following steps were taken up in the process of item analysis.

- Firstly the scored test papers or answer sheets were arranged in ascending or descending order.
- Then the two sub groups of test papers i.e. upper 27 percent (students received highest marks) and the lower 27 percent (students received lowest marks) of the groups were separated.
- The frequency of each possible response to each item for the chosen groups was found out.
- The sum of the frequencies for the two groups was calculated and then item difficulty and discriminative index were found for each item with the help of the formula given below:

\[ D.I. = \frac{R_{(\text{high})} + R_{(\text{low})}}{2N} \times 100 \text{ Difficulty value} \]

\[ D.P. = \frac{R_{(\text{high})} - R_{(\text{low})}}{N} \times 100 \text{ Discriminative power} \]

Where

- \( R_{(\text{high})} \) = Number of correct responses to an item in the high group
- \( R_{(\text{low})} \) = Number of correct responses to an item in the low group
- \( N = 27\% \) of the total group

Since adequate number of items were not available with Discriminative Power greater than 0.40 and Difficulty Index between 40 and 60, some
adjustments in this limit were found necessary. As suggested by Noll et al. (1995) the items with a difficulty value in the range of 21-80% and discriminating power greater than 0.20 were selected for the final test, which amounted to twenty eight items. Four questions were deleted from the test as a result of item analysis. The result of analysis of items in the achievement test in social studies is as follows:

Table 3.13: Item Analysis of Achievement Test in social studies

<table>
<thead>
<tr>
<th>Item</th>
<th>D.I.</th>
<th>D.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.89</td>
<td>-.05*</td>
</tr>
<tr>
<td>2</td>
<td>.32</td>
<td>.27</td>
</tr>
<tr>
<td>3</td>
<td>.57</td>
<td>.5</td>
</tr>
<tr>
<td>4</td>
<td>.64</td>
<td>.45</td>
</tr>
<tr>
<td>5</td>
<td>.45</td>
<td>.36</td>
</tr>
<tr>
<td>6</td>
<td>.5</td>
<td>.45</td>
</tr>
<tr>
<td>7</td>
<td>.57</td>
<td>.59</td>
</tr>
<tr>
<td>8</td>
<td>.27</td>
<td>.27</td>
</tr>
<tr>
<td>9</td>
<td>.25</td>
<td>.41</td>
</tr>
<tr>
<td>10</td>
<td>.05</td>
<td>.09*</td>
</tr>
<tr>
<td>11</td>
<td>.25</td>
<td>.45</td>
</tr>
<tr>
<td>12</td>
<td>.27</td>
<td>.55</td>
</tr>
<tr>
<td>13</td>
<td>.5</td>
<td>.55</td>
</tr>
<tr>
<td>14</td>
<td>.64</td>
<td>.27</td>
</tr>
<tr>
<td>15</td>
<td>.66</td>
<td>.5</td>
</tr>
<tr>
<td>16</td>
<td>.75</td>
<td>.41</td>
</tr>
<tr>
<td>17</td>
<td>.36</td>
<td>.73</td>
</tr>
<tr>
<td>18</td>
<td>.52</td>
<td>.59</td>
</tr>
<tr>
<td>19</td>
<td>.59</td>
<td>.36</td>
</tr>
<tr>
<td>20</td>
<td>.57</td>
<td>.59</td>
</tr>
<tr>
<td>21</td>
<td>.16</td>
<td>.14*</td>
</tr>
<tr>
<td>22</td>
<td>.43</td>
<td>.68</td>
</tr>
<tr>
<td>23</td>
<td>.19</td>
<td>.20*</td>
</tr>
<tr>
<td>24</td>
<td>.63</td>
<td>.5</td>
</tr>
<tr>
<td>25</td>
<td>.27</td>
<td>.32</td>
</tr>
<tr>
<td>26</td>
<td>.43</td>
<td>.59</td>
</tr>
<tr>
<td>27</td>
<td>.43</td>
<td>.5</td>
</tr>
<tr>
<td>28</td>
<td>.36</td>
<td>.55</td>
</tr>
<tr>
<td>29</td>
<td>.48</td>
<td>.59</td>
</tr>
<tr>
<td>30</td>
<td>.63</td>
<td>.5</td>
</tr>
<tr>
<td>31</td>
<td>.43</td>
<td>.5</td>
</tr>
<tr>
<td>32</td>
<td>.21</td>
<td>.32</td>
</tr>
</tbody>
</table>

* Deleted
3.7.5 Validity of the Test

Content validity was established by evaluating the relevance of the test item individually and as a whole (Cohen, Manion & Morrison, 2007). For estimating the content validity of the social studies achievement test, the investigator subjected the test items for expert’s evaluation. The items, objectives and areas from which the items are selected were given to the experts for scrutiny. As per the feedbacks of the experts, it was found that the test contents cover the significant concepts as well as comprehensive enough in terms of cognitive process dimensions. Thus the content validity of the Social science achievement test was established.

3.7.6 Reliability of the Test

Reliability of the achievement test in social studies was established using Test-Retest method. A representative sample of one hundred students in three divisions of tenth standard students of HS Balaramapuram, Kerala were selected for establishing reliability of the test on achievement in social studies. Since it was the beginning of the academic year and the students of tenth standard had just entered after the completion of ninth standard, it was found that they are the right sample for conducting the reliability. Before the administration of the test, the purpose of the test was made clear to the students. The test materials in sufficient numbers were provided. All the necessary guidelines about the test and additional information needed for the test were given. The test was conducted to the students. The retest was conducted for the same sample with the same tool after a gap of fifteen days. The performance of students in both the test and retest were analysed for its reliability.
A test retest coefficient tells the stability of the test. It answers the question concerning how stable or dependable are the measurements over a period of time. High reliability of this kind tells us that the individuals remain rather uniform, or maintain their rank position in spite of changes. A low retest reliability coefficient means that the function or functions measured fluctuate from time to time or the test as an instrument is affected by other things that do fluctuate (Dalen & Meyer, 1966).

The correlation coefficient of the two sets of scores, calculated using Pearson’s product moment correlation, was found to be 0.72. The obtained value of reliability suggests that the test has acceptable psychometric qualities to measure the achievement in social studies of ninth standard students. Internal consistency also was found to be 0.69 by using Cronbach’s $\alpha$ (alpha). Cronbach’s $\alpha$ (alpha) is a coefficient of reliability, which is commonly used as a measure of internal consistency or reliability of a psychometric test.

The achievement test in social studies in its final form along with its scoring key are given in the Appendices I and II.

### 3.7.7 Final Form of the Test

The final form of the achievement test consisted of 28 items, including seven objective type questions and sixteen short answer questions and five essay with the allocation of 75 marks on the whole test. The total time fixed for the final test was two and half hours.

The weightage given to the content, cognitive processes, difficulty level and form of the questions in the test were as follows.
3.7.8 Weightage Given to the Content

The weightage to the content selected for the intervention are as follows.

**Table 3.14: Weightage to content**

<table>
<thead>
<tr>
<th>Number</th>
<th>Content</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>From Food Gathering to Food Production</td>
<td>7</td>
<td>9.33</td>
</tr>
<tr>
<td>2</td>
<td>The Invention of Bronze</td>
<td>8</td>
<td>10.7</td>
</tr>
<tr>
<td>3</td>
<td>The heritage of Kerala</td>
<td>13</td>
<td>17.33</td>
</tr>
<tr>
<td>4</td>
<td>Our Atmosphere</td>
<td>13</td>
<td>17.33</td>
</tr>
<tr>
<td>5</td>
<td>The Earth Which Supports Man</td>
<td>14</td>
<td>18.67</td>
</tr>
<tr>
<td>6</td>
<td>Water-the Elixir of Life</td>
<td>10</td>
<td>13.33</td>
</tr>
<tr>
<td>7</td>
<td>Production and Factors of Production</td>
<td>10</td>
<td>13.33</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>75</td>
<td>100</td>
</tr>
</tbody>
</table>

3.7.9 Weightage Given to Cognitive Process Dimensions

While planning the construction of achievement test in social studies, the specification of objectives based on cognitive categories such as Remembering, Understanding, Applying, Analysing, Evaluating and Creating were kept in mind.

**Table 3.15: Weightage given to cognitive process dimensions**

<table>
<thead>
<tr>
<th>Number</th>
<th>Objectives</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remembering</td>
<td>8</td>
<td>10.7</td>
</tr>
<tr>
<td>2</td>
<td>Understanding</td>
<td>17</td>
<td>22.7</td>
</tr>
<tr>
<td>3</td>
<td>Applying</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Analyzing</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Evaluating</td>
<td>10</td>
<td>13.33</td>
</tr>
<tr>
<td>6</td>
<td>Creating</td>
<td>10</td>
<td>13.33</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>75</td>
<td>100%</td>
</tr>
</tbody>
</table>

3.7.10 Weightage Given to Difficulty Levels

The prepared Social studies achievement test consisted of 49.33% average questions, 40% difficult questions and 10.7% Easy questions. Weightage given to the difficulty levels are prepared in the following table.
Table 3.16: Weightage given to the difficulty levels

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Difficulty level</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Easy</td>
<td>8</td>
<td>10.7%</td>
</tr>
<tr>
<td>2</td>
<td>Average</td>
<td>37</td>
<td>49.33%</td>
</tr>
<tr>
<td>3</td>
<td>Difficulty</td>
<td>30</td>
<td>40%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>75</td>
<td>100%</td>
</tr>
</tbody>
</table>

3.7.11 Weightage Given to Form of Questions

In this achievement test 9.33% percentage marks were given to objective type, 50.7% short answer questions and 40% for essay type questions respectively.

Table 3.17: Weightage given to form of questions

<table>
<thead>
<tr>
<th>Number</th>
<th>Form of Questions</th>
<th>No. of Questions</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Objective</td>
<td>7</td>
<td>7</td>
<td>9.33%</td>
</tr>
<tr>
<td>2</td>
<td>Short answer</td>
<td>16</td>
<td>38</td>
<td>50.7%</td>
</tr>
<tr>
<td>3</td>
<td>Essay</td>
<td>5</td>
<td>30</td>
<td>40%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>28</td>
<td>75</td>
<td>100%</td>
</tr>
</tbody>
</table>

3.7.12 Blue Print for the Test

A blue print was prepared for the final test on the basis of the weightages given to the Cognitive process dimensions, Contents and Form of items.
Table 3.18: Blue Print for the Achievement Test in Social Studies

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Remembering</th>
<th>Understanding</th>
<th>Applying</th>
<th>Analyzing</th>
<th>Evaluating</th>
<th>Creating</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>FMQS</td>
<td>O  S  E</td>
<td>O  S  E</td>
<td>O  S  E</td>
<td>O  S  E</td>
<td>O  S  E</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>(1)1</td>
<td></td>
<td>(3)1</td>
<td>(3)1</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>II</td>
<td>(2)1</td>
<td></td>
<td></td>
<td>(2)1</td>
<td>(2)1</td>
<td>(2)1</td>
<td>8</td>
</tr>
<tr>
<td>III</td>
<td>(1)1</td>
<td>(5)1</td>
<td>(4)1</td>
<td>(1)1</td>
<td>(2)1</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>IV</td>
<td>(2)1</td>
<td>(2)1</td>
<td></td>
<td>(6)1</td>
<td>(3)1</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>V</td>
<td>(2)1</td>
<td>(1)1</td>
<td>(1)2</td>
<td>(4)1</td>
<td></td>
<td>(5)1</td>
<td>14</td>
</tr>
<tr>
<td>VI</td>
<td>(1)1</td>
<td></td>
<td>(6)1</td>
<td></td>
<td>(3)1</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>VII</td>
<td></td>
<td>(2)1</td>
<td>(6)1</td>
<td>(2)1</td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>17</td>
<td>15</td>
<td>15</td>
<td>10</td>
<td>10</td>
<td>75</td>
</tr>
</tbody>
</table>

Note: The figures in the parentheses indicate the marks given and the figures outside the parentheses indicate the number of questions.
3.8 CRITICAL THINKING IN SOCIAL STUDIES

The literature related to critical thinking was reviewed in order to identify the instruments that can measure critical thinking ability. From the review it was found that Ennis-Weir Critical Thinking Essay Test and the California Critical thinking Disposition Inventory were widely used by many researchers for this purpose. Many researchers have placed heavy reliance on multiple choice tests to measure critical thinking (Norris, 1988). The Watson-Glaser Critical thinking Appraisal (Watson & Glaser, 1980) is one of the oldest and most widely used critical thinking tests. It is reported to have served as a benchmark for judging the validity of other critical thinking tests and for evaluating the effectiveness of teaching for critical thinking development. But these tests were intended to measure general Critical thinking ability. The Watson-Glaser Critical thinking Appraisal consist of the dimensions like Inference, Recognition of Assumptions, Deduction, Interpretation and Evaluation of arguments.

However, it was felt that there was a need to construct a Critical thinking test in social studies suitable for students of IX standard and therefore it was decided to construct a new critical thinking test on social studies as a part of this study, with due consideration to the age of students, nature and purpose of the study. The Cognitive skills given in the Delphi Report (1990) were adopted for the construction of the Critical Thinking Test on social studies which is used in this study, since the Delphi report was found to be an authentic document created through a consensus reached by eminent scholars in the field of Psychology, Philosophy, social Science and Education. Delphi report contains detailed description of the cognitive skills and sub skills of Critical thinking. The Cognitive
skills and sub skills adopted from the Delphi Report that are taken as dimensions to develop Critical Thinking Test in social studies.

Table 3.19: Cognitive skills and sub-skills of critical thinking in the Delphi Report (1990)

<table>
<thead>
<tr>
<th><strong>1. Interpretation</strong></th>
<th>To comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1 Categorisation:</strong> to apprehend or appropriately formulate categories, distinctions, or frameworks for understanding, describing or characterizing information; to describe experiences, situations, beliefs, events, etc., so that they take on comprehensible meanings in terms of appropriate categorizations, distinctions, or frameworks.</td>
<td></td>
</tr>
<tr>
<td><strong>1.2 Decoding significance:</strong> to detect, attend to, and describe the informational content, affective purport, directive functions, intentions, motives, purposes, social significance, values, views, rules, procedures, criteria, or inferential relationships expressed in convention – based communication systems, such as in language, social behaviours, drawings, numbers, graphs, tables, charts, signs and symbols.</td>
<td></td>
</tr>
<tr>
<td><strong>1.3 Clarifying Meaning:</strong> to paraphrase or make explicit, through stipulation, description, analogy or figurative expression, the contextual, conventional or intended meanings of words, ideas, concepts, statements, behaviours, drawings, numbers, signs, charts, graphs, symbols, rules, events or ceremonies; to use stipulation, description, analogy or figurative expression to remove confusing, unintended vagueness or ambiguity, or to design a reasonable procedure for so doing.</td>
<td></td>
</tr>
<tr>
<td><strong>2. Analysis</strong></td>
<td>To identify the intended and actual inferential relationships among statements, questions, concepts, descriptions or other forms of representation intended to express beliefs, judgments, experiences, reasons, information, or opinions.</td>
</tr>
<tr>
<td><strong>2.1 Examining Ideas:</strong> to determine the role various expressions play or are intended to play in the context of argument, reasoning or persuasion; to define terms; to compare or contrast ideas, concepts, or statements; to identify issues or problems and determine their component parts, and also to identify the conceptual relationships of those parts to each other and to the whole.</td>
<td></td>
</tr>
<tr>
<td><strong>2.2 Detecting Arguments:</strong> given a set of statements, descriptions, questions or graphic representations, to determine whether or not the set expresses, or is intended to express, a reason or reasons in support of or contesting some claim, opinion or point of view.</td>
<td></td>
</tr>
</tbody>
</table>
2.3 Analysing Arguments: given the expression of a reason or reasons intended to support or contest some claim, opinion or point of view, to identify and differentiate: (a) the intended main conclusion, (b) the premises and reasons advanced in support of the main conclusion, (c) further premises and reasons advanced as backup or support for those premises and reasons intended as supporting the main conclusion, (d) additional unexpressed elements of that reasoning such as intermediary conclusions, unstated assumptions or presuppositions, (e) the overall structure of the argument or intended chain of reasoning, and (f) any items contained in the body of expressions being examined which are not intended to be taken as part of the reasoning being expressed or its intended background.

3. Evaluation
To assess the credibility of statements or other representations which are accounts or descriptions of a person’s perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intend inferential relationships among statements, descriptions, questions or other forms of representation.

3.1 Assessing Claims: to recognize the factors relevant to assessing the degree of credibility to ascribe to a source of information or opinion; to assess the acceptability, the level of confidence to place in the probability or truth of any given representation of an experience, situation, judgment, belief or opinion. For example: to recognize the factors which make a person a credible witness regarding a given event or credible authority on a given topic; to determine if a given principle of conduct is applicable to deciding what to do in a given situation; to determine if a given claim is likely to be true or false based on what one knows or can reasonably find out.

3.2 Assessing Arguments: to judge whether the assumed acceptability of the premises of a given argument justify one’s accepting as true (deductively certain), or very probably true (inductively justified), the expressed conclusion of that argument; to anticipate or to raise questions or objections, and to assess whether these point to significant weakness in the argument being evaluated; to determine whether an argument relies on false doubtful assumptions or presuppositions and then to determine how crucially these affect its strength; to judge between reasonable and fallacious inferences; to judge the probative strength of an argument’s premises and assumptions with a view toward determining the acceptability of the argument; to determine and judge the probative strength of an argument’s intended or unintended consequences with view toward judging the acceptability of the argument; to determine the extent to which possible additional information might strengthen or weaken an argument.
4. Inference
To identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to educe the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation.

4.1 Querying Evidence: In particular, to recognize premises which require support and to formulate a strategy for seeking and gather information which Might supply that support; In general, to judge that information relevant to deciding the acceptability, plausibility or relative merits of a given alternative, question, issue, theory, hypothesis, or statement is required, and to determine plausible investigatory strategies for acquiring that information.

4.2 Conjecturing Alternatives: to formulate multiple alternatives for resolving a problem, to postulate a series of suppositions regarding a question, to project alternative hypotheses regarding an event, to develop a variety of different plans to achieve some goal; to dram out presuppositions and project the range of possible Consequences of decisions, positions, policies, theories, or beliefs.

4.3 Drawing Conclusions: to apply appropriate modes of inference in determining what position, opinion or point of view one should take on a given matter or issue; given a set of statements, with the proper level of logical strength, their inferential relationships and the consequences or the presuppositions which they support, warrant, imply or entail; to employ successfully various sub-species of reasoning, as for example to reason analogically, scientifically, etc.; to determine which of several possible conclusions is most strongly warranted or supported by the evidence at hand, or, which should be Rejected or regarded as less plausible by the information given.

5. Explanation
To state the results of one’s reasoning; to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological and contextual considerations upon which one’s results were based; and to present one’s reasoning in the form of cogent arguments.

5.1 Stating Results: to produce accurate statements, descriptions or representations of the result of one’s reasoning activities so as to analyze, infer from, or monitor those results.

5.2 Justifying Procedures: to present the evidential, conceptual, methodological, logical and contextual considerations which one used in forming one’s interpretations, analyses, evaluation or inferences, so that one might accurately record, evaluate, describe or justify those processes to one’s self or to others, or so as to remedy perceived deficiencies in the general way one executes those processes.

5.3 Presenting Arguments: to give reasons for accepting some claim; to meet objection to the method, conceptualizations, evidence, criteria or contextual appropriateness of inferential, analytical or evaluative judgments.
### 6. Regulation

Self-consciously to monitor one’s cognitive activities, the elements used in those activities, and the results educed, particularly by applying skill in analysis and evaluation to one’s own inferential judgments with a view toward questioning, confirming, validating, or correcting either one’s reasoning or one’s results.

<table>
<thead>
<tr>
<th>6.1 Self-Examination:</th>
<th>to reflect on one’s own reasoning and verify both the results produced and the correct application and execution of the cognitive skills involved; to make an objective and thoughtful meta-cognitive self-assessment of one’s opinions and reasons for holding them; to judge the extent to which one’s thinking is influenced by deficiencies in one’s knowledge, or by stereotypes, prejudices, emotions or any other factors which constrain one’s objectivity or rationality; to reflect on one’s motivation, values, attitudes and interests with a view toward determining that one has endeavored to be unbiased, fair-minded, thorough, objective, respectful of the truth, reasonable, and rational in coming to one’s analyses, interpretation, evaluations, inferences, or expressions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2 Self-Correction:</td>
<td>where self-examination reveals errors or deficiencies, to design reasonable procedures to remedy or correct, if possible, those mistakes and their causes.</td>
</tr>
</tbody>
</table>

The procedure followed for the construction of the Critical Thinking Ability Test is described in the following sections.

### 3.8.1 Item Pooling

Initially there were 54 multiple choice items based on the cognitive skills and sub skills. These items were discussed with subject experts and based on their scrutiny and criticisms, few items were modified and some were removed accordingly. Hence the final tool also had forty five multiple choice items which were chosen for pilot testing. The duration of test was one hour and thirty minutes.

### 3.8.2 Initial Try Out

The critical thinking test was administered to a small group of 10 pupils who were about to complete their IX standard following the state syllabus. This was done to know the time duration, clarity of the items and to understand some words that are difficult to follow. The items were again modified based on the results obtained from these students who participated in the initial try out.
3.8.3 Final Try Out

The critical thinking ability test items were subjected to a formal try out on a sample of hundred students in three divisions of tenth standard of HS Balaramapuram. Before the administration of the test, the purpose of the test was made clear to the students. All the necessary guidelines about the test and additional information needed were given. All the hundred response sheets were scored with the help of answer key.

Final try out was performed in order to identify weak or defective items to make further improvement, identify ambiguous and intermediate implausible distracters, very difficult and easy items, determine the difficulty level of each individual test item and lastly to determine the number of test items to be included in the final test. The students were told about the purpose of the administration of the test. They were given both general and specific instructions regarding the test and were asked to answer the items in the question paper itself. All the precautionary measures were taken to avoid mutual help and to avoid unfair means in answering the questions. The average time taken by the students to answer the draft form of critical thinking ability test was one hour and forty five minutes. Final try out consisted of 54 items.

3.8.4 Item Analysis

The procedure suggested by Ebel and Frisbie (1991) was employed for item analysis. The selected response sheets were arranged in the descending order of the magnitude of scores. The scores obtained by the upper subjects (27%) and subjects (27%) were taken as the upper group and lower group respectively. For the selection of the items in the final test, the difficulty index (DI) and Discriminating Power (DP) of each item were found out.
The table gives the value of difficulty index (DI) and discriminating power (DP) of each item.

Table 3.20: The DI and DP of each item in Critical Thinking Ability Test

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Difficulty Index (DI)</th>
<th>Discriminating Power (DP)</th>
<th>Selected Items</th>
<th>Item No.</th>
<th>Difficulty Index (DI)</th>
<th>Discriminating Power (DP)</th>
<th>Selected Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>73.14</td>
<td>0.42</td>
<td>*</td>
<td>28</td>
<td>25.92</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>61.11</td>
<td>0.77</td>
<td>*</td>
<td>29</td>
<td>51.85</td>
<td>0.62</td>
<td>*</td>
</tr>
<tr>
<td>3</td>
<td>63.88</td>
<td>0.57</td>
<td>*</td>
<td>30</td>
<td>44.44</td>
<td>0.66</td>
<td>*</td>
</tr>
<tr>
<td>4</td>
<td>37.96</td>
<td>0.46</td>
<td>*</td>
<td>31</td>
<td>49.07</td>
<td>0.64</td>
<td>*</td>
</tr>
<tr>
<td>5</td>
<td>40.74</td>
<td>0.33</td>
<td>*</td>
<td>32</td>
<td>27.77</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>45.37</td>
<td>0.72</td>
<td>*</td>
<td>33</td>
<td>63.88</td>
<td>0.72</td>
<td>*</td>
</tr>
<tr>
<td>7</td>
<td>39.81</td>
<td>0.75</td>
<td>*</td>
<td>34</td>
<td>58.33</td>
<td>0.31</td>
<td>*</td>
</tr>
<tr>
<td>8</td>
<td>71.29</td>
<td>0.38</td>
<td>*</td>
<td>35</td>
<td>45.37</td>
<td>0.50</td>
<td>*</td>
</tr>
<tr>
<td>9</td>
<td>35.18</td>
<td>0.59</td>
<td>*</td>
<td>36</td>
<td>49.07</td>
<td>0.61</td>
<td>*</td>
</tr>
<tr>
<td>10</td>
<td>52.77</td>
<td>0.45</td>
<td>*</td>
<td>37</td>
<td>33.33</td>
<td>0.66</td>
<td>*</td>
</tr>
<tr>
<td>11</td>
<td>53.70</td>
<td>0.62</td>
<td>*</td>
<td>38</td>
<td>47.22</td>
<td>0.57</td>
<td>*</td>
</tr>
<tr>
<td>12</td>
<td>36.21</td>
<td>0.45</td>
<td>*</td>
<td>39</td>
<td>50.92</td>
<td>0.46</td>
<td>*</td>
</tr>
<tr>
<td>13</td>
<td>62.13</td>
<td>0.59</td>
<td>*</td>
<td>40</td>
<td>38.88</td>
<td>0.62</td>
<td>*</td>
</tr>
<tr>
<td>14</td>
<td>24.07</td>
<td>0.33</td>
<td></td>
<td>41</td>
<td>15.74</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>46.29</td>
<td>0.59</td>
<td>*</td>
<td>42</td>
<td>73.14</td>
<td>0.42</td>
<td>*</td>
</tr>
<tr>
<td>16</td>
<td>27.77</td>
<td>0.07</td>
<td></td>
<td>43</td>
<td>23.14</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>53.24</td>
<td>0.36</td>
<td>*</td>
<td>44</td>
<td>25.22</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>52.26</td>
<td>0.42</td>
<td>*</td>
<td>45</td>
<td>23.56</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>46.51</td>
<td>0.49</td>
<td>*</td>
<td>46</td>
<td>59.81</td>
<td>0.47</td>
<td>*</td>
</tr>
<tr>
<td>20</td>
<td>34.18</td>
<td>0.37</td>
<td>*</td>
<td>47</td>
<td>47.21</td>
<td>0.38</td>
<td>*</td>
</tr>
<tr>
<td>21</td>
<td>66.21</td>
<td>0.48</td>
<td>*</td>
<td>48</td>
<td>68.51</td>
<td>0.48</td>
<td>*</td>
</tr>
<tr>
<td>22</td>
<td>30.55</td>
<td>0.53</td>
<td>*</td>
<td>49</td>
<td>62.03</td>
<td>0.50</td>
<td>*</td>
</tr>
<tr>
<td>23</td>
<td>42.59</td>
<td>0.48</td>
<td>*</td>
<td>50</td>
<td>42.59</td>
<td>0.62</td>
<td>*</td>
</tr>
<tr>
<td>24</td>
<td>39.81</td>
<td>0.20</td>
<td></td>
<td>51</td>
<td>39.81</td>
<td>0.64</td>
<td>*</td>
</tr>
<tr>
<td>25</td>
<td>50.92</td>
<td>0.68</td>
<td>*</td>
<td>52</td>
<td>62.96</td>
<td>0.66</td>
<td>*</td>
</tr>
<tr>
<td>26</td>
<td>51.85</td>
<td>0.48</td>
<td>*</td>
<td>53</td>
<td>52.57</td>
<td>0.58</td>
<td>*</td>
</tr>
<tr>
<td>27</td>
<td>64.81</td>
<td>0.40</td>
<td>*</td>
<td>54</td>
<td>72.14</td>
<td>0.64</td>
<td>*</td>
</tr>
</tbody>
</table>

* Items selected for the study

Since adequate number of items were not available with Discriminating Power (DP) greater than 0.40 and Difficulty Index (DI) between 40 and 60, some adjustments in this limit were found necessary. Some items having the Difficulty Index between 30 and 70 with Discriminating Power as 0.30 and higher were
selected. From the item analysis nine items were deleted and forty four items were selected for the final test. The time duration fixed for the final test was one hour and thirty minutes and the maximum score of the test was fifty four.

3.8.5 Validity of the Test

To establish the face validity, the items of the critical thinking test were subjected to experts’ evaluation. The experts confirmed that the items included in the critical thinking test are valid and relevant for measuring critical thinking of ninth standard pupils. The items that were asked to reject, modify or accept were done based on the opinion, criticism and suggestions obtained from the experts.

3.8.6 Reliability of the Test

A representative sample of one hundred students in three divisions of IX standard were chosen for establishing reliability of the critical thinking test using test-retest method. Since it was the beginning of the academic year and the students of X standard had just entered after their completion of IX standard, it was found that they are the right sample for conducting the final try out. It was conducted in two divisions of X standard from Government School in Thiruvananthapuram located in Kerala. Before the administration of the test, the purpose of the test was made clear to the students. The draft test material and response sheets in sufficient numbers were provided. All the necessary guidelines about the test and additional information needed were given. The retest was again conducted for the same sample with the same tool after a gap of fifteen days. The performance of both the test and retest were analysed for its reliability.

The reliability of the critical thinking test was established using Test-retest method. The correlation coefficient of the two sets of scores was calculated by using Pearson’s Product Moment correlation. Coefficient of correlation was found
to be 0.72. The obtained values of reliability suggest that the test has acceptable psychometric qualities to measure the critical thinking of IX standard pupils.

The category wise reliability was also found out wherein the test retest scores of each dimension were considered for their reliability coefficient. The category wise reliability coefficients are given in the following table.

Table 3.21: Category wise reliabilities of CT in social studies

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Category of critical thinking skill</th>
<th>No. of items</th>
<th>Reliability coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Interpretation</td>
<td>9</td>
<td>0.49</td>
</tr>
<tr>
<td>2</td>
<td>Analysis</td>
<td>8</td>
<td>0.47</td>
</tr>
<tr>
<td>3</td>
<td>Evaluation</td>
<td>6</td>
<td>0.39</td>
</tr>
<tr>
<td>4</td>
<td>Inference</td>
<td>8</td>
<td>0.63</td>
</tr>
<tr>
<td>5</td>
<td>Explanation</td>
<td>8</td>
<td>0.58</td>
</tr>
<tr>
<td>6</td>
<td>Self regulation</td>
<td>6</td>
<td>0.41</td>
</tr>
</tbody>
</table>

The category wise reliability values were found to be relatively low. But, because of the less number of items in these categories, these values were treated as satisfactory. The Cronbach’s α (alpha) which is a coefficient of reliability was also used to measure the internal consistency and the reliability coefficient was found to be 0.79. Cronbach’s alpha is a coefficient of reliability, which is commonly used as a measure of internal consistency or reliability of a psychometric test. The inter-correlations among test items are maximized when all items measure the same construct, Cronbach’s alpha is widely believed to indirectly indicate the degree to which a set of items measures a single Unidimensional latent construct. In this Quasi experimental study, this Critical Thinking Test on social studies was administered as pre-tests and post-test to measure Critical Thinking on social studies in Experimental and Control group.
Table 3.22: Details of critical thinking test

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Skill</th>
<th>No. of questions</th>
<th>Question Numbers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Initial</td>
<td>Final</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Interpretation</td>
<td>10</td>
<td>9</td>
<td>1,2,3,4,5,6,7,8,34</td>
</tr>
<tr>
<td>2.</td>
<td>Analysis</td>
<td>9</td>
<td>8</td>
<td>9,10,11,13,14,21,18,35</td>
</tr>
<tr>
<td>3.</td>
<td>Evaluation</td>
<td>9</td>
<td>6</td>
<td>19,22,32,33,44,45</td>
</tr>
<tr>
<td>4.</td>
<td>Inference</td>
<td>9</td>
<td>8</td>
<td>15,23,31,27,28,29,30,36</td>
</tr>
<tr>
<td>5.</td>
<td>Explanation</td>
<td>10</td>
<td>8</td>
<td>12,16,20,2437,38,39,41</td>
</tr>
<tr>
<td>6.</td>
<td>Self-Regulation</td>
<td>7</td>
<td>6</td>
<td>17,25,2640,42,43</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>54</td>
<td>45</td>
<td>Total 45</td>
</tr>
</tbody>
</table>

3.9 VALUE PREFERENCE SCALE IN SOCIAL STUDIES

Social studies as a subject intend to develop not only awareness and cognitive skills, but also affective dimension such as attitude and value formation which are very important and play a responsible role for nurturing democratic citizens in the country. If one has the knowledge and higher order thinking related to society and it’s past and present, it is very important that he/ she should possess a value which helps the individual to live a democratic life. Since a tool was not available as such to measure the values on social studies, it was intended to develop a value preference scale on social studies that helps to find out the value preference of each individual participating in the study.

National Council of Educational Research and Training (NCERT, 1979) has proposed eighty four values that are to be inculcated among the children. The investigator considers this as the basis for identifying values. The investigator selected equality, tolerance solidarity, care and respect, shared responsibility, socio economic justice, integrity, non-violence and peace were the specific values
for the study because these values had high scope in the selected units compared to other values. The situational test items were constructed by giving a situation followed by alternative choices and the students were asked to opt for a choice among the alternatives, as their preference. It is presumed that the students’ choice of behaviour in that alternative would reflect his/her value preference. The dimensions of value preference scale are given in table.

**Table 3.23: Dimensions of Value Preference Scale**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Dimensions</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>You would like to maintain equality</td>
<td>8</td>
</tr>
<tr>
<td>II</td>
<td>Tolerance can be seen</td>
<td>8</td>
</tr>
<tr>
<td>III</td>
<td>Solidarity can be observed</td>
<td>7</td>
</tr>
<tr>
<td>IV</td>
<td>Care and respect can be seen</td>
<td>7</td>
</tr>
<tr>
<td>V</td>
<td>Shared responsibility can be observed if</td>
<td>8</td>
</tr>
<tr>
<td>VI</td>
<td>Socio economic justice can be attained</td>
<td>10</td>
</tr>
<tr>
<td>VII</td>
<td>Integrity can be maintained</td>
<td>9</td>
</tr>
<tr>
<td>VIII</td>
<td>Non violence and peace can be observed</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>66</strong></td>
</tr>
</tbody>
</table>

Seventy items which contain two statements each, among which the pupil should select the one which they prefer the most were prepared initially. Based on the feedback obtained from the experts who were consulted, four items were deleted and some of them were modified and some were retained as such. Thus sixty six items were selected for the final test.

**3.9.1 Initial Try Out**

The Value Preference Scale on social studies was administered to a small group of 10 students who were studying in IX standard following state syllabus
who were at the end of the academic year. The test was tried out in order to know the clarity of the items and to understand some words that are difficult to follow. The items were again modified based on the results obtained from these students who participated in the initial try out.

3.9.2 Validity of the Scale

To establish the face validity, the items of the Value preference scale were subjected to experts’ evaluation. The experts confirmed that the items included in the scale were valid and relevant for measuring value preference of seventh standard pupils. Certain items were eliminated or modified based on the feedback obtained from the experts.

3.9.3 Reliability of the Scale

A representative sample of one hundred students in three divisions of X standard were chosen for establishing reliability of the value preference scale using test-retest method. Since it was the beginning of the academic year and the students of X standard had just entered after their completion of IX standard, it was found that they were the right sample for conducting the final try out. Before the administration of the test, the purpose of the test was made clear to the students. It was conducted in three divisions of X standard student from Trivandrum from Kerala. The tool and response sheets in sufficient numbers were provided. All the necessary guidelines about the scale and additional information needed were given. The retest was again conducted for the same sample with the same tool after a gap of fifteen days. The performance of both the test and retest were analysed for its reliability.
The reliability of the Value preference scale was established using test-retest method. The correlation coefficient of the two sets of scores was calculated by using the Pearson’s Product Moment correlation. The coefficient of correlation was found to be 0.82. The obtained values of reliability suggest that the scale can be used to measure the value preference on sustainable development of IX standard pupils. There were sixty six items in the final scale and the duration of the scale was forty five minutes.

3.9.4 Final Form of the Test

The final form of the Value Preference Scale consists of sixty six items. Average time taken for the completion of scale was forty minutes. The Value Preference Scale in its final form along with the scoring key is given in the Appendices V and VI. The distribution of items in the final scale along with the dimension is given in table.

Table 3.24: Details of Value preference scale in social studies

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Dimensions</th>
<th>No. of items Initial</th>
<th>No. of items Final</th>
<th>Question Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>You would like to maintain equality</td>
<td>8</td>
<td>8</td>
<td>1, 2, 3, 4, 5, 6, 7, 8</td>
</tr>
<tr>
<td>II</td>
<td>Tolerance can be seen</td>
<td>10</td>
<td>8</td>
<td>9, 10, 11, 12, 13, 14, 15, 16</td>
</tr>
<tr>
<td>III</td>
<td>Solidarity can be observed</td>
<td>8</td>
<td>7</td>
<td>17, 18, 19, 20, 21, 22, 23</td>
</tr>
<tr>
<td>IV</td>
<td>Care and respect can be seen</td>
<td>8</td>
<td>7</td>
<td>24, 25, 26, 27, 28, 29, 30</td>
</tr>
<tr>
<td>V</td>
<td>Shared responsibility can be observed if</td>
<td>9</td>
<td>8</td>
<td>31, 32, 33, 34, 35, 36, 37, 38</td>
</tr>
<tr>
<td>VI</td>
<td>Socio economic justice can be attained</td>
<td>10</td>
<td>10</td>
<td>39, 40, 41, 42, 43, 44, 45, 46, 47, 48,</td>
</tr>
<tr>
<td>VII</td>
<td>Integrity can be maintained</td>
<td>9</td>
<td>9</td>
<td>49, 50, 51, 52, 53, 54, 55, 56, 57</td>
</tr>
<tr>
<td>VIII</td>
<td>Non violence and peace can be observed</td>
<td>9</td>
<td>9</td>
<td>58, 59, 60, 61, 62, 63, 64, 65, 66</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>70</td>
<td>66</td>
<td></td>
</tr>
</tbody>
</table>
3.9.5 Administration of Pre-tests

The tools were administered as pre-test for measuring achievement in social studies, critical thinking ability and value preference. The tests were administered to the students belonging to the experimental and control group. Necessary permissions were obtained from the concerned head teachers and subject teachers of the two schools before starting the experimental treatment. The time schedule for the administration of pre-test was made. Before administering the tests, the students were given necessary guidelines regarding the tests. After administering the above said tests, they were scored on all the above said variables which served as the pre-test scores of the sample students on the respective criterion measures. One test was given each day for both the groups to avoid fatigue.

3.9.6 Experimental Treatment

The ninth standard students of division L studying at GHSS, Kumbala was selected as the experimental group and ix standard students of division B studying at GHSS, Mogral was taken as control group. The investigator taught lessons using critical pedagogical approach to the students of experimental group in social studies. The researcher maintained a diary where the daily observations of classroom interactions were recorded. The classes were taken in the regular social studies periods of the school. Sometimes the co-curricular activity periods were made use of conducting project works and outdoor visits. Sixty lesson plans in social studies were prepared for seventy instructional hours with the time duration of 40-45 minutes. The experimental treatment lasted for six months excluding vacation, all other school holidays and days of term-wise examinations. Thus the
total duration of treatment worked out to be fifty hours distributes over nearly six months.

In the control group, the regular social studies teacher taught the students and covered the selected units approximately using the same number of periods. The teacher of the control group was consulted regarding the duration required for teaching the selected units, mode of teaching and the assessment that followed in the control group. The social studies teacher of control group was known as a competent teacher in the school. The experimenter bias was avoided by involving the regular social studies teacher in teaching the control group students. The researcher observed the regular teacher’s classes in the control group during which the following observations were made.

- The lessons were not planned regularly by the teacher.
- There was no scope for students to do activities on their own.
- There was no scope for addressing social issues in the classroom.
- There is no scope for reflection on their life and social realities outside the classroom.
- More emphasis was given to achievement.
- Chance for students dialogue was less in the classroom.
- Evaluation was not continuous and performance based.
- The end product of learning was given more importance rather than the ‘process’ or the ‘procedure of learning’.
Figure 3.9: Round table conference in critical pedagogic classroom

Figure 3.10: Students busy with the work of collected material on their local history Kumbala
Figure 3.11: Teacher-student interaction in computer lab

![Teacher-student interaction in computer lab](image1)

Figure 3.12: Teacher interaction with students in the classroom

![Teacher interaction with students in the classroom](image2)
Figure 3.13: Teacher observation on students involvement in group work

Figure 3.14: Teacher timely interaction with students
In the experimental group, the investigator created such an environment in the classroom that the students were able to critically/creatively construct the knowledge related to the given concepts and themes/issue by doing various activities like discussion, group and individual work, brain storming, community participation, cooperative learning etc, in which already known experiences and knowledge played a significant role to transform in to a new one. The role of the investigator was to guide and facilitate and critically reflect their learning efforts whenever found necessary. The investigator got continuous feedback from the experimental group students and their regular teachers. The teachers and experts observed some of the classes to verify that the content was transacted using critical pedagogical approach. The investigator made use of critical pedagogical principles given by (Freire, 1970; Shor, 1992; Giroux, 1998; Kincheloe, 2004; McLaren 2006) in the class are as follows:

- Dialogue is the centre of the teaching learning process,
- It should be connected to the regional knowledge and social context of the student,
- It should foster the critical thinking ability of the student,
- It should reflect the regional disparities, contradictions that are prevailing in the society,
- It should help the student to confront and interact to the diverse issues they faced in the classroom and day to day life,
- It should be based on the democratic principles.
- Problem posing is essential in classroom process.
The continuous and comprehensive evaluation was followed during the learning process. Worksheets were used as a mode of assessment. Social studies diary was maintained by each student in which their experiences of reflections on their subject social science, various social problems, values, issues etc. were recorded. A field trip was also conducted to nearby historical places of Kumbala to collect and interact people in the society.

During the course of this experimental treatment various assignments, individual as well as group work were given to the students. The purpose of assignments was to supplement the learning experiences students received in the classroom, to increase their retention and for preparing them to receive new lessons; and care was taken to avoid unnecessary addition to students’ work load. The assignments were designed to support the aim of the critical pedagogical approach to make learners autonomous in learning by seeking information and processing those to useful outputs in group works and aware about their own role in the society as a social transformer.

Some examples for the assignments/projects and other works are given below:

- Project report on local history-Kumbala: This was a group work that required students to visit various places in the panchayath as a team and inquire about: Origin of the name Kumbala, Kingdom ruled, Religious History, Social History, Political History, Economic History, Present Status of Kumbala, School Education in Kumbala, Ritual and Art forms in Kumbala, Collect information on experts on history in Kumbala. These are the guide lines for the project work.
- Documentary on local history ‘Kanipura’-based on the project report a documentary was developed. Technical support was given others teachers in the school. This was a clear evidence of critical pedagogic classroom (Please see the Appendix along with the CD attached at the end).

- Song on the heritage of Kumbala: one student develops a song on the heritage of Kumbala. Later the song was recorded and included in the documentary.

- Art and ritual in Kerala: This required students to prepare a seminar paper on arts and rituals in Kerala with special emphasis to Kumbala region and make a presentation in the class.

- Water scarcity: Awareness programme were conducted on the theme water scarcity.

- Pollution: address several social issues related to pollution on their place and discussed and reflect that in the classroom.

The group work and cooperative activities carried out as a part of the assignments were expected to help and improve students’ attitudes and behaviours; and foster cooperation, leadership, initiative, interest in social studies; and to make them realize the application of the knowledge of social studies in real life situation.

As a part of assignment the investigator gave self-assessment format for assessing the involvement in the group work and also in the individual work. Format for monitoring project work was also given to the students. All these tools helped students to assess themselves and it helped the investigator to know the performance level of students in various activities. Copies of work sheets, self-assessment formats and monitoring project work formats are given in the
Appendix. Various other examples of worksheets, projects, assignments of students are given in the Appendix in the CD attached herewith.

The classroom procedures in which the students were actively participate in different works are illustrated through some of the photographs and they are displayed as follows.

3.9.7 Administration of Post-tests

Immediately after the experiment was completed, students were administered the post-tests for all the dependent variables – achievement in social studies critical thinking ability, and value preference. Both experimental and control group students were subjected to these post-test one by one.

3.10 SCORING AND CONSOLIDATION OF DATA

Achievement in social studies, Critical Thinking ability test, Value preference were administered as pre-test to seventy eight students belonging to experimental and control group. After the experimental treatment, the tools – Achievement Test in Social Studies, Critical Thinking Ability Test and Value Preference Scale were once again administered as post-tests. Achievement in social studies, Critical Thinking ability test, Value preference were scored based on the scoring key and the criteria evolved. The responses were scored and tabulated for analysis.

As mentioned in the preceding section in achievement in social studies there were twenty eight items and in critical thinking ability test there were forty five items. The correct and incorrect answers were scored based on the scoring key and value points and corresponding marks were given.
In Value Preference Scale there were sixty six items. Each item had two options among which the student should select the one that he/she preferred the most. Hence it was of a two point scale and in that high preferred statement was given two marks and low preferred statement was given one mark. Hence the maximum score was 132 minimum score was 66.

The data from seventy eight IX standard students were obtained, as they comprised the final sample of the study. After scoring, the scores obtained in each test were tabulated and consolidated separately for the experimental and control group.

3.11 PRECAUTIONS OBSERVED

Following precautions were observed during the course of the experiment for ensuring correctness and precision in the experiment conditions that might have impacted the result.

i. All the subjects were oriented to the tests in the beginning of the treatment.

ii. No undue stress or control of any kind was imposed on the subjects at any time during the study and the experiment was conducted in a relaxed natural setting.

iii. Testing as well as teaching was simultaneous in the two groups (one experimental group and one control group) during the pre-test and post-test treatment.

iv. The effectiveness of the experimental treatment was ensured by establishing an amicable rapport in the school, in maintaining natural setting, harmonious atmosphere and providing sufficient time for various activities during experimentation.
v. It was ensured that the contents of treatment had not been previously taught to the students and not even taught by any other teacher during the experiment to any of the two groups viz. experimental and control group.

vi. Learning material was provided for every student during testing so as to avoid any disturbance.

vii. Teaching periods of 40-45 minutes were utilized fully for treatment and time was not wasted during experimentation.

3.12 STATISTICAL TECHNIQUES EMPLOYED

The pre-test, post-test answer sheets obtained from the students of both experimental and control groups were scored as per the guidelines and scoring keys of each test. The SPSS (17.0 version) was made use for the statistical analysis of data. Descriptive statistics was used to summarise the pre-test scores and the post-test scores. They were inspected to determine if the sample showed departures from the normal distribution. Analysis of covariance (ANCOVA), t-test, were employed to test various hypotheses. The data is also described qualitatively by analyzing certain classroom interactions, student diaries, worksheets towards critical pedagogical approach.

The details of the analysis carried out with the finding and discussions are presented in the following chapter.
3.13 SUMMARY OF PROCEDURE

Variables

Independent Variable

Critical pedagogical approach in social studies

Sample (Standard IX students)

Selection of experimental and control group

Content Analysis

Selection of topic for treatment

Preparation of lesson plans based on critical pedagogical approach in social studies

Tools used

Achievement test in social studies

Critical thinking ability test

Experiment

Value preference scale

Pre test

Experimental group

Treatment

Post test

Experimental group

Scoring and consolidation

Analysis

Results/Interpretation

Dependent Variables

Value Preference

Achievement in Social Studies

Critical thinking ability

198