CHAPTER III
METHODOLOGY OF THE STUDY

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3.1.0 Introduction

This study was conducted to evaluate the efficacy of the Multiple Intelligence Instructional method on students' learning competencies. In this study, learning competency primarily refers to the comprehensive learning process encompassing the three principal areas of learning: cognitive, emotional, and psychomotor. In order to carry out any study smoothly a strong methodology is required which will work as a binding agent to connect all the means in order to reach the ultimate solution of the research problem.

Methodology is something that can be relate with the word method which means the way or procedure to do something or accomplished a task. So, methodology of a research study may be considered as the way or procedure in a planned and structured manner that helps to study a particular research problem and find out the ultimate solution of the same.

This chapter provides a comprehensive overview of the research technique, encompassing the following components:

3.2.0 Research Method

Educational research methods are the systematic processes and strategies used to collect, analyze, and interpret data linked to educational phenomena. These strategies assist researchers in better understanding educational processes, improving practices, and contributing to policy development. The present study employed quantitative research based on quantitative data gathered from primary sources to study the effect of an independent variable on other selected dependent variables. As per the objective and demand of the study the researcher adopted an experimental method which will help to manipulate one variable in order to observe the effect of changes occurring on other variables. In this study the researcher will manipulate the treatment in order to see the effect or changes on the learning competencies of the students.

3.3.0 Research Design

The present study falls under the domain of experimental research and as per the need and demand of the study the researcher adopted Non- Equivalent Groups Pretest Post-test model under the scope of Quasi Experimental Research Design.

3.3.1 Rationale behind adopting the Research Design

Quasi-experimental research designs are frequently employed in classroom settings in order to investigate the effect of a treatment when random assignment of participants to various groups (such as experimental and control groups) is neither practical or ethical. Here are some reasons to adopt quasi-experimental research design in this study-

i) Practical Constraints: In a classroom setting, randomly assigning students to different groups can be difficult due to logistical concerns, pre-existing class structures, etc.

ii) Ethical Considerations: Randomly allocating children to various treatment groups may be unethical, particularly if one group does not receive potentially valuable instruction or assistance. Quasi-experimental designs enable researchers to evaluate interventions while allowing certain students to receive potentially beneficial treatment.

iii) Naturalistic Settings: In quasi- experimental research design, interventions are often investigated in natural settings, which can yield more accurate and broadly applicable results regarding how a treatment functions in actual classroom settings.

iv) Pre-existing Groups: Creating new groups randomly is impractical in many educational researches because students are already classified by class, grade level, or subject. With these pre-existing groups, quasi-experimental designs can be used to evaluate the effects of treatments.

Table 3.1 Showing the Research Design Adopted for the study

Groups	Pre- Test	Treatment	Post- Test
Experimental Group	X1	Multiple Intelligence Instructional Approach	Y1
Controlled Group	X2	Traditional Method	Y2

Table 3.2 Showing the Paradigm of design of the present study

Group	Pre-Test	Treatment	Post-Test
EG	P_1CD P_1AD P_1PD	Teaching through MIBIA	P_2CD P_2AD P_2PD
CG	P_1CD P_1AD P_1PD	Teaching through TLM	P_2CD P_2AD P_2PD

Following are the details of the abbreviations used in the above table –

EG - Experimental Group

CG - Controlled Group

P_1CD - Pre- Test on Cognitive Domain of the students

P_1AD - Pre- Test on Affective Domain of the students

P_1PD - Pre- Test on Psychomotor Domain of the students

MIBIA -Multiple Intelligence Based Instructional Approach

TLM - Traditional Learning Method

P_2CD - Post- Test on Cognitive Domain of the students

P_2AD - Post- Test on Affective Domain of the students

P_2PD - Post- Test on Psychomotor Domain of the students

3.4.0 Locale of the Study

The area of the present study is located at Nalbari district of Assam. It is situated between 26ºN and 26.51ºN Latitude and 91ºE and 91.47ºE longitude at the plains of the Brahmaputra valley. The district covers an area of 2257 sq. km. and has a population of 771,639 according to the 2011 census.

Regarding literacy rate the district has a total literacy of about 78.63% which makes it the 5^{th} position among all the districts of Assam. The researcher mainly wants to know the overall learning competency of the students in a district like Nalbari where the literacy rate is up to the mark.

Figure 3.1 Block wise Map of Nalbari District

Source of Map: https://www.mapsofindia.com/maps/assam/tehsil/nalbari.html

3.5.0 Population of the Study

In research, the population of the study denotes the complete assemblage of individuals, items, or factors that possess a shared characteristic and are pertinent to the researcher. The population refers to the group from which a sample is selected for a study, and to whom the study's findings will be applicable. Comprehending the population is crucial for structuring a research study, as it delineates the extent and applicability of the research outcomes.

The population of the current study consists of all pupils in the ninth grade in Nalbari District.

For the study the researcher selected two schools from Nalbari district of similar characteristics from where the sample of the study from class IX standard of each schools will be selected. The schools selected for the study are as follows:

1. Kharbandha Vidyapith High School, Sondha
2. Banbhag Khata Dihjari High School, Dihjari

3.6.0 Sample and Sampling Technique used in the Study

3.6.1 Sampling Technique

In research, sampling techniques are the procedures used to choose a subset of individuals, objects, or data points from a broader population in order to analyze and make conclusions. Sampling is necessary since it is frequently unfeasible, costly, and time-consuming to research an entire population. It is possible for researchers to draw conclusions about the broader population by employing a representative sample.

The researcher employed the Simple Random Sampling Technique to choose schools from Nalbari District in the current study. Simple random sampling is a probabilistic sampling method that guarantees adequate representation of a population in the sample.. Upon selecting two schools—Kharbandha Vidyapith High School, Sondha for the experimental group and Banbhag Khata Dihjari High School, Dihjari for the control group—the researcher employed the Intact Group Sampling technique to select students from the IX standard of both institutions. Intact group sampling, or cluster sampling, is a research methodology that employs complete groups as samples instead of individual units. This strategy is commonly employed when random selection of individuals from a population is impracticable or unfeasible. Instead, naturally occurring groups (such as classrooms, schools, or towns) are selected, with all members incorporated into the sample.

3.6.2 Sample

In research, the study sample is a subset of individuals, items, or instances chosen from a broader population for the purpose of conducting a study. The sample reflects the population from which it is derived, and it is used to make inferences or draw conclusions about the whole population. The method of sample selection and size can have a considerable impact on the validity, reliability, and generalizability of study findings.

A total number of 90 samples were selected from both the schools, out of which 44 samples fall under experimental group and 46 samples falls under the controlled group. At the beginning the sample consisted of total 150 students but later only 90 samples were selected on the basis of the fulfillment of the requirement of the study and students' regularity throughout the intervention. The detail description of the sample selected from both the schools are described in below Table 3.3.

Table 3.3 Showing the details of the selected samples

Serial No.	Name of the Schools	Groups	Total Number of samples
1	Kharbandha Vidyapith High School	Experimental Group	44
2	Banbhag Khata Dihjari High School	Controlled Group	46
		Total Samples	90

3.7.0 Variables of the Study

In the present study the following type of variables were used:

1. **Independent Variables:** Independent variables are generally those variables which are not dependent on other variables. These variables are not affected by the other variables. In fact, it causes an effect on the dependent variables.
   In this study Multiple Intelligence Instructional Approach is the independent variable.
2. **Dependent Variables:** Dependent variables are those variables that are dependent on the independent variables. In experimental studies the effect of an independent variable on a dependent variable is studied. In other words, it can be said that an independent variable is the cause and a dependent variable is its effect.
   In this study Learning Competency in social science is the dependent variable.
3. **Controlled/Demographic Variables:** Controlled variables are those variables that are controlled by the researcher in order to avoid any kind of interference in the result of the study. In this study demographic features such as Gender and Level of Achievement of the students are observed as controlled variables.

3.7.1 Controlling the Variables

Controlling the Intervening Variables: In the study the following Intervening variables were controlled:

- **Stress:** In order to deal with the stress of the students the researcher develops a rapport with the students so that they can be free up with the researcher and relax during the treatment.

- **Motivation:** In order to keep the students motivated the researcher constantly reinforced the students and made them actively participate in each and every activity related to the treatment.
- **Fatigue:** The researcher put full effort in order to avoid any kind of mental and physical weakness. Utmost care was taken in order to remove tiredness during the classroom activities. The activities were prepared in a planned way keeping in mind the time limit, age group, and students' capacity.
- **Boredom:** In order to overcome the feeling of boredom among the students, the researcher kept the students actively participating in all the classroom activities. Care was also taken to balance the time limit among different activities, the activities were also designed according to the age group of the students.

Controlling the Extraneous Variables:

- **Sex:** For the study, the researcher had selected both the gender i.e., male and female. Both male and female students were studied separately and compared in order to get the proper result.
- **Age:** All the students of the study belong to the same age group. Students in both the groups of the study i.e. experimental and controlled group belong to the age group of 14-15 years.
- **Academic Background:** The students selected as the sample of the study belong to the same academic background. The samples were selected from two government schools of Nalbari District belonging to the same board i.e. SEBA board, following the same syllabus and same medium of instruction i.e. Assamese.
- **Class:** All the students belong to the IX standard of each of the two schools under SEBA board.
- **Researcher's way of communication:** In order to avoid any kind of subjectivity in the study the researcher used a genuine way of communication with the students. The researcher was neither too rude nor too soft or provided any kind of hints to help the students to respond in the study.

Controlling the threats to Internal Validity

In an experimental study the researcher must be aware of the risks upon the internal validity of the study and efforts should be put on lowering the threat level by adopting effective measures.

Some of the measures taken to control the following threats to Internal Validity:

- **History:** No events in the past have affected the experimental process. The students did not have any earlier knowledge regarding the experimentation before.
- **Maturation:** The maturation of the students did not affect the study. The post- test was done immediately after the completion of the treatment. So, no threats related to maturation such as growing old, being more intellectual, fatigue over time, increase in capacity level had affected the study.
- **Testing:** In both the test i.e., pre- test and post- test no threats related to testing affected the study. There was a long gap of three months between the pre-test and post-test so no earlier knowledge was conditioned among the students.
- **Instrumentation:** Same testing tool was applied during both pre-test and post-test. So, no instrumentation threats affected the study.
- **Mortality:** Only the regular students were selected from the total sample. No dropped out or absence among the students were found throughout the experiment.
- **Bias of the experimenter:** The experimenter did not have any earlier connection with the students and have never met them before.
- **Statistical Regression:** The both groups consisted of intact classes so there were no statistical regression threats in the study.

Controlling External Validity

The external validity is the extent to which one can generalize the findings of the study. Sometimes the threats related to external validity may affect the result of the study so these threats should be controlled by the researcher. The researcher had put efforts to control the following threats to the external validity:

Hawthorne Effect: The researcher behaved in a normal way with the students during the experiment. Also, no prior information was given to the students regarding the purpose of the study. The students did not feel any kind of anxiety or nervousness during the study.

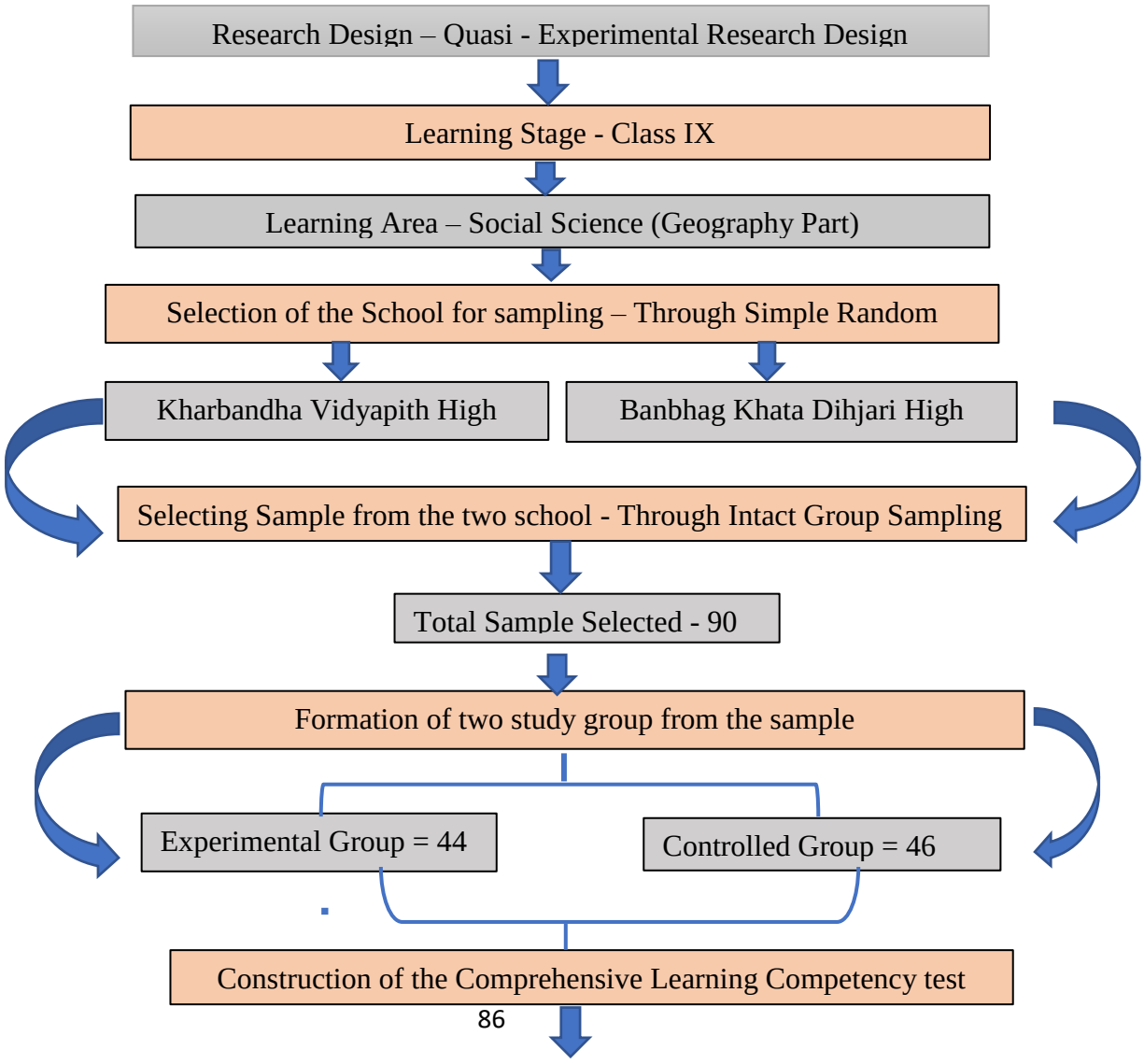
Sampling bias: All the samples of the study have similar characteristics. They belong to a similar age group, similar level of abilities, same standard, same locality etc. So, the samples were representative of the population which was selected for the study.

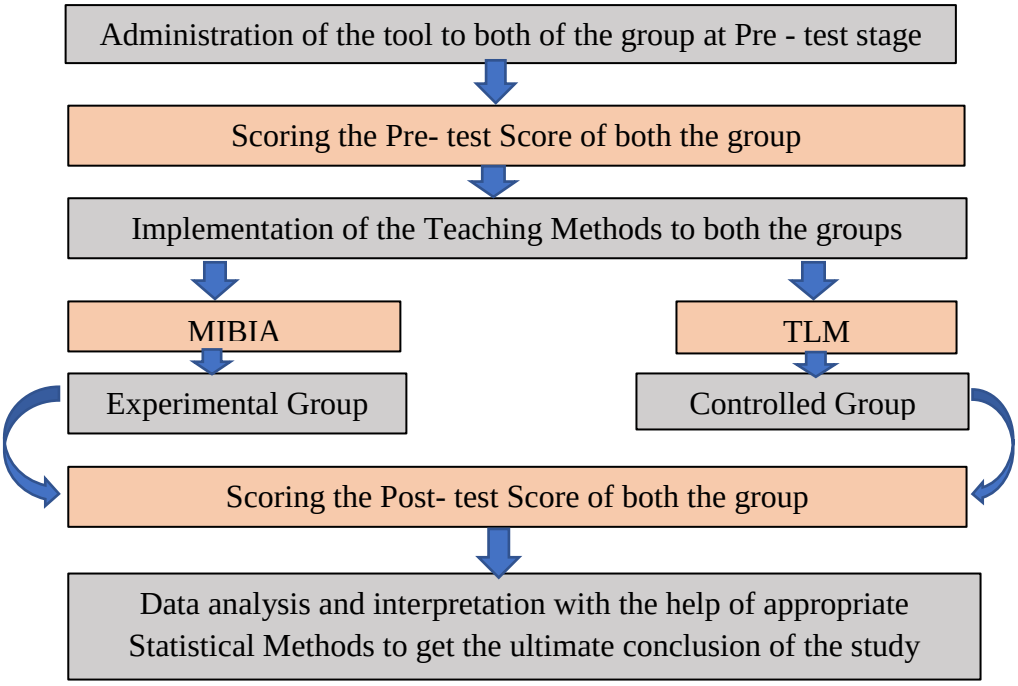
Interference of Prior treatment: Between both the pre-test and post-test there was a time gap of three months so there was no chance of prior test effect on the post-test of the study.

Order effect: In the study proper order was maintained among all the activities and the students were introduced to the activities one at a time in a particular order. Also, time gaps were maintained among the activities.

Situation effect: The study was carried out at the same place throughout the implementation period and the researcher took all the classes at the morning time for 1 hour per day.

Chart 3.1 Design of the Study





3.8.0 Tools for Data Collection

In the study the researcher made use of two types of tools

- **Instructional Tool:** Instructional tool is the tool with the help of which teaching learning process will be carried out in a classroom setting.

  In this study the following Instructional tool was used to undertake the classroom teaching:

  i. Multiple Intelligence based Instructional Module.

- **Testing tool:** Testing tools are generally those tools with the help of which the outcomes of the teaching learning process will be tested.

  In this study the researcher will test the learning competency of the students in three forms i.e., cognitive, affective and psychomotor. For this the researcher developed the following tools:

  i. Achievement test in Social Science
  ii. Attitude Scale for Social Science subject
  iii. Rubric of Performance test in Social science.

3.8.1 Descriptions of the tools are given below

3.8.2 Multiple Intelligence based Instructional Module

a) About the module: Multiple Intelligence based Instructional module is based on Howard Gardner's theory of Multiple Intelligence. The name itself reveals its meaning that this theory is related to multiple numbers of intelligence. The theory is based on the notion that an individual cannot be declared as intelligent or dumb by measuring only the two sides of his capacities i.e., their verbal intelligence/capacity and logical reasoning capacity/intelligence. Gardner believes that there are also various qualities except these two upon which an individual's intellectual capacity can be measured. According to him there are a total 8 forms of intelligence i.e., verbal, Logical, spatial, bodily kinetic, intra personal, inter personal, musical and naturalistic intelligence. Later he also added existential thinking among the other types of intelligence.

So, this module was prepared by keeping in mind activities related to all the types of intelligence included in the Multiple Intelligence theory except existential thinking for the social science subject of the IX standard students. The main motive of this module is the overall development of the learning competencies of the students covering cognitive, affective and psychomotor domains.

b) Importance of the Multiple Intelligence Module: Multiple Intelligence Module is an instructional module designed on the basis of activities related to various capabilities of an individual. It consists of activities related to the 8 forms of intelligence namely verbal, logical, spatial, bodily kinetic, intra- personal, inter- personal, musical and naturalistic intelligence. The various types of activities make use of each and every qualities of students which ultimately initiate all round development of the students from cognitive, affective as well as motor skills of the students. Also, through the activities it aims on active participation of each and every student which results in full engagement of the class in the teaching learning process. The module is also helpful for all types of learners from high achiever to low achiever, from intellectuals to sports persons, from introvert to extrovert type of students. So, we can say that it is the best means to be used in an inclusive setting where different types of learners study together.

c) Purpose of the Module: The main purpose of the module is to enhance the learning competencies of the students of 9^{th} standard in the form of cognitive, affective and psychomotor domains towards social science subjects.

All the activities in the module are centered around the 8 forms of intelligence prescribed in the Multiple Intelligence Theory. And through all these activities it aims to enhance

their academic achievements, their attitude towards the subject as well as their practical skills related to social science.

d) Structure of the module: This module is based upon the theory of Multiple Intelligence which aims to enhance the learning competencies in social science subject of the IX standard students. The module starts with a brief introduction of the chapter. Then it describes the general and specific objectives of the chapter. On the basis of these objectives, teacher and student activities related to different types of Intelligence under Multiple Intelligence Theory are developed. After each activity some exercises and revision works are provided. At the end of each of the chapters a brief summary as well as references are provided for the help of the students. The module consists of the following contents for each lessons of Social Science-

- Introduction
- Learning objectives
- Key learning points
- Activities
- Self-check exercise with answer key
- Lastly references for further learning

e) Different dimensions of the module: The module is divided into four units of geography part of the social science subject. And the activities of each unit are designed on the basis of 8 types of intelligence i.e. verbal, logical, kinesthetic, spatial, intra personal, interpersonal, musical and naturalistic intelligence.

Sl. No.	UNITS
1.	Change of the Earth's surface
2.	Atmosphere: Structure, Air pressure and Wind system
3.	Geography of India
4.	Geography of Assam

f) Multiple Intelligence Based Instructional Activities related to different dimensions of the module:

The module consists of activities related to 8 types of intelligence for each of the units of geography part in order to enhance the learning competencies among the students.

The activities of each of the units based on the 8 types of intelligence are as follows:

1. **Fill the Circle -** The "Fill the Circle" activity is a concentrated vocabulary or concept-building exercise that requires participants to think critically and select the most precise word or term that fits within a certain context. This activity is frequently used in educational settings to improve understanding of specific subject matter.
2. **Conceptual Chart -** A conceptual chart is a visual layout that connects several concepts, ideas, or pieces of information via lines, arrows, and labels. Participants begin with a central idea before branching out to investigate relevant subtopics, details, or concepts.
3. **Drawing the concept out-** "Drawing the Concept Out" is an interactive task in which one creates a concept map to visually communicate one's understanding of a topic. This practice is extremely valuable to students, instructors, and professionals alike since it fosters deep engagement with the topic, critical thinking, and collaborative learning.
4. **Model Demonstration -** Model demonstration is an instructional exercise that shows how something works or how an idea can be used in a practical, visible, and frequently interactive manner. It is a teaching method that uses a concrete example or a step-by-step demonstration to explain processes, principles, or systems. This practice helps students comprehend difficult topics by witnessing or interacting with a tangible or visual depiction.
5. **Pictorial -** A pictorial classroom exercise involves the use of pictures, illustrations, or visual aids to help students learn and understand. This strategy is especially useful for visual learners who prefer to see information in graphic or image format.
6. **Interactive Session -** An Interactive Session is a classroom activity in which students actively participate in the learning process by discussing, collaborating, and engaging with the topic. Unlike traditional lectures in which the teacher is the

chief speaker, interactive sessions engage students in activities that require their direct participation.

7. **Documentary Film -** Using documentary films in the classroom can be an effective instructional tool since they provide students with visual and narrative experiences that can help them understand a variety of topics.
8. **Solve the problem out -** Problem solving is an interactive classroom practice that encourages students to think critically, creatively, and collaboratively in order to solve challenging questions or challenges. This strategy not only helps students strengthen their cognitive skills, but it also improves their capacity to apply knowledge in real-world circumstances.
9. **Crossword Puzzles -** Crossword puzzles are word games in which players fill in a grid of white and black squares with words depending on clues provided. The goal is to write words horizontally (across) and vertically (down) so that they properly intersect at common letters.
10. **Geographical Jingle writing -** Geographical Jingle Writing is a fun classroom task that blends creativity, music, and geography. Students in this activity create and perform short, catchy songs (jingles) to transmit geographical information, such as the unique features of a country, state, area, or city. The major goal of this activity is to help students learn and remember geographical knowledge in a pleasant and memorable manner. Writing jingles promotes creativity and collaboration while emphasizing crucial geographical data such as capitals, landmarks, climate, culture, and physical features.
11. **Peer Teaching -** Peer teaching is a collaborative learning experience in which students teach and learn from one another. Students act as teachers, presenting knowledge, explaining concepts, and leading discussions with their classmates. This method relies on the premise that teaching others can reinforce the teacher's own understanding, increase engagement, and improve learning outcomes for both the "teacher" and the "learners."
12. **Field Survey -** A Field Survey is a classroom exercise that involves taking students out of the usual classroom setting to collect data or observations directly from the actual world. This sort of experiential learning allows students to apply theoretical knowledge in practical circumstances, participate in hands-on learning, and acquire skills such as data collecting, analysis, and critical thinking.

13. **Brain Teasers -** Brain teasers are an interesting and instructional classroom practice that tests students' problem-solving, critical thinking, and creative reasoning abilities. These puzzles or riddles frequently demand students to think outside the box, explore alternative perspectives, and use logical thinking to arrive at a solution.
14. **Topographical Map Challenge -** The Topographical Map Challenge is an entertaining classroom activity that teaches students about topographic maps, contour lines, elevation, and geographical features. This classroom activity combines geography, critical thinking, and hands-on learning, making it excellent for students interested in geography, environmental science, etc. This activity aims to teach students how to read, interpret, and construct topographical maps. They will learn how to portray elevation and landforms on a 2D map, as well as improve spatial awareness and analytical skills.
15. **Map Drawing -** Map drawing is the act of generating a graphic depiction of a certain area, such as a classroom, neighbourhood, city, country, or even a fictional location. It entails utilizing symbols, lines, colours, and labels to represent diverse geographical characteristics such as highways, rivers, mountains, structures, and boundaries. Map drawing is a creative and analytical exercise that is commonly used in educational settings to assist students understand spatial relationships, geography, and mapping skills.
16. **Musical Description -** Musical Description is a classroom exercise in which students use music to investigate and describe geographic locations, cultures, and landscapes. This practice combines auditory learning and geographical information to help students connect cultural and physical geography through the sounds and stories of many locations.
17. **Group Presentation -** Group Presentation is a classroom activity in which students work together in groups to study, prepare, and present information on a specific geographical topic. This activity encourages teamwork, communication, and research skills while also improving students' understanding of geographical concepts.
18. **Community Engagement -** Community engagement is a classroom activity in which students interact with their local community to have a better understanding of geographical ideas and challenges. It's a hands-on method that combines classroom learning with real-world experiences, allowing students to see the importance of geography in their daily lives.

19. **Mind Mapping -** Mind mapping is a creative and effective educational tool for organizing and visualizing information. Mind mapping in the geography classroom can assist students in understanding and connecting complicated geographical concepts, words, and relationships. It aids in the visual organization of information and demonstrates the connections between various concepts. Mind maps can be used in geography to learn about ecosystems, climate zones, landforms, etc.
20. **Power Point Presentation -** PowerPoint presentations are a popular and effective classroom activity that allows students to arrange and present content utilizing multimedia resources. This exercise can improve learning outcomes by allowing students to make visual and interactive presentations on a variety of topics.
21. **Think and Pick -** Think and Pick is an enjoyable classroom game that encourages students to reflect on their ideas, make educated selections, and justify their choices. It can be used in a variety of courses and themes to assist students build critical thinking, decision-making, and reasoning abilities.
22. **Poem/Song writing -** Poem and song writing as a classroom exercise is a creative and interesting approach for students to communicate their thoughts, emotions, and knowledge of numerous subjects. This project promotes creativity, strengthens writing skills, and helps students to explore and express their thoughts in a unique and personal manner.
23. **Work Experience -** Work Experience as a classroom activity in geography is an instructional exercise that simulates real-world tasks in the discipline of geography. This activity is meant to provide students with practical insights into how geographic knowledge and abilities are utilized in diverse industries, helping them understand the relevance of their studies.
24. **Identify the Picture -** Identify the Picture is a classroom activity in which students are presented with geography-related photographs and asked to identify and examine them. This activity enhances students' observational abilities, geographical knowledge, and critical thinking.

Table 3.4 List of Classroom Activities of the module categories according to the Intelligence Type

Sl. No.	Units	Activities	Types of Intelligence
1	Change of the Earth's Surface	Fill the circle	Verbal/ Logical
		Conceptual Chart	Intrapersonal
		Drawing the concept out	Spatial
		Model Demonstration	Bodily Kinesthetic
		Pictorial	Spatial and Naturalistic
		Interactive Session	Interpersonal
		Documentary Film	Musical
		Solve the problem out	Logical/ Mathematical
2	Atmosphere: Structure, Air pressure And Wind system	Cross word puzzles	Verbal /Linguistic
		Problem- Solving	Logical/ Mathematical
		Building models	Bodily kinesthetic
		Drawing the concept out	Spatial
		Geographical Jingle writing	Musical
		Peer teaching	Interpersonal
		Field survey	Naturalistic
		Vision Board project	Intrapersonal
3	Geography Of India	Storytelling and Brain teasers	Verbal/ Linguistic
		Topographical map challenge	Logical/ Mathematical
		Pictorials	Spatial
		Map Drawing	Bodily kinestic
		Musical Description	Musical
		Group presentation	Interpersonal
		Community engagement	Naturalistic
		Creative Expression and Mind mapping	Intrapersonal
		Map Drawing	Logical/ Mathematical

4	Geography of Assam	Power Point Presentation	Spatial and Musical
		Think and Pick	Verbal and Bodily kinetic
		Concept Map	Intrapersonal and Verbal
		Poem/Song writing	Musical
		Classroom Interaction	Interpersonal and Verbal/ Linguistic
		Work Experience	Bodily Kinetic and Naturalistic
		Pictorial	Spatial
		Identify the Picture	Spatial
		Chart diagram	Verbal/Linguistic
		Field Survey	Naturalistic and Interpersonal
		Chart Study	Spatial and Logical

g) Validity of the module: In order to test the validity of the module, the module was sent to 5 experts from different Universities and Institutions. The experts approved the module for carrying out the implementation and also considered it suitable for the study.

3.9.0 Modification of the Module as per the Suggestions of the Experts:

1. Suggestions were provided for managing the time bound as per the requirements of the different types of activities.
2. Grammatical errors in the module were needed to rectify.
3. Some similar kinds of activities were replaced with some new different forms of activities.
4. As much as possible the activities related to all the 8 types of intelligence of Multiple Intelligence Theory were develop.
5. The activities related to teacher and students were differentiated from each other.
6. As per the expert's suggestions references at the end of each unit of the module were provided for the future benefits of the teacher as well as students.

7. Information related to the chapters are asked to make precise and unnecessary information must be avoided.
8. Pictorial related activities were asked to modify and include some more standard one.
9. Musical Intelligence related activities were modified as per the expert's suggestions.
10. Map activities were revised and made as per the level of the students.

3.10.0 Procedure to implement the designed module in classroom situation:

The "Multiple Intelligence based Instructional module" is designed to enhance learning competency of the students towards social science subject. By the end of this module, students will be able to develop learning competencies in three domain i.e. cognitive, affective and psychomotor domains. This module was implemented to the experimental group students. And the duration of the implementation period of this module was 3 months and one week (April -July 1st week 2023). This module is based on learner centric activities where learners play active role in the learning process. This module covers 8 forms of intelligences i.e. logical, linguistic, spatial, bodily kinetic, interpersonal, intrapersonal, musical and naturalistic intelligence, which means it covers almost all type of students with different kinds of abilities.

Before implementing the module, the investigator visited the school where the module will be implemented in order to build a rapport with the students. The students were informed about the module, what type of activities they will be dealing with, etc. in order to develop their interest towards learning with the new module.

During the implementation the investigator make it sure to involve the students as much as she can in all the classroom activities. The activities consisted of both indoor and outdoor classroom activities. For outdoor activities such as field survey and community engagement the investigator took prior permissions from the authority of the schools. Also, permission was granted for extra classes as per requirement of the activities.

It was observed during implementation that students were very interested and motivated towards the activities of the module. Also, students were assigned with some home assignments and class exercises for their further practice and understanding.

3.10.1 Implementation of Traditional Lecture Method:

The Traditional Lecture Method (TLM) is basically the traditional form of lecture method where the teachers play most of the role in teaching learning process. This method is frequently distinguished by organized surroundings, rote memorization, direct instruction, and teacher-cantered classrooms. It is a teacher-cantered style to education in which the teacher presents material to the class in a formal, structured manner, usually in a classroom. This approach involves the teacher speaking for the majority of the class period, giving facts, justifications, and examples, while the students pay attention and take notes. There are little possibilities for student-teacher contact, discussion, or hands-on learning; instead, the emphasis is on the teacher imparting knowledge to the students. Although a lot of material can be covered quickly with this approach, students frequently end up learning passively and become more of passive recipients than active participants in the process. While lectures are an excellent way to impart fundamental knowledge, they can be less interesting and may not be suitable for a wide range of learners.

This approach was implemented to the controlled group of students. Lecture was the major teaching method used throughout the implementation period. Before implementing the lecture was systematically organised by the investigator. The lecture begins with an introduction of the topic, objectives and the key points of the whole unit. The lecture was divided into small segments, and each part of the topic was explained using examples and chalk/white board. Most of the time the students remained passive listener and sometime takes notes from the lecture. However, at the end of each unit they were asked a few questions. Students rarely get opportunity to interact with the teacher. Each and every student were taught with the same type of teaching method. It was constant throughout the implementation. The implantation was carried out for 3 months and 1 week (April - July 1st week 2023).

3.10.2 Testing tool

1. **SOCIAL SCIENCE ACHIEVEMENT TEST:** The Social Science Achievement Test is a standardized test designed primarily to investigate the impact of the Multiple Intelligence Instructional Approach on the cognitive aspects of learning objectives in Social Science subject. It was constructed on the basis of geography part of class 9 social science subject.

Nature of the test: The nature of this Social Science Achievement test are as follows:

- The Social Science Achievement test is a standardized test constructed with the help of experts on the basis of some selected units of social science subject.
- This test mainly aims to test the cognitive domain of the students.
- This test consists of questions related to all the 8 types of intelligence included in the Multiple Intelligence Theory.
- The study employed the same test in both pre-test and post-test stages in order to assess students' cognitive abilities at the entry level and to determine the differences on their cognitive abilities after giving the treatment.

Focus of the test: This test is primarily designed to assess the cognitive abilities of 9^{th} standard students. This test was constructed in order to assess the level of learning from lowest to highest. It consists cognitive capacities ranging from the lowest to the highest level of learning, including remembering, understanding, applying, analyzing, evaluating, and finally creating.

Item writing and try out: The items for the Achievement test were written, and before going for the expert review, the items were tried out among 40 students at Brajalakshmi Bidyapith HS, Nalbari to ensure the suitability of the questions for the students, the extent to which language is appropriate, the ability to access the variables of the study, and so on.

Initial Draft: At the preliminary stage the test consists of total 75 items out of which it was limited to 58 items after consulting with the experts from various NCERT, Assam University, Mizoram University, Tezpur University, as well as subject teachers from various schools.

Pilot study: After receiving expert feedback and finalizing the 58 items of the test, these 58 items were administered to 100 students of 9th grade from Nalbari district.

Item Analysis: After administering the pilot study to 100 students, the scores of each student on each of the items were tallied and sorted in order to conduct the item analysis. The item analysis was carried out using two steps:

Item's difficulty level

Item discrimination

Item's difficulty level: In order to find out the items' difficulty level, the number of students answering each of the items correctly were calculated and used the following formulae to find out the value

$$Formulae = R/N \times 100$$

Where, R = Number of students answering the item correctly

N = Total number of students.

The items between the range of 0.2 - 0.8 are accepted for the test and the items below 0.2 and above 0.4 are rejected.

Item discrimination: In order to find out the item discrimination level the students scoring highest and lowest in each of the test items were calculated and divided into two groups. Out of the total students 27% students with highest score and 27% students with lowest scores on each of the test item were sorted. The following formulae was used to calculate the discrimination value of the test items

$$Formulae = \frac{Ru - Rl}{\frac{1}{2} N}$$

Where, Ru = Students with highest score

Rl = Students with lowest score

N = Total Number of students

The item discrimination values between the range of 0.2 - 0.4 are accepted for the test.

Final Draft of the test: The final draft of the test was found after the item analysis was completed. A total 24 items out of 58 items were finalized for the final test. The distribution of the different aspects of the test is given in the following manner:

Nature of test items

The test consists of five types of test items. These are as follows:

- Multiple Choice Questions
- Very Short type Questions

- Short type Questions
- Brief answer type Questions
- Long type Questions

Weightage of marks given to types of test item

After taking proper suggestions of the experts, the researcher had distributed the weightage of marks as given below:

- Multiple Choice Questions (MCQ) = 1 mark
- Very Short type Questions (VSQ) = 1 mark
- Short type Questions (SQ) = 2 marks
- Brief answer type Questions (BQ) = 3 marks
- Long type Questions (LQ) = 4 marks
- Essay Type Questions (EQ) = 4 marks

Table 3.5 Weightage of marks given to each of the units

Sl. No.	Unit	Marks
1	Changes of the Earth's Surface	15
2	Atmosphere	15
3	Geography of India	15
4	Geography of Assam	15

Table 3.6 Weightage of marks given to different levels of learning

Levels of Learning / Objectives	Remember	Understand	Apply	Analyze	Evaluate	Create
Marks	4	4	8	12	16	16

Table 3.7 Distribution of marks on the basis of different types of test items

Sl. No.	**Types of Test Items**	**Marks**
1	Multiple Choice Question	4
2	Very Short answer type question	4

3	Short answer type question	8
4	Brief answer type question	12
5	Long answer type question	16
6	Essay type question	16

Table 3.8 Blueprint of the test

Objectives wise test items / Units	**Remember**	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Create**	**Total Marks**
Change of the Earth's Surface	1 (MCQ)	1 (VSQ)	2 (SQ)	3 (BQ)	4 (LQ)	4 (EQ)	15
Atmosphere	1 (MCQ)	1 (VSQ)	2 (SQ)	3 (BQ)	4 (LQ)	4 (EQ)	15
Geography of India	1 (MCQ)	1 (VSQ)	2 (SQ)	3 (BQ)	4 (LQ)	4 (EQ)	15
Geography of Assam	1 (MCQ)	1 (VSQ)	2 (SQ)	3 (BQ)	4 (LQ)	4 (EQ)	15
Total Items	4	4	4	4	4	4	60 / 24

Standardization of the test: To standardize the test and determine its reliability and validity, all the 24 finalized test items were administered to 80 students of 9 standard from Nalbari District. The detail description of the test reliability and validity are given below:

Reliability of the test: The reliability of the test is measured with the help of Test-Re- test method and Cronbach Alpha formula under Internal Consistency method. The reliability value found in each of the formula is-

Test - Retest method	0.72
Cronbach Alpha	0.74

Validity of the test: The validity of the test is measured by using Content validity formula. For content validity the tool was sent to the subject experts for testing the quality and efficiency of the tool.

2 AFFECTIVE DOMAIN SCALE: The Affective domain Scale is designed basically to investigate the impact of the Multiple Intelligence Instructional Approach on the affective domain of learning competency. It was constructed on the basis of four sub dimensions such as interest, student's engagement, attitude and value.

Nature of the scale: The nature of the Affective Domain scale are as follows-

- The affective domain scale mainly aims to measure the emotional aspects of the students regarding the social science subject.
- This scale is mainly a four-dimensional scale on affective domain of learning. The four dimensions are interest, student's engagement, attitude and values.
- As per the feasibility and requirement of the study the scale is delimited to only the three lower levels of affective domain of Blooms Taxonomy that are receiving, responding and valuing, the rest three higher levels of affective domains are excluded from the scale.
- The scale consists of both positive and negative items.
- This scale is constructed on the basis of 4-point Likert scale which consists of responses in the form of strongly agree, agree, disagree and strongly disagree.

Focus of the scale: This scale is designed mainly to assess the affective domain of 9^{th} standard students. This scale was constructed in order to assess the lower level objectives of affective domain. Out of the six stages of affective domain this scale comprises of only the three stages of lower level i.e., receiving, responding and valuing.

Item writing and try out: The items were written as per the dimensions selected for the scale. Also, care was taken for using proper language, grammar, appropriate words, etc. while writing the items. After a thorough study of related literature, a set of 60 items were written at the initial stage.

After item writing the prepared set of items were tried out to a small group i.e. 40 students of Brajalakshmi Bidyapith HS, Nalbari to ensure the suitability of the questions for the students, the extent to which language is appropriate, the ability to access the variables of the study, and so on.

Initial Draft: The set of 60 items were send for suggestions to the subject experts of various institutions such as NCERT, Assam University, Mizoram University and Tezpur University. After the experts' view the item was reduced to 48 as per quality concern and other technical errors. Hence these 48 items of the scale were ready for the pilot study.

Pilot study: After finalizing the 48 items with the help of experts' opinion, the scale was administered to 150 students of Nalbari District for pilot study. The result of the pilot study is essential for analysis of the items.

Item Analysis: With the help of the data gathered from pilot study, the scores of all the 150 students on each and every item were calculated and tallied for conducting item analysis. The following steps were followed for analyzing the items:

Item's difficulty level
Item discrimination

Item's difficulty level: To figure out the items' difficulty level, the number of students answering each of the items correctly were computed and applied the following formulae to get the value.

Formulae = R/N x 100.

Where, R = The number of students who properly answer the item.

N= The total number of students.

Items between 0.2 and 0.8 are allowed for the test, while items less than 0.2 and greater than 0.4 are rejected.

Item discrimination: To determine the item discrimination level, the students who scored highest and lowest on each of the test items were calculated and separated into two categories. From the total number of students, 27% of the students with highest score and 27% with the lowest score on each exam item were listed.

The discrimination value of the test items was calculated using the following formulae:

$$Formulae = \frac{Ru - Rl}{\frac{1}{2} N}$$

Where, Ru = Students with highest score

Rl = Students with lowest score

N = Total Number of students

The test accepted the items with discrimination values ranging from 0.2 to 0.4.

Final Draft: The final draft of the test came out following the completion of the item analysis stage. The final test consisted of 20 finalized items out of the total 48 items. The distribution of the different aspects of the test is as follows:

Nature of the test items: The test items were both positive and negative in nature.

Out of total 20 items 14 items were positive in nature and the rest 6 items were negative.

The list of the items distributed dimension wise is displayed below:

Table 3.9 Dimension wise distribution of the items in the Final Draft of the Scale

Sl. No.	Dimensions	Total Number of items
1	Interest	5
2	Student's Engagement	5
3	Attitude	5
4	Value	5

Scoring pattern: The Affective domain scale is based on the Likert's 4-point rating scale. The scale consists of four options i.e. Strongly agree, Agree, Disagree and strongly disagree. The scoring of each of the option range from 4 to 1 base on the level. This scoring pattern varies in case of positive and negative items. The scoring pattern of positive and negative items are shown below:

Table 3.10 Scoring Pattern of Positive And Negative Items

Sl. No	Items	Strongly agree	Agree	Disagree	Strongly disagree
1	**Positive Item**	4	3	2	1
2	**Negative Item**	1	2	3	4

Standardization of the scale: The final version of the scale is validated and standardized upon 50 students of Nalbari district. The standardization is done with the help of two processes i.e. reliability and validity.

Reliability of the test: The reliability of the scale was found with the help of two reliability methods. The results of the two methods are given as below:

Table 3.11 Results of the two Methods

Test - Retest method	0.77
Cronbach Alpha	0.78

Validity of the test: The validity of the scale is measured with the help of the following –

Item Validity - The item validity was done at the time of item analysis by finding out the item difficulty and item discrimination value of each and every item of the scale.

Content Validity - The content validity was done with the help of the suggestions of experts from different educational institutions such as NCERT, Assam University, Mizoram University, Hyderabad University and Tezpur University.

3 PERFORMANCE TEST RUBRICS IN SOCIAL SCIENCE: The rubric on the performance test is generally constructed in order to measure the motor skills or practical capabilities of the students on Social Science subject. This performance test is a rubric that

is based upon certain criteria. Each of the criteria is scored into four levels based on the quality of their performance. The scoring procedure is range from highest to lowest.

Nature of the Rubric:

- This Rubric mainly aims to measure the psychomotor aspects of the students.
- This scale consists of four criteria for marking range from highest to lowest.
- The rubric consists of total 4 activities based on the four chapters related to geography part.

Focus of the scale: The performance test rubric mainly focusses on examining the physical skills in social science activities of class 9 students. It is based on practical activities where mainly the students' accuracy, efficiency, speed, presentation skills, etc. in their practical classroom activities are measured to understand the students' progress in psychomotor domains of learning.

Item writing and try out: Before writing the items for the rubric a thorough literature review was done in order to know how to construct the rubric, to determine the criteria, what descriptors to be used for various levels of performances, use of proper language, to avoid grammatical errors, etc. After that on the basis of the purpose and aligning with the objectives 60 items of the rubric were written.

These 60 items were then tried upon 40 students of Brajalakshmi Bidyapith HS, Nalbari in order to see whether the items suit their capacity level or not, whether all the items were easy to understand, whether all the items are related to their course or not.

Initial Draft: The selected 60 test items of the performance test were then sent to experts from various Universities and institutions for feedback. After analyzing the feedbacks and making necessary corrections the number of items were reduced to 30.

Pilot study: After getting experts feedback 30 items were set for pilot study. The pilot study of these items was done upon 150 students of Nalbari District. And the result obtained from this study will be used for the analysis of the items.

Item Analysis: With the help of the data gathered from pilot study, the scores of all the 150 students on each and every item were calculated and tallied for conducting item analysis. The following steps were followed for analyzing the items:

Item's difficulty level

Item discrimination

Item's difficulty level: To figure out the items' difficulty level, the number of students answering each of the items correctly were computed and applied the following formulae to get the value.

$$Formulae = R/N \times 100.$$

Where, R = The number of students who properly answer the item.

N= The total number of students.

Items between 0.2 and 0.8 are allowed for the test, while items less than 0.2 and greater than 0.4 are rejected.

Item discrimination: To determine the item discrimination level, the students who scored highest and lowest on each of the test items were calculated and separated into two categories. From the total number of students, 27% of the students with highest score and 27% with the lowest score on each exam item were listed.

The discrimination value of the test items was calculated using the following formulae:

$$Formulae = \frac{Ru - Rl}{\frac{1}{2} N}.$$

Where, Ru = Students with highest score

Rl = Students with lowest score

N = Total Number of students

The test accepted the items with discrimination values ranging from 0.2 to 0.4.

Final Draft: The final draft of the performance test rubric consists of 4 items. These items were then gone through the process of standardization in order to maintain the accuracy and consistency of the whole tool.

Standardization of the scale: The standardization of the final 4 items of the performance test rubric was done upon 80 students of IX standard of Nalbari district with the help of two processes i.e., validity and reliability of the test. The result of the two are given below-

Reliability of the test: Reliability refers to the capacity of a tool to provide accurate and consistent result repeatedly. For this tool the test- retest reliability method was used. After calculating the data of the test- retest method the reliability of the performance test rubric was found to be 0.74 which is acceptable for using in the study.

Validity of the test: The validity of the test item is the degree to which a tool measures accurately what it is designed to measure. For this test both item validity and content validity were tested.

Item Validity- The item validity was done at the time of item analysis when each and every item's difficulty level and discriminating value were checked and selected the appropriate one.

Content Validity- Content validity was done with the help of subject experts. In order to check the content validity of items the tool was send to total 5 subject experts and asked their feedbacks regarding the item's language, grammar, whether the items were prepared according to the selected dimensions or not, whether they can fulfill the objective of the study or not.

3.11.0 Procedure for data collection

The data collection stage primarily pertains to the systematic process of gathering data for analysis. This phase comprises multiple stages to ensure the precise outcome. The following are the generalised steps: Preliminary Phase: This phase of data collection is the most fundamental and initial level. It is the initiation of the data collection process. The researcher obtained the requisite permits from both the Head of the Institution and the Head of the Department at their own institution to facilitate the data gathering process. Following the acquisition of approvals from the institutions, the researcher administered the pre-test examination to the sample. The students were assured that their data would remain confidential and that participant privacy would be preserved.

Implementation Stage: This stage can also be called as experimental stage. After conducting the pre- test exam, at this stage the researcher starts the implementation of the method. The study consists of two groups one is experimental group and the other is

controlled group. The researcher implemented the designed Multiple Intelligence based Instructional module upon the experimental group and for the controlled group the traditional instructional method was used. The implementation was carried out for a duration of 3 months.

At the end of the implementation Post-test was conducted upon both the groups i.e. experimental and controlled group.

Recording and Organization phase: The results of both pre-test and post-test of the two groups were recorded at this stage. The data were recorded and organized systematically with the help of MS Excel and SPSS software for the analysis purpose.

Analysis Stage: At this stage the recorded and organized data of both the pre-test and post-test exam from both the groups were analyzed statistically with the help of SPSS software in order to study the objectives of the study. Both descriptive and inferential statistics were used to fulfill all the objectives of the study.

Final Stage: At the final stage the raw data were ready for the analysis and interpretation part.

3.12.0 Statistical Techniques

Both descriptive and inferential statistical techniques were used for analysis and interpretation of data.

3.12.1 Statistics related to Descriptive Analysis

1) Measures of Central tendency (Mean, Median and Mode).

2) Measures of Variability (Standard Deviation, Skewness, Kurtosis)

3.12.2 Statistics related to Inferential Analysis

1) Analysis of Co variance (ANCOVA)
2) Analysis of Variance (ANOVA)
3) Paired Sample t-test.

The scoring process of all the data were done with the help of MS excel and IBM SPSS Statistics 22 software.