EFFECTIVENESS IN GEOGRAPHY ACHIEVEMENT UNDER GUIDED-DISCOVERY LEARNING AND RECEPTION LEARNING CONDITIONS

PADMANABHAN M. M.A., M.ED.

THESIS
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DECLARATION

I, Padmanabhan. M., do hereby declare that this thesis entitled "EFFECTIVENESS IN GEOGRAPHY ACHIEVEMENT UNDER GUIDED DISCOVERY LEARNING AND RECEPTION LEARNING CONDITIONS" submitted to the University of Calicut for the award of the degree of **Doctor of Philosophy** in **Education**, has not been submitted by me fully or partially for the award of a degree, diploma, title or recognition before.

Calicut University Campus,
15-12-2002.

PADMANABHAN. M.

Dr. K. KARUNAKARAN
Head
Department of Adult and Continuing Education &
Extension Services
UNIVERSITY OF CALICUT

CERTIFICATE

I, Dr. K. Karunakaran, do hereby certify that the thesis entitled "EFFECTIVENESS IN GEOGRAPHY ACHIEVEMENT UNDER GUIDED DISCOVERY LEARNING AND RECEPTION LEARNING CONDITIONS" is a record of bonafide study and research carried out by Sri. Padmanabhan. M., under my supervision and guidance.

Calicut University Campus,
15-12-2002

Dr. K. KARUNAKARAN
(Supervising Teacher)

HEAD OF THE DEPARTMENT
Adult and Continuing Education
Extension Services, University of
Calicut University P.O. 673 635, Kerala

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PADMANABHAN.M

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CHAPTER I

INTRODUCTION

INTRODUCTION

Human beings acquire knowledge through natural and cultural processes. To achieve desired knowledge, deliberate attempt is inevitable. Ever so many innovations and discoveries have been made for educating the human beings to higher level of understanding and consciousness. Learning is a march from a state of nothingness towards the concept of perfect knowledge and understanding. It has become a matter of great concern for educationists and policy makers to bring about suitable reading and learning techniques to cope up with the changing needs of the society. This calls for improving the efficacy of the teachers and the methods they use. It is said that the best teacher is he who teaches less. A teacher should lead the pupil to learn, how to learn and create an environment for self learning, independent thinking, mutual discussion and self discovery. Teacher's role in the process of teaching is not only to impart knowledge, but to create a spirit of inquiry and quest for self discovery as well.

The human psyche has its own natural and cultural functions. Culture in the sense means getting enlightenment by acquiring knowledge. On the other hand, natural function denotes the innate qualities and propensities inherent in every individual. Education aims at emancipating the individual by incessant effort and enthusiasm. Cognitive understanding rather than mechanical adoption of learning techniques has been given greater stress in all theories of learning and models of teaching put forward by gestalt psychologist (Cofca).

The cognitive developmental theorist like Piaget and Bruner (1978) advocate for learner centred education, by which the learner becomes the discoverer of knowledge and instrumental to his self development. In order to support this, they have explained well, as to how a learner can take up the position of a discoverer, controller of his own power of attending, learning and thinking. The learners gets clear perception of an idea with the help of natural, social and cultural environments, where he lives; motivated by some clues given by the teacher. The role of the teacher is to give guidance, so that the learner becomes a true discoverer.

Concept of Models in Teaching

The effort of Gagne, Ausubal and others (1982) contributed much to make instruction more scientific. Attempts are being made to systematize the process of teaching and learning on scientific foundations. Educationists have been evolved effective models of teaching and these models are intended to make aware and guide the pupils towards various goal of learning (Marsha Weil and Bruice Joyce 1989). Information processing, personal development, behavioural modification and scientific thinking ability are the four families of models in teachig.

The overwhelming influence of science and technology paved the way for maximizing the output of learning qualitatively and quantitatively. The concept of maximum output has been adopted which in turn resulted in the formation and development of modern educational technologies.

The dynamic changes occurred in the field of information technology, computer, electronic devices and other discoveries call for suitable modification and reforms in the existing strategies and methods of imparting education. To cope up with the fast changing situation and needs of the society, the teacher should possess a wide range of teaching strategies. According to Joyce (1973) the teacher should diagnosing the learning situation, prepare the setting for learning, guide learning activities, evaluate the learning abilities and apply the follow-up.

The principles to be followed by the learner are enunciated by Bugelski (1971) as follows: Students must be attentive or responsive, learning takes some amount of time and that there is limitation in the quantity of learning.. Speculation about the internal regulation which control the motivation of the individual and determines to what extent and in what ways that individual will have in a given situation.

The adoption of right model in teaching, smoothens, perfects and quickens the learning process. Development of models of teaching is one of the recent innovation in teaching and learning. The teaching model is to assist the teacher on a wide range of approaches creating ample interactive environments for learning. A judicious application of these approaches enables the teacher in adopting suitably, the learning needs of the students.

In the views of Bruice Joyce and Marsha Weil (1972) teaching models are instructional designs. They explain the process of specifying and producing educational

situations, helping the pupils to contact and to bring about desired behavioural changes. A teaching model presupposes of achieving the desired goals of teaching and learning. Hence the multiple role of teachers in imparting instruction is to be highlighted. Various models of teaching 'are no doubt' helpful for the effective teaching. Models of teaching often call for teaching strategies based on established theories of learning and development.

A model of teaching is a guideline for suitable instructional activities in the classroom environment. Different types of models are used to cope up with the various goals of teaching. From experience it is found that there is no 'one best way' to teach. Hence it is up to the teacher to adapt an apt model to implement and to evaluate the effectiveness of the teaching learning process.

Selection of the Appropriate Model

From many a discovery and innovation hitherto brought about in the field of education, we have experienced that such theories could not be applied satisfactorily in every context of learning especially in the case of teaching and learning at secondary school level. Pupils being teenagers the methodology adopted for teaching and learning should in conformity with their potentialities and interests. Hence the primary duty of a teacher is to impart knowledge to pupils by minimizing stress or strain in the process of learning. In such a state of affairs the pupils feel a sort of happiness, alertness coupled with an awareness of the subject matter of study. The teachers duty is to select and plan

appropriate method before imparting knowledge. Identification of suitable method and techniques is very important especially in the case of teenagers who face inexplicable psychological problems during the stages of adolescence.

In the secondary school level, the pupils have to learn different subjects like science, social science, mathematics and different languages. Different methods and techniques are to be adopted by teachers for effective learning and teaching. The inadequacy of planning and methods adopted by teacher leads to defective understanding among students. Hence the teacher's role is to identify effective methods and techniques, through different approaches and to create meaningful learning environments.

Teaching of Geography

The subject of social science in secondary school includes History, Economics, Civics and Geography. However Geography is purely a science subject which includes physical science natural science and geology. The subjects of Geography being complex in nature, more awareness in content and application of scientific approaches and methods are required. The selection of suitable method applicable to the specific content is important. The investigator being a secondary school social science teacher experienced difficulty in selecting suitable methods due to inadequacy of the existing methods. Hence the investigator decided to conduct an experiment in using different methods for teaching, a specific content, in Geography and to identify which of the

methods is more suitable in teaching Geography. With this end in view, the investigator tried to find out the effect of the application of Guided Discovery Learning, Reception Learning and Traditional Learning Methods to find out as to which of the above brings about desired outcomes in teaching of the subject Geography.

Most of the prevalent teaching methods are found to be inadequate in acquiring a positive touch of stimulation and a sense of inquiry and responsibility among pupils. No doubt that the cooked up learning practices have become obsolete in the cyber world.

Guided Discovery Learning

In the present investigation the investigator made slight deviation from the pure discovery learning method for the teenagers who are not matured enough for becoming self discoverers. Usually they are not motivated for acquiring knowledge of special nature for any discovery. In Guided Discovery Learning the teacher meaningfully structures the learning situation, giving suitable clues and information by which the learner can discover the goals. The investigator has adopted the method of Guided Discovery Learning and Reception Learning. It aims at the possibilities of awakening the skills of inquiry learning potentials of the pupils. The purpose is to instill a sense of inquiry and curiosity among pupils.

Comparison of Reception Learning and Discovery Learning

While Reception learning method imparts to the pupils the content of the subject matter in detail. Discovery learning method provides the learners only with some

essential clues of the content enabling the pupils to achieve the goal by a process of discovery. Reception learning is not fully practiced in our classrooms. Reception learning refers to conceiving of ready made and organized information. Discovery learning implies creating information. It is true that in both ways, the learner internalize the subject matter of the study.

In the case of Discovery learning, the learner can discover the idea by internal effort using the clues obtained from the teacher, on the strength of his experience of conjoining with the environment. Ausubel (1983) stands for Meaningful Reception Learning when the teacher makes available to the learner, the information and the learner utilizes the information for learning.

Though Ausubel (1963) admits the idea of the learner discovering knowledge for himself, he is in favour of the direct presentation of organized knowledge as more effective and time saving. According to Piaget (1962) the Meaningful Reception learning would be advisable in the formal operation stages of the pupil's development and that the Discovery learning can effectively be applied in later period of cognitive development.

According to Gagne (1969) Discovery learning means "teaching in which the teacher withholds from pupils, the concept and principles they are to learn, but give them the instance, examples and problems from which they can induce these concepts and principles."

Gagne (1969) refers Reception learning as "teaching in which pupils are presented with all facts, concepts and principles they are to learn."

Another method of learning is open discovery, when guidance of the teachers is almost absent. This method is often found successful in the higher levels of learning.

In Reception learning the essentials of whole contents of the subject of study are directly imparted to the learner.

Guided discovery learning is a new method adopted by the investigator in the teaching and learning of Geography. In Guided Discovery teacher meaningfully structures the learning situation, giving clues, and required in formation so that the learner can derive the generalizations or discover the goals. The out put of this method depends upon the quantity and quality of the instructional structures and situations provided by the teacher.

The term discovery learning has two connotations, learning to discover and learning by discovery. According to Bruner (1960) :"Discovery learning is primarily learning to discover. Discovery is a process, a way of approaching problems rather than product or particular item or knowledge."

Discovery learning is discovering some thing in a new context. Discovery learning focuses on what is to be discovered, a concept, a principle, a generalization or a procedure to do something.

Glasser (1966) describes that discovery learning is learning by discovery and feels that it is most frequently characterized by two properties.

(i) The teacher follows an inductive presentation of the learning task and.

(ii) The teacher gives the minimum of structured sequence, so that pupils have scope for trial and error approaches in various levels of learning.

Towards Guided Discovery Learning

Open discovery is not based on any guidance by the teacher, on the other hand in Guided Discovery, the teacher provides the learner with varied degrees of structures and guidance. Meaningful and controlled guidance is a precondition for the success of Guided discovery learning, judicious and systematic guidance helps to develop the learning potentials of the pupils. Yelon and Heinston (1977) pointed out "Guided discovery learning retains the thrill of insight without allowing the impulsive youngsters to leap to incorrect answers and faulty generalization." On the other hand Open discovery is time consuming and unscientific. Hence learning in the classroom is to be guided by the teacher with a view to attaining certain specific objectives within a specific time. Of course certain unguided search is involved in learning and the mastery of heuristics, but this would not be suited in the learning of concepts, principles or problem solving rather it may become counteractive.

The prime duty of the teacher is to decide the level of guidance and structures to suit the respective learning situation. Turney et al (1977) opined the less able and more

anxious pupils require high degree of guidance compared to less anxious and intelligent pupils.

In guided discovery careful sequencing of examples providing suitable questions, appropriate verbal direction and written instructions are judiciously adopted. Guidance is given according to the objectives, tasks and situation.

National .Education .Policy. (1986) prescribed for the minimum level of learning to be attained by the pupils in different stages of schooling and so far the mastery and competency in different subjects. To achieve this goal adoption of appropriate teaching methods satisfying the needs of the learner are essential and hence the importance of the present investigation.

NEED AND SIGNIFICNACE OF THE STUDY

Education being dynamic, consisting of a number of components, any change in anyone of the components may influence the performance of the system adversely or favourably. In this context right educational technology has profound implications. Teachers' task being stimulating, facilitating and guiding the pupils, it may result in the attainment of desired objectives. With a view to directing and orienting the pupils for attaining definite goals short and long term suitable methods and models are required.

The researcher being a social science teacher in a secondary school who teaches Geography felt the need for creating appropriate learning situations enabling the low achievers to improve well, to achieve high scores to be imbibed with more interest and

motivation to enalyse the cause of the problem and to suggest some practical measures for improving the condition were found necessary and hence this study. The investigator assumes that the Guided discovery method can be employed effectively, enabling the pupils to achieve better knowledge in Geography than relying upon the conventional methods of teaching.

Since there are high incidences of failure in the subject, in S.S.L.C. examination in Kerala, a new strategy of learning involving diagnosis and remedial measures as its integral parts has to be adopted. The investigator stands for employing suitable teaching and learning strategies of dual advantages to the group and the individual.

Guided discovery is one such strategy providing almost all pupils with the chance of successful learning experiences. It presupposes that every pupil can discover, himself, new ideas and concepts in the light of proper guidance rendered by the teacher. To learn and discover oneself calls for the support of scientific outlook and hence proper direction and guidance are to be followed in the classrooms.

To implement Guided discovery method in Geography and to test its effectiveness comparing with the Reception learning method, existing classroom teaching, are the major objectives of the study. This can transcend the monotonous and memorizing classrooms to a higher level of self discovery and learning. Teaching process refers to the arrangement of environment within which the pupils can interact and study easily.

STATEMENT OF THE PROBLEM

The present study is an attempt to devise an effective learning environment in Geography teaching for the pupils of Ninth Standard Secondary Schools in Kerala. The study aims at comparing the effectiveness of these different approaches namely Guided discovery learning. Reception learning and traditional learning methods. the traditional method as (the one) followed in almost all schools of Kerala in imparting instruction in the subject of Geography.. According to the Education Commission Report (1966) "the strength or weakness of any educational set up must largely depend upon the teacher available and employed. So the teacher must be well versed in the subject and capable of adopting suitable methods of teaching in accordance with the changing needs and situations."

This idea lead the investigator to employ the three methods and to test the effectiveness in learning the subject geography. It is true that the educational researchers have explained well empirically the above method in different situations and in different subjects coming under Science and Mathematics. However Guided discovery method is a new attempt adopted by the investigator in teaching the subject of geography. This attempt for enabling the pupils to shift from a state of mere memory to self discovery is to make the learning of geography effective. Also the study is designed to compare the levels of achievement in Geography learning.

TITLE OF THE STUDY

EFFECTIVENESS IN GEOGRAPHY ACHIEVEMENT UNDER GUIDED-DISCOVERY LEARNING AND RECEPTION LEARNING CONDITIONS.

DEFINITION OF TERMS

Effectiveness

Chambers 20th Century Dictionary defines effectiveness as "Success in producing the desired effect." But in the present investigation effectiveness is intended to mean the comparative effectiveness in Geography achievement of secondary school pupils of Kerala, under guided discovery learning and reception learning conditions.

Geography

The science of the surface of earth, ethos and its inhabitants. In the present investigation three chapters from Ninth Standard Geography text book of Kerala, viz. Lithosphere, Hydrosphere and Biosphere have been considered.

Guided Discovery Learning

Guided discovery learning refers to the method where the teacher offers the learners with varying amount of structures and guidance and the learners discover the solution of the given problem individually or group-wise.

Reception Learning

Reception learning means the presentation of the content of the subject (What is to be learned by the learner in its final form. It is the ready made learning method derived from the concept of Bloom's taxonomy of education, proposed by Ausubel. In the present investigation Reception Learning implies the meaningful presentation of the content matter of the study.

OBJECTIVES OF THE STUDY

1. To develop comprehensive lesson plans for the three chapters of Ninth Standard Geography text book of Kerala, viz. Lithosphere, Hydrosphere and Biosphere in tune with.

   (a) Guided discovery learning condition

   (b) Reception learning condition

2. To study effectiveness sin Geography achievement under Guided discovery learning condition by comparing it with the achievement under traditional learning condition.

3. To study the effectiveness in Geography achievement under Reception Learning Condition by comparing it with the achievement under Traditional Learning condition.

4. To study the effectiveness in Geography achievement under Guided Discovery Learning condition by comparing it with the achievement under Reception Learning condition.

5. To test whether any sex difference exists in Geography achievement when compared with Guided Discovery Learning condition and Traditional Learning condition.

6. To test whether any sex difference exists in Geography achievement under Reception Learning condition by comparing it with the Achievement under Traditional Learning condition.

7. To test whether any significance difference exists in Geography achievement when compared it with Guided Discovery Learning and Reception Learning condition.

8. To test whether any significant difference exists in Geography achievement in sex-wise and levels of cognition in total and sub samples.

Assumptions

(1) The syllabus prescribed in Geography for ninth standard secondary school students can be analysed and learning experience formulated with a view to provide learning conditions appropriate to Guided Discovery Learning condition, and a comprehensive lesson plan developed.

(2) The syllabus prescribed in Geography for ninth standard secondary school students can be analysed and learning conditions appropriate to Reception Learning condition with a comprehensive lesson plan adopted.

HYPOTHESES

(1) There will be significant difference between pupils taught under Guided Discovery Learning condition, than those taught under Reception Learning condition in their mean achievement in Geography.

(2) There will be significant difference between pupils taught under Guided discovery learning condition than those taught under Traditional Learning condition in their mean achievement in Geography.

(3) There will be significant difference between pupils taught under Reception learning condition than those taught under Traditional Learning condition in their mean achievement in Geography.

(4) If Geography achievement in three cognitive levels, namely Knowledge, Understanding and Application are determined and the respective pairs of group (as mentioned above) compared, there will be significant difference in each of the three levels and between sex wise comparison with three cognitive levels.

VARIABLES

The dependent variables of the study is '**Achievement in geography**' and the independent variables are the following:

(i) Guided Discovery Learning condition

(ii) Reception Leaning condition

(iii) Traditional Learning condition.

Controlled Variables

Control is made on given classificatory variables.

(i) Intelligence

(ii) Socio Economic Status (Parental income, Parental education and Parental occupation)

(iii) Pre-requisites in Geography (first two chapters from the ninth standard geography text book of Kerala syllabus)

(iv) Sex and locale

(v) Type of management of school

(vi) Time and climate of school

(vii) Teacher variable (the experiments were conducted by the investigator himself).

Type of study

The present study comes under the purview of experimental study.

Sample

The investigator conducted his study on a representative group of 120 students studying in ninth standard of one secondary school in Kerala. The proportionate sampling techniques with adequate representation to categories like sex, locale, type of management time and climate were strictly observed. Three different classes (divisions) of ninth standard in Poilkave Secondary School in Changottukave village near Koyilandy Municipality, Kozhikode district in Kerala State were selected for the study.

Tools

Tools for controlling

1. Verbal Test of Intelligence (Nair, A.S., Kerala university)
2. Socio-Economic Status Scale (Kerala University)
3. Pre-requisite test in Geography (constructed and standardized by the investigator)

Tools for treatment

(1) Comprehensional lesson plan of Guided Discovery Learning for the three chapters namely Lithosphere, Hydrosphere and Biosphere from ninth standard Geography text book of Kerala (developed by the investigator in tune with subject experts).

(2) Comprehensional lesson plan of Reception Learning for the three chapters namely Lithosphere, Hydrosphere and Biosphere from ninth standard Geography text book of Kerala (redeveloped by the investigator in tune with the concept of Bloom's taxonomy of education with experts).

(3) Specimen lesson plan for the existing classroom teaching method for the three chapters namely Lithosphere, Hydrosphere and Biosphere from ninth standard Geography text book of Kerala (adopted by the investigator).

Tools for testing

(1) Achievement Test in Geography (constructed and standardized by the investigator)

Basic steps involved in the study

(1) Identification of the vital subject matters, concepts and principles to be discovered by the student.

(2) Sequencing of the subject matter of the learning into small steps logically and viably.

(3) Reporting of observable results then and there and evaluating them according to the objectives.

(4) Testing and noticing of each sequential step of learner achievement.

(5) Testing of three learning approaches in the same achievement test.

(6) Controlling of the quantity of instruction, the time devoted, climate of school and the teacher variable.

(7) Arranging of examples, models, diagrams, charts, maps, glob, photos, paper ;cuttings, books, questions and so on necessary to determine to discover new concepts.

Stages of Experiment

(i) Controlling stage:

Three classes (divisions) of ninth standard from one selected school were selected by measuring verbal test of intelligence, socio economic status scale, and the score obtained in the pre-requisite test in Geography. Sex, locale, climate, management of school and teacher variable were strictly controlled.

(2) Treatment Stage

Teaching of Geography through Guided discovery learning conditions to experimental group I and Reception learning conditions to experimental group2, and Traditional teaching method to control group by the investigator.

(3) Testing Stage

Measurement of pupils achievement in Geography taught under three methods by using the same standardized achievement test in Geography.

Procedure of Investigation

To control the Experimental group G1 (Guided Discovery Learning), Group 2 (Reception Learning) and Control Group (Traditional Learning) the investigator administered verbal test of intelligence, socio-economic status scale adopted from Kerala University. After consulting the experts and Geography teachers, pre-requisite test in geography with regard to the first two chapters of Ninth Standard Geography text book was conducted by the investigator which was developed and standardized by him. On the basis of the mean scores of three tests (Intelligence, SES and pre-requisite test), three divisions were selected as G1, G2 and Control group. All these three divisions were equated with forty students comprising twenty boys and twenty girls. Topics namely Lithosphere, Hydrosphere and Biosphere of ninth standard Geography Text book have been taught in three learning conditions, viz. Guided Discovery Learning, Reception Learning and Traditional Method.

Final achievement test in Geography was employed after teaching twenty lessons each. The score obtained from the final achievement test was analysed according to the objectives of the study.

Techniques of Analysis

Different statistical techniques were utilized to measure the score in the form of

(1) Arithmetic mean

(2) ANOVA

(3) Comparison of relevant groups using test of significance for mean difference.

SCOPE AND LIMITATIONS

Scope

The study is mainly intended to introduce a new and effective method of teaching in the classroom for secondary schools of Kerala. There might be various methods for different subjects but the investigator selected Guided Discovery Learning Method in the teaching of Geography in this context.

The study is limited to the pupils of secondary schools limited to the pupils of secondary schools only. One secondary school from Kozhikode District of Kerala was selected for the study. Due to practical difficulties and shortage of fund and time the

study was confined to one secondary school and that a sample of 120 students were selected for the investigation.

Limitations

The investigator took the maximum care in selecting the representative samples and equating group and valid tools for the study. Even though certain limitations were unavoidable. They are stated below:

1. The present study has been confined to a sample of 120 students of IX standard from one secondary school (Poilkave Secondary School, Edakkulam, Koyilandy) from Kozhikode district of Kerala. Samples could have been selected from other schools and other districts of Keerala. But as an experimental study which is beyond the control of investigator to control and make equated groups with limited resource and time.

2. The study has been limited to the variables of Guided-discovery and Reception learning method with Traditional learning method because of the same investigator is teaching three methods in same school in different groups. Due to practical difficulty he confined in three method.

3. The study has been limited the variables of cognitive levels of learning 'Knowledge, Understanding and Application' due to the nature of the study and lack of time and practical difficulty.

4. The present study is limited to use scientific instruments like computer, T.V. due to lack of time and facility.

Tools constructed for the study especially the comprehensive lesson plan and approaches would help the teachers of Geography in secondary schools. This tool can also be applied in different subjects and in different samples. This study shall help the teachers to adopt new methods in their classroom practice leading to become competent teachers and alert strict self discovery and motivate the pupils.

CHAPTERIZATION

The introductory chapter deals with the backgrounds need and importance and significance of the study followed by statement of problem, definition of key terms, objectives of the study, assumption and hypothesis, tools, technique etc used for the study.

Second chapter is divided into two parts. First part deals with the theoretical overview, discovery learning, guided discovery learning, reception learning and other methods of learning. The second part deals with empirical studies made in the field.

The third chapter deals with the Methodology describing procedure for the experimental study, the development and stadardisation of achievement test in Geography, the comprehensive lesson plan for Guided discovery learning condition and reception learning conditions. It also consists of the criteria of sample selection

controlling method for selecting groups, treatment steps and data collection, measurement of scores using different statistical techniques, etc.

Fourth chapter consists of the result of the experiment and Fifth chapter consists of suggestions and further scope of the study. Then comes Bibliography and Appendices.

REVIEW OF RELATED LITERATURE

Padmanabhan M. "Effectiveness in geography achievement under guided-discovery learning and reception learning conditions" Thesis. Department of Adult & Continuing Education and Extension services, University of Calicut, 2002

5A

CHAPTER II

REVIEW OF RELATED LITERATURE

REVIEW OF RELATED LITERATURE

This chapter has been divided into two parts. Part A deals with Instructional Strategies and its theoretical backgrounds, its shift from teacher to learner from the group to individual and from the monotonous textual reading. Part B deals with review of certain empirical studies relevant to the topic

PART A : INSTRUCTIONAL STRATEGIES AND ITS THEORETICAL BACKGROUND

The role of teacher in the national development is pivotal one. Both formal and non-formal system have been formulated in forthright time setting the national objectives. Teaching has been one of the most respected professions in the world. The role, the competence and preparation of teacher have no doubt undergone a change from time to time, but the need for a teacher has been imperative in all ages.

Our national goals of education are the following:

1) To develop education, so as to increase productivity.

2) To achieve social and national integration

3) To accelerate the process of modernization

4) To cultivate moral, social and spiritual values.

5) To make education a powerful instrument for the social, economic and cultural transformation necessary for the realization of the national goal.

So the human resources can be developed through properly organised form of education. The need of competent and well trained teacher is inevitable for the challenging needs and channellising the growing generation to achieve the national goals of education. The spirit and concept of education signifies the secular and democratic view to economic development. It is the educational policies which decide the national programmes and through dynamic and resourced teachers we can implement it successfully.

By imparting authentic and dynamic programmes through resourceful teachers and effective implementation and evaluation we can achieve the objectives of education and make it an agent for social change.

World gives teachers profound respect and reverence, but not concentrating on the future citizen who are the destiny of the nation. The prosperity and productivity depend upon the style and standard of education and character and quality of teachers. The quality and competency of the teacher attracts the pupils and it will create new behavioural change in pupils.

Personality, professional qualities, higher values and knowledge and proper training of teachers will effect the pupils and it will inculcate desirable values and skills based on acceptable learning experiences. The role of effective teachers is significant in the overall development of the child. Hence dynamic instructional strategies and their classroom implications change learners from passive recipients to active learners.

REVIEW OF RESEARCH ON LEARNING

Now "instructional strategies have continued to be more or less teacher centred, group oriented and text book based" (Dible 1971). Hence learning should be sifted from teacher to leaner, from bookish to self discovery and from passive to dynamic.

Great ;educators like Jean Jacques Rousseau and John Dewey directed teaching through discovery. Rousseau's words are of special significance for the present interpretation of discovery learning. He advocated "put the problem before him and let him solve himself. Let him know nothing because you have told him, but because he has learned it for himself. Let him not to be taught science, let him discover it" (Rousseau Emile, Book 3, p.131).

John Dewey (1915) advocated for the advantage of discovery method in his words "... if he cannot devise his own solution and find his way out, he will not learn, not even if he can recite some correct answers with hundred per cent accuracy."

Famous cognitive developmental theorist Jean Piaget pointed out the important conceptual basis of discovery learning as follows:

"The question comes up whether to teach the structure or to present the child with situations, where he is active and creates the structures himself, the goal of education is not to increase the amount of knowledge but to create the possibilities for a child to invent and discover. When we teach too fast, we keep the child from meeting and discovering himself. . . teaching means creating situation where structures can be

Bruner, Godnow and Austin (1977) put forward to study the cognitive activity called categorizing. By categorizing they meant the principal means by which a growing member of the society is socialized. By understanding the category one can reflect in the culture in which he lives. All sets of concepts are the product of the same kind of though processes and the means of inquiring of any concept is essentially the same. Concept formation is the act by which new categories are formed. Concept formation is the first step towards concept attainment. It is an act of invention, concept formation defines the process by which the children classify experiences into categories, and in general assign label to these categories. Child in his process learn to discriminate and recognize the things he encounters in the environment.

Bruner's concept has remarkable important and applicability in teaching for the following reasons

(1) By understanding the nature of the conceptual activity one can better determine when pupils have attained a concept and when they are repenting without conceptualizing..

(2) We can recognize the categorizing strategies, students are using and to help them use more effective ones.

(3) We can improve the quality of instruction for concept learning by using models of teaching that capitalize on the basis of the concept attainment model.

Educational objectives of Discovery Learning

1) To help students acquire a new idea himself or by group discussion.

2) To enrich and clarify their thinking on previously acquired concepts.

3) To teach the concept of discovery including the meaning and terminology and method of discovery of new ideas through cognitive learning process.

4) To help them to attain the objectives by their own thinking process and discovery strategies.

1. THE INSTRUCTIONAL IMPLICATION OF SOME MAJOR LEARNING THEORIES

1.1. The importance of individual difference in instruction

Each student has his own uniqueness in personality traits, intelligence and social backgrounds. His unique behaviour reflects in the classroom. Some may be weak in Mathematics but excellent in languages and wise-versa. Cognitive difference is also seen. Some pupils may be extremely bright and some may be dull. So instruction should be to cope up with the individual differences of the learners. Now teachers are giving learning situation without considering fast learners and slow learners. A small set of learners can satisfy through mass instruction. This instruction will not encourage both creative students as well as dull students. "Learning is passive and the emphasis is placed on telling" (Shane 1978). Same method of instruction might not always meet the needs of normal distributions.

1.2. The influence of Heredity and Environment on Learning

Environmental contingencies and heredity potential are the influencing factors of individual differences. The behaviour of an individual may be largely due to the heredity potential interacting with the environmental forces. The heredity can be nurtured or stifled with the amount and quality of environmental factors that the individual encounters. Here learning is an outcome of an individual's active interaction with the environmental factors accepting some and rejecting some. The teacher should guide the pupil by appropriate selection of environmental forces. Environment influence individual's achievement. Hence teachers role is crucial and to arrange the environment for learning and instruction.

1.3. Learning and Instruction

"Learning is characterized as a fairly suitable change in observable behaviour that may be attribute to experience which must, however, be psychological in character rather than physiological or mechanical (Gagne, 1967). By learning we expect positive behavioural changes in learner.

Instruction as a mechanism leads to learning is a deliberately planned and sequenced presentation of ideas in various modes. This includes dividing contents into meaningful units, setting specific objectives in the behavioural terms, selecting learning experiences and describing the procedure of evaluation to understand the extend to

which learning has taken place and to utilize this information for further refinement of the instructional system.

2. THEORIES OF LEARNING AND ITS INSTRUCTIONAL STRATEGIES

Learning theories give focus, direction and formulate objectives for a teaching learning situation and to develop instructional strategies, in order to realize these formulated objectives. They encompass affective, psychomotor and cognitive development. Learning theories have developed into two main branches, (1) Behaviouristic, the focus of which is on behaviour as evidence of cognitive growth and (2) cognitive, the focus of which is perception as evidence of cognitive growth.

For the contextual reference of the present study some of the important ideas and instructional implications of Skinner and Gagne as representatives of behaviourm and Piaget, Bruner and Ausubel representatives of cognitivism are presented in the following few paragraphs.

2.1. Theory of Learning by Skinner

The major advocate of Behaviourism, Skinner (1938) put forward two kind of behaviour. Respondent and Operant and more emphasis is was given to Operant behaviour or operant learning. Skinner points out the respondent behaviour is elicited by the environment (conditioned stimuli) whereas the operant behaviour is acquired by the individual (organism) and is controlled by its consequences. The stimulus, the response and the consequences are the components of the operant conditioning. The stimulus

provokes response, the consequence of the response reinforces the behaviour by increasing the probability of the response.

Skinner stated that the most important in human behaviour is reinforcement. He explains, reinforces and reinforcement as follows:

A reinforce is a stimulus whereas reinforcement is not a stimulus but rather its effect. Two kinds of reinforcement (1) Positive, involving presentation of positive stimulus and (2) Negative, involving removal of negative stimulus. Punishment is a different process from reinforcement. Reinforcement strengthen a response but punishment weakness a response. Reinforcement may be presented continuously or intermittently in a random or fixed manner. Continuous reinforcement lead to foster learning. In terminal schedules of reinforcement result in larger extinction periods.

2.2. Skinner's View of Instruction

Skinner (1969) viewed 'Teaching is an arrangement of contingencies of reinforcement which expedite learning. Skinner investigated that promotion of learning is possible by giving attention to the amount of behaviour to be learned, the reinforcement which may be used and the scheduling of reinforcers.

Programmed instruction advocated by Skinner provides individual difference by allowing the learner at their own speed. In terms of Skinner's operant behaviour "a programme can be seen as an arrangement of material that will lead students to emit correct responses and will also provide reinforcement for the response (Lefrancois,

1979). The core elements of programmed instruction have been listed by Suchman (1964) as follows: (1) Ordered sequence of stimuli, (2) specific student responses (3) immediate knowledge of results (4) small steps (5) minimum errors (6) gradual shaping of terminal behaviour and (7) self pacing.

2.3. Piagetian Theory of Cognitive Development

The prominent cognitive developmental theorist Piaget advocates on learning and instruction. As a Swiss child psychologist, he is closer to the stages of intellectual development of the child. Piaget interested not in recording the correct responses of the children but on pursuing reasons for the wrong responses. He was involved in the analysis of process in the organization of knowledge and thinking process of children. His semi-clinical interview method has become so widely used and discussed. Mental growth was regarded as the acquisition of new mental abilities that were not present earlier Mental growth is qualitative not quantitative.

Piaget (1925) advocated "Intelligence is an adaptation, life is a continuous creation of increasingly complex forms and progressive balancing of adaptation and organization to man within the environment."

2.4. Factors influencing growth

Inhelder and Piaget (1969) advocated four factors that influence the individual's progress through stages of intellectual growth. They are biological maturation, specific

experiences with the physical environment, social interaction and self regulation or equilibration.

The cognitive developmental theorist Piaget suggests about the experience with the physical environment, that there are two types of experiences namely Physical experience and logical mathematical experience. Heywood (1982) suggested with regard to logical mathematical experience "depends on the way in which the subject and object interact." Piaget argues that within the mind there is a cognitive 'know how' which he calls 'structure' (Hillgard and Bower, 1977).

Piaget suggests (1969) with regard to social interaction, higher importance to language since it is crucial to the process of socialisation. He argues that the development of logical operation is prior to the development of language.

Piaget asserts that some factors influence the coordination of equilibration. They are the mental acts related to each other and together in cluster called schemas or structures/behaviour patterns. The external environment is assimilated by the child with the help of these structures. By this process the child fits every new experience into his pre-existing structures called assimilation. Assimilation of new experience also requires a change in the existing structure. So that "there is congruence between external reality and child's mental structures (Haywood, 1982). This process is called accommodation. Equilibration is a process of adjustment between assimilation and accommodation.

2.5. Stages of Cognitive Development

Piaget investigated four sequenced and distinct stages of cognitive development in child. They are shown below:

(1) Sensori-motor stage, in which action predominates (the first eighteen months)

(2) Pre-operational stage, which is intuitive and perception oriented (from eighteen months to about the age of seven)

(3) Concrete operational stage, in which experimental logic is used (from the age of seven to twelve) and

(4) Formal operational stage is which hypothetical deductive logic is used (starting around the age of twelve)

This shows that Piaget appropriates age-levels only. The order in which the child progresses through four defined stages of intellectual development is fixed. It is impossible to skip a stage.

Piaget asserts that process of development can not be rushed. Each stage is distinct and exists in its pure form. Traces of other stages, both preceding and succeeding may be present in each stage.

1.5 Piaget's Learning theory and its Classroom Implication

Piaget advocates two types of learning. They are: 1) Imitative reconstruction and (2) Logical construction.

Imitative reconstruction otherwise known as P. Learning, results from the environment acting on the learner. Piaget associates this kind of learning to conditioning (both operant and respondent) and rote learning. Piaget gave less importance to this learning.

Logical construction also is called LM Learning, resulting from the learner acting on the environment. This type of learning requires the learner to manipulate the matter from processing information and to think about the situation or knowledge. Pupils may learn by discovery the logical relationships that exists in the situation.

Piaget advocates (1971) "if we desire ... to form individuals capable of inventive thought and of helping to society of tomorrow to achieve progress, then it is clear that an education which is an active discovery of reality is superior to one that consists merely in providing the young with ready made wills to will with a ready made truths to know with." Piaget lay emphasis on the superiority of self discovery learning (Sinclair, 1973).

Piaget firmly asserted that the basis of all learning is the pupils own activity and advocate that the instructional technique must be closely matched to the developmental levels of the pupils.

Piaget (1971) stated 'present to the subject to be taught in forms assimilable to children of different ages is accordance with their mental structure." This obviously requires a great deal of individual instruction.

3. BRUNER'S THEORY OF LEARNING AND INSTRUCTION

The great developmental psychologist and a cognitive learning theorist Jerome S. Bruner (1915) contributed novel ideas to meaningful instruction. His approach to psychology is electric. His major area concentration were human perception, motivation, learning and thinking. His famous contribution can be seen in his book "The Process of Education (19690), The Concepts of his instructional study revolves mainly on four. They are (10 structure, (2) readiness, (3) intuition and (4) interest. Bruner has advocated the practice ofdiscovery learnig in school curriculum, an idea strongly supported by Piaget, Bruner identified that learning situation should be structured to enable the pupil to learn on its own.

Bruner (1966) fostered that an instructional theory has four main features, they are as follows:

3.1. Structure of knowledge

A theory of instruction must specify the ways in which the knowledge should be structured for the learner. About Bruner's Theory Lewton (1973) says "the relationship between the nature of the knowledge to be learned and the nature of the learner as an individual." Bruner comes forthwith his often repeated controversial statement "any subject can be taught effectively in some intellectually honest form to any child at any stage of development'. Bruner's (1960) this point of view is in contrast to Piagetian view.

The structure of any domain of knowledge maybe characterized in three ways which are interrelated: (10 the mode of representation (2) its economy and (3) its power. Each of this factor will effect the ability of the learner to get a mastery of knowledge. Mode, economy and power vary in relation to ages, to different style of learners and to different subjects.

3.2. Sequence

A theory of instruction must specify the effective sequences in which to present materials to be learned. For Bruner, sequencing is not a step sequencing that behavioural psychologist prefer, sequencing is organization of material by the learners according to their own interests rather than the external imposed structure. There is no one sequence for all learners.

3.3. Reinforcement

An instructional theory should specify the nature and pacing of rewards, moving from extrinsic reward to intrinsic one. Bruner agrees with Skinner on the importance of reinforcement.

Bruner identifies three important sequential stages in the intellectual development of the child. They are enactive, iconic and symbolic. There is closer comparison between the stages of development put forward by Piaget and Bruner. Bruner's enactive stages corresponds to Piaget's sensory motor and pre-operational

stages. Iconic stages corresponds to Piaget's concrete operations and symbolic stages corresponds to formal operations.

Bruner strongly argued that readiness should be taught and that one need not wait for it. In contrast to this Piaget believes that children will have to develop at their own pace and should not be subject to training for high levels of thought.

Discovery Approach in Learning

Bruner recognizes that instruction should make learners self sufficient problem solvers. But it should not be noted that Bruner does not restrict discovery to an act of finding out, something that before was unknown. Discovery includes "all forms of obtainable knowledge for one self by the use of one's own mind" (Bruner and Anglin, 1973).

4. LEARNING THEORY BY GAGNE

Gagne also lays emphasis on the role of instrumental conditioning in learning, like Skinner. But instrumental conditioning for him is largely as a matter of information processing. Piaget and Bruner already pointed out that cognitive growth and learning takes place in fixed sequences. Piaget believes that learning is subordinate to cognitive growth but Gagne advocate 'growth is the result of learning." He defines cognitive development in terms of learning and learning takes place in a hierarchic sequence, from the simple form of learning to highly complex form with each level being pre-requisite for succeeding levels.

Gagne emphasized (1877) effective instruction requires a careful order of learning tasks. For each task learners are carefully prompted or guided in their attempt to respond correctly. This implies that the "need for independent discovery is minimized" (Craig, 1969).

Stones (1990) asserts that "an important aspect of his general thesis is that rote and meaningful learning on the one hand and reception and discovery learning on the other hand, are two distinct dimensions of learning and that the equating of reception learning with rote learning is profoundly mistaken" (p.193).

5. LEARNING CONCEPT OF AUSUBEL

Rote learning involves injecting isolated bits of information into existing structure where as meaningful learning involves relating new materials to the existing structure. "Learning become rote (1) the material to be learned lacks logical meaningful (2) the learner lacks relevant ideas in his cognitive structure (3) individual concerned lacks a meaningful learning set" (Miller et al. 1982).

Ausubel set some criteria for meaningful learning. They are (1) the material to be learned must have potential to be meaningful and (2) the material must be potentially meaningful for the learner (Miller et al.1982).

Ausubel (1963) suggested that no idea, concept or object is meaningful in and of itself, it is meaningful only in relation to a learner. This application of teaching is therefore, that the teacher should present no new material until the learner is with the

appropriate cognitive structure to understand it. Here Ausubel finds Piaget's stages of cognitive development as valuable in evolving suitable instructional method. Ausubel describes that meaningfully learned material are related and anchored to relevant and more inclusive concepts in the existing cognitive structure and the retention span of meaningfully learned materials is usually longer.

6. DIFFERENT DIMENSION OF DISCOVERY LEARNING

The total content of what is to be learned is presented to the learner in its final form in Reception learning, but in Discovery learning the learner is not given the entire content but must find it for himself .Reception implies understanding of already organized information,. Discovery implies the creation of information. In both methods the learner internalizes that which is to be learned. In the case of Discovery learning the learner can only do it when he has obtained the entire content on his own. Ausubel suggests meaningful Reception learning with the teacher supplying information and the learner utilizing of a meaningful style of learning.

Ausubel (1963) observes that Bruner over emphasizes the necessity for the learner to discover knowledge and the direct presentation of already developed knowledge, would be more effective and time saving method, but he concedes that meaningful reception learning must be applied in the formal operational stages described by Piaget.

The most significant contribution to the improvement of classroom instruction are the following: Skinner's Programmed Instruction, Gagne's hierarchical Learning, Piaget's Self Discovery Learning, Bruner's Discovery Learning and Ausubel"s Meaningful Reception Learning.

The question of relative effectiveness of Reception and Discovery Learning appears to have sufficient pedagogical and theoretical importance to justify further attempts to shed new light on instructional process (Cantor, et al. 1982).The recent publications, Brainerd (1978) and Ausubel, Novak and Hanesian (1978)focus on discovery versus reception distinction with attention directed to two clearly different background literature. Brainerd deals with a literature with a focus on Piagetian principle for learning. Ausubel et al. deals with a focus on the contrasting view point of Bruner in support of discovery learning and Ausubel in support of meaningful verbal reception learning.

7. DISCOVERY LEARNING IN HISTORICAL PERSPECTIVES

Discovery learning has appear in the educational scenario down from Socrates and Plato to Bruner and Chomski. Socrates in Plato's Meno, says "do you observe Meno, that I am not teaching the boy anything best only asking him questions. . ." (Johnson, 1966). This method is widely known as Socratic method. Socratic methods "involves a dialogue between the teacher and the student in which the student reaches the desired conclusion through a carefully arranged sequence of questions" (Cooney,

Davis and Henderson, 1975). Socratic and discovery methods are different but there are some significant common elements in two methods.

7.1. Overview of discovery, open discovery, guided-discovery and reception learning

Discovery learning means to "teaching in which the teacher withhold from pupils the concept and principles they are to learn, but gives them the instances, examples and problems from which they can induce these concepts and principles" (Gagne, 1969).

Reception learning refers to "teaching in which pupils are presented with all facts, concepts and principles they are to learn" (Gagne, 1969).

In Guided-discovery learning situation the teacher carefully structures the learning situation so that the students themselves derives the generalization or obtain information from available sources. Guided discovery learning occupies the intermediate position being determined by the amount of guidance offered to the pupil.

In open discovery learning complete absence of outside structure or guidance are necessary but in Guided-discovery the teacher offers the pupils varying amount of structure and guidance. Healthy guidance is the key factor in the effectiveness of guided discovery learning. Judicious guidance enhances the learning potential. As Yelon and Weistein (1977) have pointed out "Guided Discovery Learning retains the thrill of insight without allowing the impulsive youngsters to leap to incorrect answers and faulty generalization.

Open discovery is a lengthy process so learning in the classroom is guided by teacher, where the teacher has various specific objectives. To some extent unguided search is desirable in learning and mastery of heuristics but may be far less desirable in the learning principles, concepts or problem solving. The teacher can deliberately manipulate the extent of guidance and structure to suit the particular learning outcomes. Turney, et al. (1977) suggested that less able and more anxious pupils for instance may profit from high degree of guidance and structure in learning concepts and principles, then more able and less anxious pupils.

Guidance leading to discovery may take the form of a careful sequencing of examples, asking suitable questions, giving suitable verbal directions and instructions. Guidance may be offered according to the ability of pupils and task characteristics.

7.2. Guided Discovery to Learning

Much has been written about adult learners and their learning styles. At the Command Institute great attention is given to how a person deals with ideas and day-to-day situations. How people absorb and dealwith new information is examined through assessing an individual's preferred learning style. Instructional materials are developed for classroom with the following beliefs taken from the Experimental Learning Model:

1. People learn from immediate, here and now experience, as well as from concept and books.

2. People learn differently; this is, according to their preferred learning styles

(we are committed to using these beliefs in the classroom)

During an Orientation session participants deal with the following concerns:

1. How do you characterize the way in which you learn?
2. What do you think is your greatest strength as a learner?
3. What is your greatest weakness as a learner?
4. What kind of learning situations help you learn best?
5. What makes it difficult for you to learn?
6. What can the instructor or other group members do to make this the best learning experience for you?
7. What do you want from this program of study?
8. How do you want to improve your leadership and managerial skills?
9. What changes would you like to make in your learning style?

We realize that people grow and develop in four main areas of their lives as they acquire information, specialize through formal education and/or career training and integrate non-dominant or non-preferred styles and skills:

1. Affectively: developing sensing-feeling skills
2. Symbolically: developing thinking or cognitive skills.

3. Behaviourally: developing acting or behaviour skills

4. Perceptually: developing observing skills

Four learning orientations are applied to participants and help located a person's preferred style of learning:

1. Concrete Experience: An experience-based, involved approach to learning

2. Abstract Conceptualization: a conceptually-based analytic approach to learning.

3. Active experimentation: An action-based, active approach to learning

4. Reflective observation: An observation-based, impartial approach to learning.

Participants enrolled in the supervisory leadership programme expect the classroom to be a place where instructors are facilitators who rely upon the following principles:

1. Creating a climate where there is freedom to discover by doing.

2. Challenging learners to consider what has happened, to analyze it for relevance, do it, and share it with others.

3. Learners are led to analyze data and to form concepts.

4. The value of the learning experience is expressed through ananalysis of the created experience.

5. Where instructors 'step back' and become available as coaches and stabilizers in learning activities.

The Guided Discovery to Learning is truly an approach to learning that is built upon identifying a participant's strengths/weaknesses, as a learner through self-awareness and assessment. Knowing how you learn and finding a 'safe environment' in which learning is challenging and motivating is accomplished in the Supervisory leadership programme. Success is defined as knowing oneself and being prepared to improve one's capacity to learn.

7.3. **Inductive / deductive presentation of Discovery – Reception Learning**

Both discovery and reception learning methods have most often been equated with inductive learning and deductive learning respectively. Inductive learning may be defined as being "based on the presentation to the learner, of a sufficient number of specific examples to enable him to arrive at a definite role or principle or fact" (Good 1959). Deductive learning is a method "that proceeds from rules or generalizations to the examples and subsequently to conclusions or the application of the generalizations" (Good 1959). Inductive learning is characterized by its emphasis on the verbalization of what has been discovered by the learner (Hendrix, 1947). A number of studies (eg. Worthen, 1968; Keeze,1972) have been conducted using inductive-deductive modes of presentation to find the relative effectiveness of discovery and reception as method instruction.

7.4. Egrule and Ruleg Presentation of Discovery-Reception Learning

The important features of Egrule presentation is that "certain number of examples are given with instructions to derive a concept, principle or generalization and this is followed by a statement of concept, principle or generalization by the teacher (Turney, et al. 1977).The essential features of the Ruleg is that :"the concept, principle or generalization is presented first followed by the examples" (Turaney, et al. 1977). Egrule sequence is equated with discovery learning Ruleg with reception learning. Because of the high degree of experimental control that is possible, may research studies (eg. Hermann, 1971;Herman and Jacka, 1977; Hermann and Hirickman 1978) have used Egrule-Ruleg sequence to compare the effects of discovery and reception as methods of instruction.

7.5. Controversial Appraisal of Discovery and Reception Learning

The advent of discovery learning are vocal in their claims for their superiority of discovery learning as a mode of instruction over reception learning. Bruner (1961) suggested that "the most uniquely personal of all he (any one) knows is that which he has discovered for himself," and goes on to point out the following benefits: a greater cognitive potency, intrinsic motivation, memory processing and learning the heuristics. As a result of these claim several new mathematical programmes of post sputnik era included discovery learning approach with the basic assumption that discovery enhances students ability to learn mathematics (NCTM, 1963).

Skinner (1968) criticizes discovery learning as a 'swim' method for instruction. Ausubel (1964), in almost complete contrast to Bruner, asserts that "actually a moment's reflection should convince any one that most of what he really knows and meaningfully understands, consists of insights discovered by others which have been communicated to him in meaningful fashion." Discovery offers little to the learner that cannot be offered equally well by good reception learning (Ausubel 1961) and concludes that the most efficient learning in or out of school occurs by the reception of that material which is presented in near final form (Ausubel, 1964). Thus the different effects of discovery learning versus reception learning have been a controversial issue over the years.

The research evidence are conflicting. Worthen (1968) working with mathematics found that discovery learning favoured retention and transfer. Francis (1975) emphasized that reception learning favoured retention and transfer, but Leith and Trown (1970) found no interaction between teaching and learning outcome.

Keese (1972) employed an experimental design to look at the interaction between two teaching methods (discovery and expository) and two creative levels (high and low) and the effect of interaction on achievement tin mathematics. Prior to investigation, models which described specific teaching behaviour were developed for the discovery and expository methods of instruction. Two intact classes of eighth-grade students were selected as sample for the experiment. There were 31 students in each class. The discovery method was assigned, randomly, to one class and the expository

method to the other. Prior to this students had been classified as of high and low ability using tests of creativity and the four groups resulting had been checked for mathematical comparability. An investigator-made achievement test was administered to all the students at the end of the treatment period. A two dimensional analysis of variance was performed. The results indicated no interaction of teaching methods with the level of creativity and no significant difference in achievement between high and low creative students. But, the results showed that the students taught by discovery excelled the students taught by exposition in their achievement in mathematics. The implication of this for instruction seemed to be that method of teaching is a more important variable in mathematics achievement.

Mason and Frayer (1972) used 228 seventh-grade students and taught them selected simple geometrical concepts in an attempt to investigate the relative effects of inductive and deductive methods on short-and long-term retention and transfer. It was a study of shorter duration. The group that received instruction through inductive method achieved comparatively less and no interaction was found.

The study by Nelson and Frayer (1972) was almost exactly a replication of an earlier investigation by Scott (1970) with 256 sixth-grade students. There was no aptitude-treatment-induction found in this study too.

Olander and Robertson (1973) employed contrasting teaching treatment with fourth-grade students learning selected mathematical principles and relationships. A

total of eight schools, thirteen teachers, and 374 students selected for the study were assigned in an unbiased way to either treatment. 190 pupils were taught for 31 weeks through a discovery approach (D)while another 184 used an expository approach(E). Pupils were given pretests and there was an in-service program for teachers to define and develop the techniques necessary for teaching through the approach assigned. During the instructional period teachers were observed and rated on a scale designed by the investigators. Pupils were tested at the end of the instructional period and again five weeks after the instructional period. The results of this study confirmed Worthen's (1967) findings that the trends favoured expository teachings for immediate recall and discovery teaching on retention and transfer. Further it was found that weaker students seemed to benefit from exposition and stronger students from discovery.

McCreary's (1975) study afforded an opportunity to examine statistically the relative effectiveness of a guided discovery, programmed instruction and lecture-text method of teaching mathematics to eighty one college freshmen. Each student was randomly assigned to one of the three treatment groups which were taught by the investigator. Students' achievement was determined by the grade in the course and by a standardized test. Scores obtained by the students in the three treatment groups were compared at three levels of ability. Analysis of data was done by using a 3 x 3 analysis of variance. Mc Creary found that there was no significant interactions between the three methods and the three levels of ability. There were no significant differences in gain in mathematics achievement among the three groups.

8. STUDIES USING COGNITIVE STYLE VARIABLES

Messick (1976) defined cognitive styles as characteristic "ways of organizing and processing information and experience." Cognitive styles reflecting both differences in abilities and personality (Cronback and Snow, 1977). A cognitive style permeates the totality of behaviour including cognitive, affective and inter-social aspects (Messick,1976). Threadgill (1976), Onyejaka (1982), Horak and Horak (1982) and others conducted experiments to find the interaction between instructional treatments and learners cognitive styles.

The study conducted by Threadgill (1976) was designed to investigate the relationship between analytic-global cognitive style, and didactic and discovery methods of instruction in mathematical concept attainment. Sixty students, thirty analytic and thirty global, were chosen from among the 197 seventh-graders on the basis of their performance on a simplified version of Hidden figures test. They were from each category randomly assigned to either didactic treatment or discovery treatment. The content material that was taught was transversibility of graphs. The didactic method involved the deductive method with rules stated and followed by examples. The discovery method required the students to identify the relevant information and to complete rules with minimum feed back provided. Teaching was completed in two sessions with a test given at the end of the second session. Analysis of covariance using IQ as a covariate revealed that analytic students performed significantly better than global students. There was no significant difference between the relative effects of the

two instructional methods. There was no significant interaction between analytic-global cognitive style and the two treatments of instruction.

The purpose of the study by Onyejakn (1982) was to look for the possible effects of analytic versus non-analytic cognitive styles and the two modes of instruction: discovery versus expository on student's performance on mathematics tasks. Eighty students from two schools formed the total sample. They were selected according to their cognitive styles and were further divided into two treatment groups. The treatment period lasted for seven weeks. Immediately after the treatment initial learning, retention and transfer were measured with appropriate tools. A three week interval was allowed for the retest. A two way analysis of covariance factorial design was used to analyse the data. The ANOVA showed significant f-ratios for the main effect of cognitive style. Analytic boys in the expository group scored significantly higher than non analytic students. The analysis revealed no significant main effect of instructional treatments. Neither of the two methods is significantly more effective for retention and transfer.

The study by Horak and Horak (1982) utilized ATI techniques to investigate how mathematics achievement might be affected by different instructional treatments (inductive versus deductive) and by the cognitive style of locus of control (internal versus external). The subjects of the study were 102 college students enrolled in two classes. The two classes were randomly assigned either to the inductive or to the deductive treatments. The learning material included selected topics from transformation geometry. The inductive treatment followed an example rule paradigm

whereas the deductive treatment followed a rule example paradigm. However, in the inductive treatment rule was not expected to be stated. The same investigator taught both the classes. Treatment lasted for two weeks. The criterion measure consisted of questions differentiated into lower and higher levels of understanding. The internal students achieved higher when taught with the inductive methods on the lower level items. The external students achieved higher, on the same items, when taught with the deductive method.

9. INTERACTION WITH INTELLIGENCE IN LEARNING

The term intelligence is frequently used in educational field. Wechsler (1958) defines intelligence as "the global and aggregate capacity of an individual to think rationally, to act purposeful and to deal effectively with his environment." Hebb (1986) suggested intelligence of two kinds: Intelligence A and Intelligence B. "A" is "the innate potential for cognitive growth", and "B" is "a general or average ability to perceive, to learn, to solve problems to think, and to adapt" (Hebb, 1966,p.332).

Intelligence of the learner is related to successful performance of school task. Ausubel et al. (1978) report that the correlation between academic achievement in various school subjects and measured intelligence over a large number of studies is about 0.5 Research studies (i.e. Anastasi, et al. 1970) indicate that intelligence is one of the important learner variable interacting with instructional methods.

SURVEY OF EMPIRICAL STUDIES ON LEARNING

Different attempts have been made to empirically investigate the relative effect of discovery learning and reception learning. The studies designed to compare these methods of instruction have typically made use of one or more of the following different criteria (1) speed of learning (2) retention of learning (3) transfer of learning (4) creativity (5) critical thinking and (6) motivation to learn. Therefore, it should be possible to evaluate the methods without relying solely on opinion, conjecture or theoretical speculation.

Discovery method is not merely a method of learning but it entails several methods. It includes to varying degrees, combination of (1) inductive method, (2) the non-verbal awareness method (3) the incidental method (4) the deductive method and (5) the variation method (Bittinger, 1968).

In the various types of discovery learning methods different terms like open discovery, guided discovery and directed discovery etc. are used. Here the research report does not always differentiate between the variations of discovery learning and reception learning method. This study is restricted to those study concerned with classroom instruction and effect on achievement.

PIONEERING STUDIES ON DISCOVERY METHOD

Winch (1913) conducted an experiment to compare the effectiveness of discovery and reception methods of instruction. In this study better retention was

obtained from reception learning and better transfer was obtained from inductive method. Winch's study was the first experimental study on discovery learning.

Evert and Lambert (1932) conducted discovery method in their experiment and compared four instructional methods which varied in the amount of teacher guidance. The subjects were required to more disk of different size among three circles until a certain arrangement resulted. A general procedure could be used in the solution of the problem. The subjects were divided into four groups. The first group was given the procedural rules only. The second group was given procedural rules, and was asked to find one general procedure which was appropriate for all the problems, the third group was given the rule and the general procedure and the demonstration of the procedure. The performance was measured in terms of time taken to reach the solution and the number of moves made. The best performance score were obtained on both of the criteria by the third group which was given procedural rules and general procedure, the worst by the first group which was given the procedural rules only, the fourth and the second group falling between the two in that order. The investigators concluded that the more complete the verbal instructions the less manipulation necessary to solve the problem.

Mr Connel (19234) used authoritative and discovery methods to teach addition and subtraction facts to second grade students. The group taught by the authoritative method emphasized the rote learning of rules and drills where the discovery method stressed the meaningful perception of relationship and derivations of generalization. The

study was conducted in four hundred students per treatment and the instruction continued for seven months.

Mc Connell found the discovery method superior on transfer tests and the authoritative method superior on speed retention tests. This study reveals that the discovery method benefit of concrete knowledge in students.

Research conducted by Thieb (1935) and Sevenson (1949) which were same study of Mc Conell (1934) also compared the 'drill' and 'generalisation' method of teaching, number of facts to the pupils of second grade. Another famous investigation by Anderson (1949) was also conducted in the same way but used fourth grade pupils. All those studies, indicated that instruction, which stressed on understanding of relationships and provided practice in arriving at generalisation was superior to instruction which provided rote learning of rules and drill.

Out of these four studies 'Generalisation' method was superior on transfer tests where the rote learning method was found to be superior on tests calling for immediate and automatic recall of knowledge.

Fawcett (1938) in an experimental study compared the relative effectiveness of two instructional methods (discovery and conventional) for teaching Geometry to two groups of ninth, tenth and eleventh grade students. One group was taught by discovery method and another group by conventional method. He proved that conventional method did not improve the reflective thinking ability of the students, but the discovery

method enhanced the reflective thinking ability of the students and this improvement was general in character and transferable to variety of situations.

Hendrix (1947) compared three teaching methods in presenting a mathematical generalisation to three small groups of high school and college students. The first method expected the teacher to state principle, then give illustration to the principle, then restate the principle and then ask the students to apply to examples. In the second method the teacher was expected to give a series of problems with which they were expected to discover the principles independently. The student was not expected to verbalise the principles recognised. In the third method the teacher had to give the student a series of problems with which they were not only expected to discover independently the principle but also verbalise it before they were dismissed. A transfer test was given two week after the presentation of the method. Hendrix investigated that the student who discovered the principle independently and left it unverbalised (second group) exceeded in transfer than the third group who first discovered the principle and then verbalised it. Students of both the discovery groups exceeded in transfer, those who had the concept presenter to them and exemplified (first group). Schaff (1954) conducted a similar study and indicated that discovery approach was exceedingly effective in increasing mathematical understanding. Beeker and McLead (1967) observed that the type of transfer tested was limited in scope since only one principle was presented and there was no trace of statistical control.

Nornam (1955) reported similar results for discovery method over an expository method in terms of retention and transfer. Fullerton (1955) investigated the differential aspects of inductive and deductive methods of teaching multiplication facts to two groups of third grade students. He found that the group taught by inductive method was superior taught by deductive method in terms of initial learning and in terms of subsequent retention and transfer.

Kersh (1958) compared the relative effect of three methods of teaching. He divided the college students into three groups—Open Discovery, Guided Discovery and Expository Method. It was found that no help treatment group was superior to the other two groups on immediate achievement test and on a retest given four weeks after the learning sessions.

Larson (1963) based on Kersh's empirical study found that the least part of the superiority in retention of Kersh's discovery group was attributable to the Zeigarnik effect a tendency to remember more complicated tasks.

Seandura (1962) compared the achievement in problem solving of students taught by expository and discovery method. Delayed and immediate tests of retention were administered at the end of the treatment and after a lapse of time respectively. The expository treatment group scored higher, but not significantly on both the tests.

Ballew (1965) investigated the effect of discovery learning on achievement in Mathematics and on critical thinking ability on Algebra of high school students.

Students of three classes were taken as sample as experimental class and control class. Throughout the experimental period of eighteen weeks, the same teacher taught all the three classes. The findings were, no significance difference among the three classes. Discovery learning group has the power of critical thinking ability.

Fleckman (1966) conducted a study to compare convention method with discovery method. In fifth and sixth grade students were taught by two treatment. He found that discovery learning produced significantly better concept learning, but no significant difference between discovery and conventional method in respect of skill learning.

Howitz (1965) envisaged a study which was similar to Ballew (1965) with some deviations with regard to the selection of samples material to be taught and the criterion tests. Howitz (1965) attempted to compare the differential effect of a guided discovery and an expository treatments in terms of pupil achievement in Mathematics. Twelve class of ninth grade general mathematics students from four city schools participated in the study. Six teachers were involved in the study. Treatment were randomly assigned to both in experimental and control classes. The sample consisted of 290 students with 143 experimental group (guided discovery treatment group) and 147 students in the control group (conventional treatment group). At the end of one year treatment two post tests were administered. Howitz found no significant difference in achievement of the two groups but there was a significant difference in favour of discovery in achievement

as measured by General Mathematics Achievement Test and hence the evidence was inconclusive.

Wardelin's (1966) conducted a study to examine the relative effectiveness of external direction (reception learning) and individual discovery (guided discovery) in learning of mathematical principles using randomly selected sample of student of six and seventh grade classes (N = 58+63). Werdelin found that guided discovery group was comparatively better as to other group in retention and transfer.

Price (1967) in a study used three classes of tenth grade low achievements in general mathematics of large city school to examine the effects of two discovery method on the achievement and critical thinking abilities of the students so taught. All the three classes were taught by the same teacher, the same content. The control group were taught traditional approach, the experimental group were taught by deductive procedure to promote discovery and the third group were taught guided in applying the generalization to practical problems (the transfer group). The final test administered in 18 students in control class, 28 in discovery class and 23 in transfer class. Price found that the discovery and transfer classes were significantly better than the control class. Price concluded that discovery approach had in itself no significant transfer gathering capacity.

Shoefee (1970) conducted an experiment to compare the changes of attitude and achievement in modern mathematics by employing guided discovery method and

expository method. The sample consisted of 82 students of elementary schools. No efforts were made to grouping. 39 students in guided discovery group and 43 students in expository group. The investigator taught both the groups and found that both were effective in producing gain in achievement.

Keese (1972) employed an experimental design to look at the interaction between two teaching methods (discovery and expository) and two creative levels (high and low) and the effect of interaction on achievement in Mathematics. Prior to investigator, models which described specific teaching behaviour were developed for the discovery and expository methods of instruction. Two intact classes of eighth-grade students were selected as sample for the experiment. There were 31 students in each class. The discovery method was assigned, randomly, to one class and the expository method to the other. Prior to this students had been classified as of high and low ability using tests of creativity and the four groups resulting had been checked for mathematical comparability. An investigator made Achievement Test was administered to all the students at the end of the treatment period. A two dimensional analysise of variance was performed. The results indicated no interaction of teaching methods with the levelof creativity and no significant difference in achievement between high and low creative students. But, the results showed that the students taught by discovery excelled the students taught by exposition in their achievement in mathematics. The implication of this for instruction seemed to be that method of teaching is a more important variable in mathematics achievement.

Nelson and Frayer (1972) used 228 seventh grade students and taught them selected simple geometrical concepts in an attempt to investigate the relative effects of inductive and deductive methods on short and long term retention and transfer. It was a study of shorter duration. The group that received instruction through inductive method achieved comparatively less and no introduction was found.

The study by Nelson and Frayer (1972) was almost exactly a replication of an earlier investigation by Scott (1970) with 256 sixth grade students. There was no aptitude-treatment-interaction found in this study too.

Olander and Robertson (1973) employed contrasting teaching treatments with fourth grade students learning selected mathematical principles and relationships. A total of eight schools, thirteen teachers, and 374 students selected for the study were assigned in an unbiased way to either treatment. 190 pupils were taught for 31 weeks through a discovery approach(D) while another 184 used an expository approach (E). Pupils were given pretests and there was an in-service programme for teachers to define and develop the techniques necessary for teaching through the approach assigned. During the instructional period teachers were observed and rated on a scale designed by the investigator. Pupils were tested at the end of the instructional period and again five weeks after the instructional period. The results of this study confirmed Worthen's (1967) findings that the trends favoured expository teachings for immediate recall and discovery teaching on retention and transfer. Further it was found that weaker students seemed to benefit from exposition and stronger students from discovery.

Mc Creary's (1975) study afforded an opportunity to examine statistically the relative effectiveness of a guided discovery, programmed instruction and lecture-text method of teaching mathematics to eighty one college freshmen. Each student was randomly assigned to one of the three treatment groups which were taught by the investigator. Students' achievement was determined by the grade in the course and by a standardized test. Scores obtained by the students in the three treatment groups were compared at three levels of ability. Analysis of data was done by using a 3x3 analysis of variance. McCreary found that there was no significant interactions between the three methods and the three levels of ability. There were no significant differences in gain in mathematics achievement among the three groups.

Students using Cognitive Style Variables

Messick (1976) defined cognitive styles as characteristic 'ways of organizing and processing information and experience." Cognitive styles reflect both differences in abilities and personality (Cronbach and Snow, 1977). A cognitive style permeates the totality of behaviour including cognitive, affective and intersocial aspects (Messick, 1976). Threadgill (1976), Onyejaka (1982) Horak and Horak (1982) and others conducted experiments tofind the interaction between instructional treatments and learners cognitive styles.

The study conducted by Threadgill (1976) was designed to investigate the realtionshiip between analytic-global cognitive style, and didactic and discovery

methods of instruction in mathematical concept attainment. Sixty students, thirty analytic and thirty global, were chosen from among the 197 seventh graders on the basis of their performance on a simplified version of Hidden Figures Test. They were from each category randomly assigned to either didactic treatment or discovery treatment. The content material that was taught was transversibility of graphs. The didactic method involved the deductive method with rules stated and followed by examples. The discovery method required the students to identify the relevant information and to complete rules with minimum feed back provided. Teaching was completed in two sessions with a test given at the end of the second session. Analysis of covariance using IQ as a covariate revealed that analytic students performed significantly better than global students. There was no significant difference between the relative effects of the two instructional methods. There was no significant interaction between analytic global cognitive style and the two treatments of instruction.

The purpose of the study by Onyejaka (1982) was to look for the possible effects of analytic versus non-analytic cognitive styles and the two modes of instruction: discovery versus expository on student's performance on mathematics tasks. Eighty students from two schools formed the total sample. They were selected according to their cognitive styles and were further divided into two treatment groups. The treatment period lasted for seven weeks. Immediately after the treatment initial learning, retention and transfer were measured with appropriate tools. A three week interval was allowed for the retest. A two way analysis of covariance factorial design was used to analyse the

data. The ANOVA showed significant F-ratios for the main effect of cognitive style. Analytic boys in the expository group scored significantly higher than non-analytical students. The analysis revealed no significant main effect of instructional treatments. Neither of the two methods is significantly more effective for retention and transfer.

The study by Horak and Horak (1982) utilised ATI techniques to investigate how mathematics achievement might be affected by different instructional treatments (inductive versus deductive) and by the cognitive style of locus of control (internal versus external). The subject of the study were 102 college students enrolled in two classes. The two classes were randomly assigned either to the inductive or to the deductive treatments. The learning material included selected topics from transformation geometry. The learning material included selected topics from transformation geometry. The inductive treatment followed an example rule paradigm whereas the deductive treatment followed a rule example paradigm. However, in the inductive treatment rule was not expected to be stated. The same investigator taught both the classes. Treatment lasted for two weeks. The criterion measure consisted of questions differentiated into lower and higher levels of understanding. The internal students achieved higher when taught with the inductive methods on the lower level items. The external students achieved higher, on the same items, when taught with the deductive method.

Beena (1998) prepared a discovery learning model on classification of plants and tested its effectiveness for teaching biology. The analysis of the data collected with the

sample of 100 students using experimental teaching achievement test, judgement schedule, questionnaire and socio economic status reveals that discovery learning model is superior to lecture method for teaching biology at primary level.

Jibby George (2002) conducted a study on discovery learning model with lecture method and computer assisted model in the sample of 370 pupils of secondary schools. This experiment proves that discovery learning model is superior than other two models in learning geometry.

Discovery learning method is not practiced in social science subjects. Studies about guided discovery learning models are not conducted in geography so far. Hence the investigator tried to evolve guided discovery learning method in geography teaching of secondary schools of Kerala in his study.

METHODOLOGY

Padmanabhan M. "Effectiveness in geography achievement under guided-discovery learning and reception learning conditions" Thesis. Department of Adult & Continuing Education and Extension services, University of Calicut, 2002

CHAPTER III

METHODOLOGY

METHODOLOGY

The present study is an attempt to compare the effectiveness of Guided-discovery learning and reception learning in Geography achievement. For this, experimental study involves the application of relevant procedures and statistical processing. The details of the sample selected, tools employed and the statistical techniques adopted are described in this chapter under the following.

I. Design of the study

II. Variable of the study

III. Hypothesis

IV. Lesson plan for experimental treatment

V. Selection of sample

VI. Description of tools

VII. Treatment of data and techniques of analysis

I. Design of the study

The investigator mainly focused to measure the effectiveness of the Guided-discovery and reception learning with traditional learning method. This study evolves two experimental groups and one control group. The study is an experimental one.

Experimental design varies in complexity, treatment and controlling in the nature of investigation, in the nature of the problem, in the nature of data, in the facilities for carrying out the investigation and in the competence of the investigator

Since experimental design is the most exacting and difficult one of all the methods used in educational research, it is judged by the degree of testing by which they eliminate or minimise treats to experimental validity.

The following are the main experimental designs generally used:

1. Pre-experimental design – It provides either no control group or no way of equating the groups, since it is least effective.
2. True experimental design – This employs randomisation of samples for controlling equivalent groups and exposure to treatment.
3. Quasi-experimental design – This provides a less satisfactory degree of control which is used when randomisation is not possible.

Even though there are various combination of experimental techniques, the investigator selected, post test only design, of equivalent groups. Hence it is the most effective and it minimises the threats to experimental validity.

The present experiment was conducted with three equivalent group and the relative effects of the three different treatments were compared on these groups which were totally equated in all aspects of experiments.

Identification of groups

The procedures and functions employed for selecting and equating the experimental and control groups are described as follows. Instead of using matched pair techniques the groups were matched with respect to pre-requisite test in Geography, verbal test of Intelligence and socio-economic status before treatment procedure.

The investigator was a former teacher of the selected school and the close relationship with students and staff has been utilised in employing test in 300 students of the IX standards. After considering their achievement in pre-requisite test in Geography, socio-economics status and scores obtained in verbal test of intelligence,. 3 equal groups with equal number of either sex were selected for experiment. Three groups were highly homogenous in number sex, social status, intelligence, and pre-requisite performance in Geography.

The experiment was employed in three equivalent groups and the relative effects of the three different treatments were compared on these three groups which were equated in all aspects.

Identification of Groups

The procedures adopted for selecting and equating the experimental and control groups are described as follows:

Matched pair techniques is not used. The groups were matched with respect to pre-requisite test in Geography, Socio economic status and verbal test of intelligence. As the investigator was a former teacher in the school and he had hearty relationship with the teachers and students it became useful for the investigator to get 300 students of IX standard allotted for employing pre-requisite test in Geography, SES and intelligence test. . With respect to their performance in pre-requisite test, SES and intelligence test score pupils were divided in to three groups of 40 (20 boys + 20 girls). Thus 120 students were selected having homogeneity in all aspects.

Testing the homogeneity

The task of the investigator was to equate the varying groups to homogeneity group by some reliable measuring techniques.

Thus the groups were tested for homogeneity with respect to pre-requisite test in Geography, socio economic status scale and verbal test of intelligence. All these test were made for controlling equated groups. The scores of the tests were analysed and the results established the homogeneity of the experimental and control groups (the result of the analysis of scores are detailed in Chapter IV).

During the treatment stage the investigator himself taught the same topic of Geography to 3 groups with different methods and techniques. Experimental group I was taught under Guided-discovery learning method and experimental group II was

taught under Reception learning method and the control group was taught by the traditional method of teaching (Lecture method).

The class room climate like day, time, length and other factors were equated. At the end of the treatment of twenty lessons in each group a final achievement test in Geography was administered as a post test, constructed and standardised by the investigator. The difference between mean scores were subjected to a test of statistical significance. The result of the analysis is separately given in the IV chapter.

Table 1

DESIGN OF THE STUDY

		Variables	Selection of school	Selection of Sample	Method/ group	Mode of testing	Control of factors	Post-test
1		Independent variables						
	i)	Guided discovery learning method	A single aided management school (Poilkave H.S. Edakkulam Koyilandy)	120 pupils (equal numbers from either sex) are randomly assigned to three groups. The groups were tested for homogeneity with respect to pre-requisite test in Geography, SES and intelligence	Experimental Group I (Ex.1) Experimental Group II (Ex. 2) Control Group (C1)	Guided discovery learning method Reception learning method Traditional lecture method	All factors regarding classroom climate like time day, duration of hours, Sex SES intelligence teacher variable, pre-requisite in geography	Achievement test in geography Achievement tet in Geography Achievement Test in Geography
	ii)	Reception learning method						
	iii)	Traditional Learning method						
2		Dependent Variable						
	i)	Achievement in Geography						
3		Control variables						
	i)	Pre-requisite in Geography						
	ii)	Socio-economic status						
	iii)	Intelligence						

II VARIABLES OF THE STUDY

"Variables are the conditions or characteristics that the experimenter manipulates, controls or observes."

1) Independent Variable

The independent variables are the conditions or characteristics that the experimenter manipulates or controls in his attempt to ascertain their relationship to observed phenomena.

The independent variables of the study are

1) Guided-discovery learning method.

2) Reception learning method

3) Traditional learning method

2) Dependent Variables

"The dependent variables are the conditions or characteristics that appears, disappear or change as the experimenter introduces removes or changes independent variables."

The present study is "Effectiveness in Geography Achievement under Guided-discovery learning and Reception learning conditions." The criteria of effectiveness in Geography achievement was measured by scores obtained through an achievement test

in Geography which was constructed and standardized by the investigator. Hence "achievement of pupils in Geography" is the only one dependent variable.

3) Control Variables

The following variables were controlled for the experimental period to get homogeneity and equated groups.

(i) pre-requisite in Geography

(ii) Socio-economic status

(iii) Intelligence

The age of the students was almost the same and the standard in which they were studying was the same and sex and classroom climate were also controlled carefully by the investigator.

III. HYPOTHESES

1. There will be significant difference between pupils taught under Guided discovery learning condition and those taught under reception learning condition in their mean achievement in Geography.

2. There will be significant difference between pupils taught under guided-discovery learning condition and those taught under Traditional learning condition in their mean achievement in Geography.

3. There will be significant difference between pupils taught under reception learning condition and those taught under traditional learning condition in their mean achievement in Geography.

4. If Geography achievement in three cognitive levels namely knowledge, understanding and application is determined and the respective pairs of groups (as mentioned above) compared, there will be significant difference in each of the three cognitive levels and between sex-wise comparison of three cognitive levels.

IV. LESSON PLAN FOR EXPERIMENTAL TREATMENT

Three chapters from the Geography text book of Standard IX, Kerala syllabus, were selected for the present experiment. They were: Lithosphere, Hydrosphere, Biosphere.

The major curricular statements in tune with cognitive objects of the lessons were identified with due description. The detailed lesson plan structured with new approaches is given in the Appendix I (a) & (b)

V. SELECTION OF SAMPLE

The present study comes under the experimental design. The investigator selected the samples from a single school, Aided Poilkave High School, Edakkulam, Koyilandi in Kozhikode district. This school is near to Koyilandy Municipality but situated in a coastal Grama panchayat namely Chengottukave. Hence the condition in

Kozhikode district Koyilandy Municipality and Chengottukave Grama panchayat and problem, environment and curriculum with regard to secondary schools are same.

Another reason for selection of Poilkave High School is the investigator's personal acquaintance with the school as a former teacher and it is and very near to his residence. The staff and students gave incessant co-operation and facilities for the experiment even though it took a minimum of four months duration (time). From the whole population the investigator selected pupils of IX standard for the experiment to be conducted.

Since standard VIIIth is the beginning of High school classes and standard Xth is busy terminal class, the Xth standard pupils were selected as the ideal target group for the present study.

Since the investigator was a colleague and was a alumna of the school all teaching staff extended their sincere co-operation in all stages of experiment.

The study has been structured in three different stages. The first stage is the formation of homogeneity group or controlling stage, second is experimental stage or treatment stage and the final stage is evaluation or testing stage.

By employing pre-requisite test in Geography in tune with previous lessons, viz. our natural environment, atmosphere, water in the atmosphere and some general concept about Geography and the score obtained through SES data sheet and the score obtained by verbal test of intelligence the investigator selected 120 students of IX

standard out of 300 students, making them three groups having 20 girls and 20 boys in each group. Equal abilities, socio economic background and equal sex wise ratio are taken for each group. Thus the investigator controlled the homogeneity of the group in first stage. The detailed description of the above tools are given separately. The results were analysed and proved that 3 groups were almost same in pre-requisite in Geography, SES and intelligence. Thus it was established that all the three groups were homogenous with respect to pre-requisite in Geography, SES and Intelligence.

VI. EXPERIMENTAL PROCEDURES

The study was conducted in three different phases.

(i) Equating the groups

The first stage was intended to equate the experimental and control groups on the basis of scores obtained in the pre-requisite test in geography, SES and intelligence test. Pre-requisite test in geography was prepared and standardised by the investigator and verbal test of intelligence, and SES data sheet were adopted from Kerala University. The details of the tools are included in the following pages.

(ii) Treatment

This stage was the most rigorous and exact experimental one. This study was conducted in the second term of the academic year 2000-2001 (in the working days of August 2000 to December 2000). Twenty lesson plans were structured and developed

in tune with Guided Discovery Learning, Reception Learning and lecture methods,. covering the same area of content of geography viz. Lithosphere, Hydrosphere and Biosphere.

Experimental group I was conditioned with lesson plans in guided-discovery learning method. Experimental group II was conditioned with lesson plans in Reception learning method and control group was conditioned with lesson plans in traditional learning method. Specimen copies of Guided Discovery Learning and Reception Learning lesson plan are given in the Appendix I (a), I (b).

The class room climate like day, time, teacher variable was strictly adhered. Classes were treated regularly on the same day without changing morning/afternoon difference. The investigator himself employed the treatment in three groups for 45 minutes period each.

(iii) Post-testing

A standardised achievement test in Geography was administered to the 3 groups after the completion of twenty lessons. The test was prepared and standardised by the investigator himself. The test consists of 50 objective type questions covering the topics of selected chapters in Geography text book of ninth standard viz. Lithosphere, Hydrosphere and Biosphere.

The Achievement test was administered by the investigator with the supervision of Headmaster and Geography teachers of the school. The students of two

Experimental groups and one Control group were arranged for the test in the school hall only two being seated on a bench. After necessary instructions were given to them through schoolmic supervising teachers gave answer sheets and questions to students. Maximum one hour for 50 item objective type questions was allotted and then collected the answer sheets.

The investigator analysed the score for statistical treatment. A detailed analysis of test score is given in the IV chapter.

The details about the experimental procedure is given in table 3.2.

Table 2

Details of the Procedure of the Study

Sl. No.	Method	Group	Class	Pre-treatment stage	Treatment stage	Post-treatment stage	No.of pupils		No.of periods	Name of topics
							Boys	Girls		
1	Guided-Discovery Learning	G1 (Experimental Group 1)	IX	Pre-requisite test in Geography, Intelligence Test, Socio-Economic Status	Teaching through Guided discovery learning method	Testing for Achievement in Geography	20	20	20	Lithosphere Hydrosphere Biosphere
2	Reception Learning	G2 (Experimental Group 2)	IX	Pre-requisite test in Geography, Intelligence test, Socio Economic Status	Teaching through Reception learning method	Testing for Achievement in Geography	20	20	20	Lithosphere Hydrosphere Biosphere
3	Traditiona l Learning	G3 (Control Group)	IX	Pre-requisite in Geography, Intelligence test , Socio economic status	Teaching through traditional learning method	Testing for achievement in Geography	20	20	20	Lithosphere Hydrosphere Biosphere

6. TOOLS FOR DATA COLLECTION

To select apt tools for collection of data was the prime task of the investigator. Only standardised tools were used in the present study. The details of tools employed for the study are presented in the following table 3.3.

Table 3.3

The details of the tools employed

.	Variable measured	Name of the tool	Number of items	Time limit
1.	Pre-requisite in Geography	Pre-requisite Test in Geography	25	40 mts
2	Intelligence	Verbal Test of Intelligence	100	1 hour
3	SES	Socio-Economic Status Scale	6	No limit
4		Lesson plans (GDL) (RL) (TL)	 20 20 20	 45minutes each " "
5	Achievement in Geography	Achievement Test in Geography	50	1 hour

DESCRIPTION OF TOOLS

1. Pre-requisite test in Geography

This tool was constructed and standardised by the investigator for controlling, equating and maintaining the homogeneity of the groups by measuring the

understanding of the previous lessons in Geography. Hence this test was prepared by covering the previous lessons of the IX standard Geography text book, viz. (I) our natural environment, (ii) atmosphere, (iii) water in the atmosphere and some general information about Geography. This test consisted of 25 objective type questions carrying a maximum of 25 marks. The time limit was 40 minutes. Weightage to different levels and content areas along with objectives are detailed below.

Table 3.4

Weightage to Content

Sl.No.	Content	Marks	Percentage
1	Our Natural Environment	7	28%
2	The Atmosphere	7	28%
3	Water in the Atmosphere	7	28#
4	General geography	4	16%
	Total	25	100%

Table 3.5

Weightage to Objectives

Sl.No.	Objectives	Marks	Percentage
1	Knowledge	8	32%
2	Understanding	12	48%
3	Application	5	20%
	Total	25	100%

Table 3.6

Weightage to form of questions

Sl.No.	All objective type questions	Marks	Percentage
1	Selecting from Distracters	19	76%
2	Filling the Blanks	3	12%
3	Matching types	3	12%
	Total	25	100%

Table 3.7

Weightage to Difficulty level

Sl.No.	Difficulty level	Marks	Percentage
1	Easy	5	206%
2	Average	15	60%
3	Difficult	5	20%
	Total	25	100%

Table 3.8

BLUE PRINT

Sl. No.	Objectives / Form of questions / Content	Knowl-edge	Under – standing	Appli-cation	Total
1	Our natural environment	2	3	1	6
2	Atmosphere	2	3	2	7
3	Water in the atmosphere	2	3	1	6
4	General Geography	2	3	1	6
	Total items	8	12	5	25
	Total score	8	12	5	25

All questions carry equal marks: (one mark each) Total Items: 25

Pre-requisite test was prepared by the investigator by employing draft test of 40 items of objective type questions to 370 students of IX standard, Thiruvangore High School, Thiruvangore, G.V.H.S.S. Boys, Koyilandy and G.G.H.S.S. Koyilandy. Test-retest method was adopted for try out. After test construction analyses, 25 item pre-requisite test in Geography was constructed and employed in 370 students of Poilkave High School to control homogeneity in groups.

Details regarding the validity, reliability, difficulty index, Discriminative Power .etc. are given below:

Table 3.9

Table showing the validity of the prerequisite test in Geography

Sl.No.	X	Y	XY	X^2	Y^2
1	23	22	506	529	484
2	18	20	360	324	400
3	15	18	270	225	324
4	14	19	266	196	361
5	12	14	168	144	196
6	16	19	304	256	361
7	13	15	195	169	225
8	11	15	165	121	225
9	14	16	224	196	256

Sl.No.	X	Y	XY	X^2	Y^2
10	10	15	150	100	225
11	17	17	289	289	289
12	15	19	285	225	361
13	16	19	304	256	361
14	14	18	252	196	324
15	15	17	255	225	289
16	21	19	399	441	361
17	17	19	323	289	361
18	10	17	170	100	289
19	13	16	208	169	256
20	7	14	98	49	196
21	21	14	294	441	196
22	20	20	400	400	400
23	24	17	408	576	289
24	8	16	128	64	256
25	12	10	120	144	100
26	18	17	306	324	289
27	13	12	156	169	144
28	14	15	210	196	225
29	6	14	84	36	196
30	20	16	320	400	256
31	15	17	255	225	289

Sl.No.	X	Y	XY	X^2	Y^2
32	12	8	96	144	64
33	12	16	192	144	256
34	18	17	306	324	289
35	11	9	99	121	81
36	16	16	256	256	256
37	7	8	56	49	64
38	15	14	210	225	196
39	20	18	360	400	324
40	16	17	272	256	289
41	8	7	56	64	49
42	21	18	378	441	324
43	12	15	180	144	225
44	16	14	224	256	196
45	16	17	272	256	289
46	17	20	340	289	400
47	10	8	80	100	64
48	23	21	483	529	441
49	21	19	399	441	361
50	25	22	550	625	484
	758	800	12681	12538	13436

$$\frac{50 \times 12681 - 758 \times 800}{\sqrt{50 \times 12538 - (758)^2 \times 50 \times 13436 - (800)^2}}$$

$$\frac{634050 - 606400}{\sqrt{(626900 - 574564) \times (671800 - 64000)}}$$

$$= \frac{27650}{\sqrt{52336 \times 31800}}$$

$$= \frac{= 27650}{\sqrt{228.77 \times 178.3}}$$

$$\frac{27650}{40789.8}$$

$$r = 0.677$$

The correlation coefficient was found to be 0.677. It indicates that the test is valid for the purpose of the study.

Answer sheets were valued and the results were subjected to a test of statistical significance (ie. analysis of variance). The result shows that there is no significant difference between three groups with respect to their pre-requisite test scores. Thus as far as prerequisite test in Geography is concerned the three groups are homogeneous.

Table 3.10

Table showing the Data used for computing the test re-test reliability of the pre requisite test in Geography

Sl.No.	X	Y	XY	X^2	Y^2
1	23	24	552	529	576
2	18	19	342	324	361
3	15	16	240	225	256
4	14	15	210	196	225
5	12	12	144	144	144
6	16	18	288	256	324
7	13	13	169	169	169
8	11	11	1231	121	121
9	14	14	196	196	196
10	10	9	90	100	81
11	17	17	289	289	289
12	15	15	225	225	225
13	16	16	256	256	256
14	14	14	196	196	196
15	15	14	210	225	196
16	21	21	441	441	441
17	17	17	289	289	289
18	10	11	110	100	121
19	13	163	169	169	169

Sl.No.	X	Y	XY	X^2	Y^2
20	7	7	49	49	49
21	21	20	420	441	400
22	20	20	400	400	400
23	24	24	576	576	576
24	8	8	64	64	64
25	12	12	144	144	144
26	13	13	169	169	169
27	14	15	210	196	225
28	6	6	36	36	36
29	20	20	400	400	400
30	15	16	240	225	256
31	12	12	144	144	144
32	12	11	132	144	121
33	18	18	324	324	324
34	11	11	121	121	121
35	16	16	256	256	256
36	7	7	49	49	49
37	15	15	225	225	225
38	20	20	400	400	400
39	16	16	2566	256	256
40	8	8	64	64	64
41	21	21	441	441	441

Sl.No.	X	Y	XY	X^2	Y^2
42	12	12	144	144	144
43	16	17	172	256	289
44	16	15	240	256	225
45	17	17	289	289	289
46	10	9	90	100	81
47	23	24	552	529	571
48	21	21	441	441	441
49	25	24	600	625	576
50	25	24	400	625	576
	765	768	13081	13685	12952

Table 3.11

Table showing the test retest reliability of pre requisite test in Geography

Sl.No.	X	Y	XY	X^2	Y^2
1	23	24	552	529	576
2	18	19	342	324	361
3	15	16	240	225	256
4	14	15	210	196	225
5	12	12	144	144	144
6	16	17	272	256	289
7	13	13	169	169	169
8	11	11	121	121	121

Sl.No.	X	Y	XY	X^2	Y^2
9	14	14	196	196	196
10	10	9	90	100	81
11	17	17	289	289	289
12	15	15	225	225	225
13	16	16	256	256	256
14	14	14	196	196	196
15	15	15	225	225	225
16	21	21	441	441	441
17	17	17	289	289	289
18	10	11	110	100	121
19	13	13	169	169	169
20	7	7	49	49	49
21	21	22	462	441	484
22	20	20	400	400	400
23	24	24	576	576	576
24	8	8	64	64	64
25	12	12	144	144	144
26	18	18	324	324	324
27	13	13	169	169	169
28	14	15	210	196	225
29	6	6	36	36	36
30	20	20	400	400	400

Sl.No.	X	Y	XY	X^2	Y^2
31	15	16	240	225	256
32	12	12	144	144	144
33	12	11	132	144	121
34	18	18	324	324	324
35	11	11	121	121	121
36	16	16	256	256	256
37	7	7	49	49	49
38	15	15	225	225	225
39	20	20	400	400	400
40	16	16	256	256	256
41	8	8	64	64	64
42	21	21	441	441	441
43	12	12	144	144	144
44	16	17	274	256	289
45	16	15	240	256	225
46	17	17	289	289	289
47	10	9	90	100	81
48	23	24	552	529	576
49	21	21	441	441	441
50	25	24	600	625	576
	758	763	12876	12538	12778

Table 3.12

Table showing item analysis of the prerequisite test in Geography

Sl. No.	No.of correct response in the Upper group	No.of correct response in the Lower group	Item difficulty	Item discrimination	Selected/ Rejected
1	54	32	0.43	0.22	R
2	869	46	0.66	0.4	S
3	91	35	0.63	0.56	S
4	83	36	0.6	0.47	S
5	85	45	0.65	0.4	S
6	14	9	0.12	0.05	R
7	70	32	0.51	0.38	S
8	85	28	0.56	0.57	S
9	68	37	0.53	0.31	S
10	80	37	0.57	0.45	S
11	34	25	0.3	0.09	R
12	24	19	0.22	0.05	R
13	55	19	0.27	0.16	R
14	89	51	0.69	0.36	S
15	88	49	0.68	0.39	S
16	91	30	0.06	0.61	SD
17	44	25	0.35	0.19	R
18	964	27	0.06	0.67	S

Sl. No.	No.of correct response in the Upper group	No.of correct response in the Lower group	Item difficulty	Item discrimination	Selected/ Rejected
19	82	38	0.6	0.44	S
20	83	43	0.63	0.04	S
21	78	47	0.63	0.31	S
22	92	39	0.65	0.53	S
23	45	14	0.29	0.31	R
24	44	25	0.35	0.19	R
25	14	15	0.15	0.01	R
26	91	44	0.67	0.47	S
27	85	31	0.58	0.54	S
28	76	25	0.51	0.51	S
29	71	31	0.51	0.04	S
30	87	44	0.65	0.43	S
31	86	46	0.66	0.4	S
32	42	15	0.28	0.27	R
33	63	21	0.42	0.42	R
34	38	17	0.27	0.21	R
35	33	16	0.25	0.17	R
36	90	40	0.65	0.04	S
37	70	35	0.52	0.35	S
38	68	40	0.54	0.28	S
Sl.	No.of correct	No.of correct	Item	Item	Selected/

No.	response in the Upper group	response in the Lower group	difficulty	discrimination	Rejected
39	58	22	0.04	0.36	R
40	99	90	0.95	0.09	R

1.Reliability of the 1st test $= \frac{118593}{\sqrt{127581}\sqrt{114729}}$ $r = 0.98$

2. Reliability of the re-test $= \frac{66530}{\sqrt{99025}\sqrt{57776}}$ $r = 0.879$

The test-retest reliability of the pre-requisite test is established to be reliable by the test-retest method. The reliability of the test are 0.98 and 0.879 respectively.

2. The Verbal Test of Intelligence

This test was administered to measure the intelligence for testing homogeneity of the experimental and control groups. Verbal test of Intelligence was constructed by A.S. Nair, and Amma (1968) and it was adopted and used for this purpose. This is a five point scale of intelligence in Malayalam developed for measuring the general intelligence 'g' of secondary school pupils of Kerala. The scale consists of five sub-tets, viz., verbal Analogy, Verbal Classification, Proverbs, Number series and verbal reasoning. The details regarding the subtests are given in table 3.13.

Table 3.13

Sub-tests of Kerala University Group Test of Intelligence (verbal)

	Sub tests	No. of items	Time limits
1.	Verbal Analogy	20	6 minutes
2.	Verbal classification	20	5 minutes
3.	Proverbs	20	8 minutes
4.	Number series	20	6 minutes
5.	Verbal reasoning	20	10 minutes

The nature of each sub test is described below:

(i) Verbal Analogy

In each item, two pairs of item are given in such a way that the relation connecting the first pair agrees with that of the second pair. Of these four one pair is given fully, whereas one word in the other pair is left out. The respondents have to find out the relation between the first two words and to apply the same on the third word given and identify the word left out.

The test contain 20 items, with six minutes to answer.

Example:

Ice : water; Water : . . . . . .

((a) water, (b) fire (c) vapour (d) heat.

Various factor analytic studies have shown that this test involves a reasoning factor indicated by the ability to identify relationships.

1. Verbal classification

In every item of the test, five words are given of which four can be grouped together as per certain principles. The pupil has to identify the words that stands out from group. The test included 20 such items and the time allotted is five minutes.

Example:

(a) Centimeter; (b) Millimeter (c) Meter (d) Gram (e) Kilometer.

The mental process involved in answering questions of this type is more or less the same as that of the previous test, viz. identifying relationships.

2. Proverbs

Every item of this test contains a proverb and four statements explaining its meaning. The pupil has to choose the statement which is very close to the idea of the proverb. The test contains 20 items and the time allotted to complete is seven minutes.

Example:

(1) Slow and steady win the race

(a) If we eat slowly we can eat a large amount of food.

(b) If we work systematically we can perform difficult tasks also.

(c) Any work should be done slowly.

(d) Any work which is done slowly is good.

Test of these types are said to be saturated with 'g' factor of intelligence. The mental ability of the pupils in this case is termed as "Verbal comprehension factor."

3. Number Series

Every item of the test consists of a series of numbers arranged in a certain order, out of which one is missing. The pupil is to choose the missing number from those given in brackets. The test has 20 items and the time limit is 6 minutes.

Example:

120, 60, 30, 15, 7½, ...

(a) 8 (b) 3¾ (c) 1 7/8

Thurston termed the mental ability involved in terms of this kind as 'Inductive Reasoning.'

4. Verbal Reasoning

Every item is a question requiring the perception of certain relationship and its identification. The subject is required to select the correct answer to the problem for the four alternative given.

Example:

1) A is taller than B, but shorter than C. C and D are of same height. Who is the shortest among them?]

(a) A (b) B (c) C (d) D.

Thurston calls the mental ability involved in answering items of this type, 'Deductive reasoning'.

Validity and Reliability

Validity of the test was determined by adopting components from other test of proved merit and partly by ensuring high internal validity alttained through item analysis. The inter-test correlation of the sub-tests has been worked out on a selected representative sample (N=120). The inter-test correlations of the five tests in the battery are given in table 3.14.

Table 3.14

Reliability coefficient of Group Test of Intelligence

	Sub-tests	1	2	3	4	5
1	Verbal Analogy	.	.75	.66	.45	.56
2	Verbal Classification	.	.	.63	.47	.41
3	Proverbs	.	.	.	.47	.41
4.	Number series	.	.	.	.	.32
5.	Verbal reasoning	.	.	.	.	.

The validity coefficients of sub tests 1 to 5 assured by comparing with school marks (external criterion) were 0.61, 0.53, 0.65, 0.67 and 0.45 respectively (N = 50).

With Raven's Progressive Matrices Test as the external criterion, the validity coefficient of the whole (total scores in the five tests) was found to be 0.56 (N=120)

The fundamental validity of the test has been assessed by Kurup (1969). It was found that 79 per cent of the common variance of the battery is accounted for by the 'g' factor of intelligence.

The split half reliability (N = 120) corrected for shortening, using Spearman-Brown formula is given in table 3.15.

Table 3.15

Reliability coefficient of the Group Test of Intelligence (Verbal)

	Sub-tests	Split half reliability coefficients (N = 120)
1.	Verbal analogy	0.88
2	Verbal classification	0.86
3.	Proverbs	0.86
4.	Number series	0.86
5.	Verbal reasoning	0.84
6.	Whole test	0.93

The test retest reliability assumed on a sample of 86 was 0.79, the internal between the test and retest being one month. This test was constructed to measure educative component of 'g' as defined by theory of cognitive ability.

3. Kerala Socio-Economic Status Scale (Revised version)

In the present study the Kerala Socio-Economic status scale developed by Nair (1978) was used with slight modification. The scoring Scheme suggested for income was revised to catch up with rising cost of living, as income increases.

The socio-economic status scale was used to three dimensions of socio-economic status, viz, Education, Occupation and Income Level & the head of the family. Each variable in the scale has been divided in to categories on the basis of the discussion held with expert in the field and suggestions given by them.

The data for the scale has been obtained from the 'General Data Sheet' administered on the sample. It has been divided in to two parts, part first highlight the general information about the subject regarding the name of the pupil, sex, age, caste and religion, number of elder siblings, number of younger siblings, locality of the school etc. The second part is given with a view to obtain information regarding level of education occupation and income of parents and siblings.

The information collected through the first part of General Data Sheet has facilitated in classifying student's sex wise and locale wise. The information gathered from the second part of General Data Sheet has been used to ensure the

educational level, occupational level and income level of father, mother and siblings. These information has been used to measure the Socio-Economic status of the pupils.

A copy of General data sheet is given as Appendix IV.

Details regarding the scoring scheme of the Kerala Socio-Economic status scale is present in table 3.16.

Table 3.16

.Details regarding the scoring key of SES

Variables	Categories	Weightages
1. Parental Educational level	1. Illiterate	5
	2. Standard I to IV	10
	3. Standard V to VII	15
	4. Standard VII to X	20
	5. Pre-University/Pre-Degree/T.T.C/Intermediate.	25
	6. BA/BSc/B.Com/Egg.Diploma etc	30
	7. MA/M.SC/M.B.B.S/M.Ed/ B.Sc Egg/B.Sc (Tech) L.L.B	35
2. Parental Occupation	1. Unemployed	5
	2. Unskilled	10
	3. Semiskilled	15
	4. Skilled	20
	5. Semi-Professional	25
	6. High Professional	30
3. Parental Income level (Monthly)	1. Below Rs: 450/-	5
	2.Rs: 451-1000/-	10
	3. Rs:1001-2000/-	15
	4.Rs: 2001-3000/-	20
	5.Rs: 3001-4000/-	25
	6. Rs. 4001-5000/-	30
	7. Above Rs: 5000/-	35

4. Parental Occupation Level

This has been classified in to six categories, these are as follows.

I) Unemployed

Those are not in regular employment. The weightage assigned this category is five.

II) Unskilled

Coolies, ordinary labourers, watchman, peon etc. form the unskilled labourers. 10 point is assigned to this group.

III) Semi-skilled

Farmers, small scale merchants, library attenders, police constables etc. belonging to this category and they are 15 points

IV) Skilled

Merchants, Filters, Electricians, Drivers, Photography, Laboratory assistant, Carpenters, Document writers, Vakkeel clerks, Head Constables, Village Officers and so on are under this category and they are assigned 20 points.

v) Semi-Professional

Chemist, Druggists, qualified nurses, teachers Superintendent of offices, managers, contractors small land lords, Sub-Inspectors of Police, Sub-Registrars,

Educational officers, Block officers, Public Health workers or equivalent etc fall under this category and they are assigned 25 points.

V) High Professionals

Ministers, Judges, Bank executive and officials, Doctors, Engineers, Lawyers, University teachers, Head of Government Departments, Secretaries to Government, Big land Lords, Business Executives and like sections belonging to them category and 30 points allotted to this category.

VII. SAMPLE USED FOR THE STUDY

The population used for the present study are pupils studying in the various secondary schools of Kerala. Based on this experimental study the investigator has taken certain decision in sample selection. The following factors were considered while selecting the sample.

1) Size of the sample

2) Techniques of sampling

These are explained in detail below.

1. Size of the sample

The investigator intended to study the comparative effectiveness in Geography achievement of Secondary School Pupils of Kerala under Guided-Discovery learning

and Reception learning conditions with Traditional Learning Method. Three groups of samples are warranted for study. First Guided-Discovery Learning group (Experimental group 1.) Second Reception Learning group (Experimental group 2) and the third is Traditional Learning group (Controlled group) Equated groups of (40+40+40=120) pupils were selected for the study. Proportion of boys and girls was 20+20 in each group.

Table 3.17

Details showing the samples selected for the study

Class	No. of Students in the classes	Area/Locality	Girls	Boys
(E1) Guided-discovery learning (IX std)	40	Poilkave Secondary School, Edakulam Koyilandy	20	20
(E2) Reception Learning (IX Std)	40	Poilkave Secondary School, Edakulam Koyilandy	20	20
Control group Traditional Learning (IX Std)	40	Poilkave Secondary School, Edakulam Koyilandy	20	20
Total	120		60	60

VIII. TOOLS USED FOR DATA COLLECTION

For the nature of this study four kinds of measuring instruments viz. a) tools for measuring in Geography achievement these include the last chapters in the curricular

area for IX Standard Geography test book. b) tools for measuring control variables of the study, (c) tool for final evaluation for which the tools listed below were used:

1. Pre-requisites Test in Geography. (prepared and standardised by the investigator in 2000).
2. The Kerala University Verbal test of intelligence.
3. The Kerala Socio-Economic status scale.
4. Achievement Test in Geography

Brief description of these measuring tools is presented below.

1. Pre-requisite Test in Geography

Pre-requisite Test in Geography included the first two chapters of IX standard Geography curricular area. This test has been developed by the investigator with the help of expert teachers in the subject. 25 point objective type test comprised of 25 marks are developed. Due weightage has been also given to three cognitive levels, like Knowledge, Understanding and Application (5+15+5 marks respectively).

Validity of the test

It is assumed that the test has content validity because it is based on the subject matter contained in the geography text book of standard IX. Besides the test items prepared by the investigator was subjected to the scrutiny and criticism of the experts.

The empirical validity of the test was established by correlating the scores in the pre-requisite test in Geography test. The study was conducted on 50 students.

The correlation coefficient was found to be 0.677 it indicates that the test is valid for the purpose of study.

Reliability of the test

The reliability of the test was established by test retest method and the same was found to be 0.98.

4. Achievement Test in Geography

Achievement test in Geography was consisted of objective type multiple choice items only. The procedures adopted for the construction and standardisation of the test are given below:

(i) Planning of the test

(ii) Preparation of the test

(iii) Try out of the test

(iv) Finalisation or Evaluation of the test.

(I) Planning

Planning is the primary step in the construction of a standrdised test. The main point to be remembered is coverage of educational objectives, coverage of type of items and range of item difficulty. These were strictly followed in the present study.

1) Thorough analysis of content to be tested

2) Making specific objectives

3) Selecting the type of questions to be used

4) Determining the difficulty level of the test

5) Deciding the discriminative level of the test

6) Preparing the blue print of the test.

Details of the steps taken are given below.

(i) Weightage to objectives

The prime consideration in planning test for scientific evaluation is to determine and classify the objectives to be measured. Relative importance to each of the objectives in the form of weightage is to be given. The investigator made a thorough analysis of the objectives with the help of Geography teacher. After consultation with experts the investigator assigned weightages to the cognitive levels as shown in the blue print.

The topics viz. Lithosphere, Hydrosphere and Biosphere are concerned with the levels of cognition 'Understanding' which is given more priority than to 'Knowledge' and 'Application' for which structuring questions of objective type for 'Application' level is very difficult.

1. Weightage to content area

The researcher thoroughly analysed the whole content of the IX standard Geography Chapter viz. Lithosphere, Hydrosphere and Biosphere and structured the main points as well as the instructional objectives based on Bloom's taxonomy. The proper weightage was given to each content area after consulting Geography teachers. The weightage to content area is given in the following table as shown in the Blueprint.

Table 3.18

Weightage to Content

Sl.No.	Content	Marks	Percentage
1	Lithosphere	18	36%
2	Hydrosphere	18	36%
3	Biosphere	14	28%
	Total	50	100%

Table 3.19

Weightage to Objectives

Sl.No.	*Objectives*	Marks	Percentage
1	Knowledge	15	30%
2	Understanding	20	40%
3	Application	15	30%
	Total	50	100%

Table 3.20

Weightage to form of questions

Sl.No.	All objective type questions	Marks	Percentage
1	Objective – Selecting from Distracters	40	80%
2	Objective – Filling the Blanks	5	10%
3	Objective –Matching types	5	10%
	Total	50	100%

Table 3.21

Weightage to Difficulty level

Sl.No.	Difficulty level	Marks	Percentage
1	Easy	12	24%
2	Average	26	52%
3	Difficult	12	24%
	Total	50	100%

Table 3.22

BLUE PRINT

Sl. No.	Objectives / Form of questions / Content	Knowl-edge	Under - standing	Appli-cation	Total
1	Lithosphere	4	10	4	18
2	Hydrosphere	3	11	4	18
3	Biosphere	2	7	5	14
	Total items	9	28	13	50
	Total score	9	28	13	50

5. Preparation of the test

The test items were prepared in tune with objectives given in the blue print. The investigator referred question banks, books, atlas and consulted experts in Geography and senior teachers for preparation of items. Hence the investigator prepared a draft test of 60 objective type items, out of which 50 objective type were selected after rejecting doubtful and ambiguous questions with the help of expert teachers.

All the 50 items were carefully checked with the tables of Objectives and content areas. They were scrutinised by a team of experts in Geography. The items were arranged in the hierarchical arrangement of difficulty level. This test includes 50 multiple choice items and it is included in the Appendix V(a).& (b).

Preparation of Scoring Key

For the present study each of the objective type items is given one point credit and scoring key is given in Appendix VI.

Pilot Test

The pilot test was administered in 370 pupils (equal numbers from either sex) from Thiruvangore H.S.S., G.V.H.S.S. for Boys , Koyilandy and G.G.H.S.S. Koyilandy to find construction difficulty, ambiguity and time limit of the items.

On careful study of the answer sheets the investigator was able to delete certain items with mistakes and also the items having difficulty to understand the meaning. The defects were rectified and the time limit was fixed as one hour.

Try-out test

Try out is a sample test to know how the test will function in actual use.

Sample for try out

It was not practical to conduct test to all pupils of standard IX of schools in Kerala state. Hence a small sample was selected from three schools in Kozhikode district. The details of the sample selected are given below:

Table 3.23

Selection of try out sample

Sl. No.	Name of schools	Location	Boys	Girls	Total
1	Thiruvangore Higher Secondary School	Rural	82	82	164
2	GVHSS Boys, Koyilandy	Urban	103		103
3	GGHSS Koyilandy	Urban	-	103	103
	Total		185	185	370

The prime objective of the try out test was item analysis. The test was administered during the first week of October 2000. It was conducted with the help of Headmasters and class teachers. The scores for the answer scripts were consolidated with the help of scoring key. Each correct response was given one point and zero for wrong.

Item analysis

The investigator arranged all the 370 answer sheets in the ascending order for item analysis. Top 100 scores were designated as upper group or 'U' and the bottom 100 as lower group or 'L' respectively. The middle 170 were discarded. Each item in U and L was analysed by calculating the Difficulty Index of 'DL' and the Discriminative Power or DP using the following formula.

$$D.P. = \frac{U -- L}{N}$$

And

$$D.I. = \frac{U + L}{2\ N}$$

Item analysis of the Achievement Test in Geography

The same procedure and criteria adopted for the item analysis of the pre-requisite test was also adopted for the item analysis of the achievement test.

Following the criteria it was found that 50 items out of the 60 of the draft test have the difficulty index between 0.5 and 0.7 and the discriminatory power is greater than 0.15 and they were selected for the final test.

There was no need of revising or removing any distracters because more than two per cent of the 370 students had been chosen every distracter against each item.

The data and result of the item analysis is given in table

Table 3.24

Table showing Item analysis of the Achievement Test in Geography

Item No.	No.of correct answer in the High group	No. of correct answer in the Lower group	Item difficulty	Item discrimination	Selected/ Rejected
1	58	27	.42	.31	R
2	63	42	.52	.21	S
3	61	44	.52	.17	S
4	69	53	.61	.16	S
5	71	53	.62	.18	S
6	42	52	.47	-.1	R
7	67	47	.57	.2	S
8	73	39	.56	.34	S
9	70	41	.55	.29	S
10	66	40	.53	.26	S
11	64	43	.53	.21	S
12	48	33	.4	.15	R
13	62	43	.52	.19	S
14	68	52	.6.	.16	S
15	80	59	.69	.21	S
16	79	61	.7	.18	S
17	76	58	.67	.18	S
18	44	60	.52	-.16	R

Item No.	No.of correct answer in the High group	No. of correct answer in the Lower group	Item difficulty	Item discrimination	Selected/ Rejected
19	77	56	.66	.21.	S
20	45	58	.51	-.13	R
21	66	44	.55	.22	S
22	69	37	.53	.32	S
23	74	40	.57	.34	S
24	70	39	.54	.31	S
25	62	43	.52	.19	S
26	69	45	.57	.24	S
27	70	43	.56	.27	S
28	77	44	.6	.33	S
29	68	47	.57	.21	S
30	60	43	.81	.17	S
31	75	68	..71	.07	R
32	64	48	.56	.16	S
33	62	46	.54	.16	S
34	68	43	.55	.25	S
35	78	56	.67	.22	S
36	72	52	.62	.2	S
37	33	28	.3	.05	R
38	75	9	.62	.25	S

Item No.	No.of correct answer in the High group	No. of correct answer in the Lower group	Item difficulty	Item discrimination	Selected/ Rejected
39	72	53	.62	.19	S
40	62	46	.54	.16	S
41	71	51	.61	.2	S
42	69	44	.56	.25	S
43	73	52	.62	.21	S
44	67	51	.59	.16	S
45	64	42	.53	.22	S
46	72	48	.6	.24	S
47	65	47	.56	.18	S
48	70	58	.64	.12	R
49	69	47	.58	.22	S
50	84	56	.7	.28	S
51	87	59	.73	.28	S
52	80	60	.7	.2	S
53	90	64	.77	.26	S
54	60	51	.55	.09	R
55	70	65	.67	.05	R
56	92	63	.77	.29	S
57	89	66	.77	.23	S
58	80	59	.69	.21	S
59	67	42	.54	.25	S
60	92	65	.78	.27	S

Validity of the test

It is presumed that the test has content validity because it is based on the subject matter contained in the geography test book of standard IX. Besides the test items prepared by the investigator it was subjected to the scrutiny and criticism of the experts.

The empirical validity of the test was established by correlating the scores in the achievement test with the scores attained by the students in their class test The study was conducted on 50 students. The data used for computing the validity is presented in table.

Table 3.25

Table showing the data computed for validity of the achievement Test

Sl.No.	X	Y	XY	X^2	Y^2
1	46	22	1012	1216	484
2	37	20	740	1369	400
3	34	18	612	1156	324
4	33	19	627	1089	361
5	43	14	602	1849	196
6	35	19	665	1225	361
7	36	15	540	1296	225
8	21	15	315	441	225
9	25	16	400	625	256

Sl.No.	X	Y	XY	X^2	Y^2
10	26	15	390	676	225
11	27	17	459	729	289
12	30	19	570	900	361
13	29	19	551	841	361
14	35	18	630	1225	324
15	29	17	493	841	289
16	38	19	722	1444	361
17	39	19	741	1521	361
18	31	17	527	961	289
19	28	16	448	784	256
20	32	14	448	1024	196
21	22	14	308	484	196
22	38	20	760	1444	400
23	32	17	544	1024	289
24	31	16	496	961	256
25	29	10	290	841	100
26	35	17	595	1225	289
27	19	12	228	361	144
28	25	15	325	625	225
29	23	14	322	529	196
30	27	16	432	729	256

Sl.No.	X	Y	XY	X^2	Y^2
31	28	17	476	784	289
32	18	8	144	324	64
33	22	16	352	484	256
34	26	17	442	676	289
35	19	9	171	361	81
36	28	16	448	784	256
37	19	8	152	361	64
38	25	14	350	625	196
39	26	18	468	676	324
40	28	17	46	784	289
41	16	7	112	256	49
42	31	18	558	961	324
43	22	15	330	484	225
44	22	14	308	484	196
45	31	17	527	961	289
46	39	20	780	1521	400
47	16	8	128	256	64
48	40	21	840	1600	441
49	31	19	589	961	361
50	41	22	902	1681	484
	$\Sigma X=1463$	$\Sigma Y=800$	$\Sigma XY=24395$	$\Sigma X^2=45359$	$\Sigma Y^2=13436$

The correlation coefficient was found to be 0.77 which indicates that the test is valid for the purpose of study.

Reliability of the test

As in the case of the pre-requisite test the reliability of the test was established by test retest method. The data used for computing the reliability of the test is presented in Table. 3.26.

Table 3.26

Data showing the Reliability of the test Achievement test in Geography

Sl.No.	X	Y	XY	X^2	Y^2
1	46	41	1886	1216	1681
2	37	32	1184	1369	1024
3	34	29	986	1156	841
4	33	28	924	1089	784
5	43	38	1634	1849	1444
6	35	30	1050	1225	900
7	36	31	1116	1296	961
8	21	17	357	441	289
9	25	21	525	625	441
10	26	22	572	676	484

Sl.No.	X	Y	XY	X^2	Y^2
11	27	23	621	729	529
12	30	25	750	900	625
13	29	25	721	841	900
14	35	30	1050	1225	625
15	29	25	725	841	1089
16	38	33	1254	1444	1156
17	39	34	1326	1521	676
18	31	26	806	961	576
19	28	24	672	784	729
20	32	27	864	1024	324
21	22	18	396	484	1089
22	38	33	1254	1444	729
23	32	27	864	1024	676
24	31	26	806	961	625
25	29	25	725	841	900
26	35	30	1050	1225	196
27	19	14	266	361	441
28	25	21	525	625	361
29	23	19	437	529	529
30	27	23	621	729	576
31	28	24	672	784	196
32	18	14	252	324	324

Sl.No.	X	Y	XY	X^2	Y^2
33	22	18	396	484	484
34	26	22	572	676	225
35	19	15	285	361	576
36	28	24	672	784	225
37	19	15	285	361	441
38	25	21	525	625	484
39	26	22	572	676	576
40	28	24	672	784	144
41	16	12	192	256	676
42	31	26	806	961	324
43	22	18	396	484	324
44	22	18	396	484	676
45	31	26	806	961	1156
46	39	34	1326	1521	144
47	16	12	192	256	1225
48	40	35	1400	1600	676
49	31	26	806	961	1296
50	41	36	1476	1681	
	$\Sigma X=1463$	$\Sigma Y=1239$	$\Sigma XY=38625$	$\Sigma X^2=45359$	$\Sigma Y^2=32997$

The correlation co-efficient was found to be 0.99. It indicates that the test is highly reliable. The copies of the draft test and final test are given in appendices 5(a) & (b).

Construction of Comprehensive Lesson Plan

1. Guided Discovery Learning Lesson Plan

For the present GDL Lesson plan the investigator selected 3 chapters viz. Lithosphere, Hydrosphere and Biosphere from IX standard Geography text book of Kerala. 20 lesson plan for instruction was prepared with the support of senior geography teacher. This should provide appropriate objectives, proper presentation of content, motivating the learner, exploiting learners curiosity, providing learning activities, facilitating learning by doing, promoting transfer of learning, scope for collecting information, observing, interacting between groups, selecting and connecting learning objectives, exploring facts and principles, increasing interest to discovering new ideas.

The investigator indirectly guides to discover learning contents with the help of support materials and proper guidance. Group work and active participation, monitoring, consolidating and presenting gives chances to understanding of below average students. This enables the learner from mere recipient to active participant and hence become self discoverer. Making charts , wall maps, point out the specific places in the out line map, preparing seminar papers, making questions, discovering relevant answers writing foot notes presenting collected matters from the classroom re the special features of the GDL. Hence this 20 lesson plan was given in the appendix in detail.

Teacher induces and give clues and proper guidance but the learner observing, exploring and consolidation the subject matters. Teacher's direction is carefully hence this comprehensive lesson plan is to be constructed by the investigator. All the cognitive levels of the learning are come under GDL lesson plan. Teachers evaluation and proper guidance also given prime importance. Hence the investigator structured the GDL lesson plan in the following heads:

(i) Phases, activities and time chart

(ii) Major contents of the lesson to be learned

(iii) Objectives

(iv) Social system

(v) Support system

(vi) Syntax (phase by phase activities in the classroom.

Specimen copy of the lesson plan on the topic of Lithosphere is given as Appendix I(a).

II. Reception learning lesson Plan

This is the presentation of the content in total hence it is the ready made classroom lesson plan. The teacher's role is important and the learner is inactive but it is time saving in crowded class. In order to compare the relative effect of G uided

Discovery learning the investigator developed Reception Learning lesson plan in tune with Bloom's Taxonomy.

Reception Learning lesson plan in the same three topics of Geography was popularly used in effective teaching. Twenty lessons plan are also given in the Appendix No. The investigator prepared the Reception Learning Lesson plans giving importance for the following points.

(i) Major content areas

(ii) Objectives

(iii) Checking the previous knowledge

(iv) Presentation of the subject matter directly

(v) Evaluation

(vi) Assignment

Specimen copy of lesson plan is given as Appendix I (b).

III. Traditional Learning

In order to get specific result of the experiment the investigator used Traditional method or Lecture method in the three Geography topics included for the present experiment in control group. This is a traditional learning method used in our classrooms. Hence the lesson plans pertaining to this method is not appended.

Techniques of analysis

The data had been carefully analysed by employing appropriate statistical techniques. ANOVA and test of significance are used to describe the distribution of scores. Detailed analysis of the data and discussion based on the result are presented in the IVTH chapter

Item analysis of the Achievement Test in Geography

The same procedure and criteria adopted for the item analysis of the pre-requisite test was also adopted for the item analysis of the achievement test.

Following the criteria it was found that 50 items out of the 60 of the draft test have the difficulty index between 0.5 and 0.7 and the discriminating power greater than0.15 and they were selected for the final test.

There was no need of revising or removing my distracter because more than two per cent of the 370 testees had chosen every distracter against each item.

Validity of the test

It is assumed that the test has content validity because each item in the test was prepared on the basis of the subject matter contained in the text books on geography and environmental sciences for the students who follow the syllabus prepared by the department of Education of the Government of Kerala. Moreover, each item prepared

by the investigator was subjected to the scrutiny and criticism of the experts in the field of Geography teaching.

The empirical validity of the test was established by correlating the scores of the present test with the scores attained by the students in geography in their class test (monthly examination). The study was conducted on a sample of 50 students. The data used for computing the validity is given in table .

The correlation coefficient for the two sets of scores was calculated by using the following formula.

The correlation coefficient was found to be 0.67. This indicates that the test is valid for the purpose of study.

Reliability of the test

The reliability of the test was estimated by test-retest method. The test was administered on 50 students with two weeks interval. The data used for computing the reliability of the test is given in table 3.26.

The correlation coefficient for the two sets of score was found to be 0.99. It reveals that the test is highly reliable.

The copies of the draft and final pre-requisite tests are given as Appendices V(a) & (b).

TREATMENT OF DATA AND TECHNIQUES OF ANALYSIS

The experimental data have been carefully analysed by employing appropriate statistical techniques. Descriptive statistics such as mean and standard deviation have been used to describe the distribution of scores to compare the gain scores obtained in experimental and control groups and for instructional objectives of cognitive levels like knowledge, understanding and application separately. 't' test and analysis of variance have been employed to test various hypotheses. The obtained numerical results of achievement in Geography have been interpreted meaningfully and detail analysis of the data, description and the results are presented in the fourth chapter.

ANALYSIS

Padmanabhan M. "Effectiveness in geography achievement under guided-discovery learning and reception learning conditions" Thesis. Department of Adult & Continuing Education and Extension services, University of Calicut, 2002

CHAPTER IV

ANALYSIS

ANALYSIS

The study is mainly intended to find out the relative effects of the independent variables on Achievement in Geography. The extent of relation of each independent variable with Achievement in Geography. How far the efficiency of the each variable in predicting Achievement in Geography.

The results of the statistical analysis are discussed in this chapter under the following headings.

1. Main and interaction effects of the independent variables on Achievement in Geography.
2. Estimation of the extent of relation between each independent variable and Achievement in Geography.
3. Analysis of variance.
4. Tests of significance.

PLAN AND PROCEDURE

1. The Sample

Population in the present study is the students studying in Secondary Schools of Kerala.

Keeping in view of the paucity of time and the intensity of work the investigator confined his study to IX standard students of secondary school. Three equal groups of 40 students comprising 20 Boys and 20 Girls were selected from Poilkave Secondary School, Edakkulam, Koyilandy, Kozhikode district, Kerala.

The table shown below (Table 4.1) reveals that the sample represents homogeneity in type of schools, sex, locale and number.

The students included in the sample were studying in IX standard. Total number of students selected for the study was 120.

Table.4.1

Details of the sample selected for the study

No	Groups	Locale	Area & type of management	Boys	Girls	Total
1	Guided Discovery Learning (Experimental Group I)	Rural	Poilkave Aided Secondary School, Koyilandy	20	20	40
2	Reception Learning. (Experimental Group II)	Rural	Poilkave Aided Secondary School, Koyilandy	20	20	40
3	Traditional Learning.(Control Group)	Rural	Poilkave Aided Secondary School, Koyilandy	20	20	40

Tools used

1. Controlling stage

a) Pre-requisite test in Geography

(Constructed and standardized by the investigator)

b) Verbal test of intelligence

(Adopted from Kerala University)

c) Socio Economic Status Scle (adopted from Kerala University).

2. Treatment stage

a) Guided-discovery learning lesson plan

(for experimental group I – prepared by the investigator)

b) Reception learning lesson plan

(for experimental group II – prepared by the investigator)

c) Traditional learning lesson plan

(for control group)

3. Evaluation stage

a) Achievement test in Geography.

(Constructed and standardized by the investigator)

One of the major objectives of the present study is to prepare lesson plan in Guided-discovery learning and Reception learning methods for IX standard Geography and to test its effectiveness by a standardized achievement test in Geography.

To test whether any difference exists in sex-wise and in level of cognition viz Knowledge, Understanding and Application.

To understand the efficacy of the Guided-discovery learning method than Reception learning and Traditional learning method was the main objectives of the study.

The comparisons were made with the help of test of significance for difference between groups and within groups using the formula for critical ratio 't'.

$$\text{'t'} = \frac{1M_1 - M_2 1}{SE_D} \quad \text{where,}$$

$$SED = \sqrt{\frac{\sigma 1^2}{N_1} + \frac{\sigma 2^2}{N_2} + \frac{\sigma 3^3}{N_3}}$$

t = Critical ratio

M_1 = Mean of group 1

M_2 = Mean of group 2

M_3 = Mean of group 3

N_1 = Number of pupils in group 1

N_2 = Number of pupils in group 2

N_3 = Number of pupils in group 3

σ_1 = Standard deviation of group 1

σ_2 = Standard deviation of group 2

σ_3 = Standard deviation of group 3.

SED = Standard Error of Difference

PRELIMIMINARY ANALYSIS

One of the major assumptions of Analysis of variance is that the distribution of the dependent variable in the population from which the samples are drawn is normal. The major characteristics of a normal distribution are that,

i) the mean, median and mode coincide

ii) Coefficient of Skewness is zero

iii) Coefficient of Kurtosis is three.

The basic statistics comprising of mean, median mode, Standard deviation, Skewness and Kurtosis are worked out for the scores of the dependent variable, Achievement in Geography are presented in table 2. These indices reveal that the variable is almost normally distributed, as there is not much deviation between the

value of mean, medium, and mode, co-efficient of Skewness close to Zero and co-efficient of Kurtosis is very close to three

Table 4.2

Basic Statistics of Total sample (Dependent Variable)

Variable	Mean	Median	Mode	S.D	Skewness	Kurtosis
Dependent	32.192	30.00	23.00	11.353	0.138	-0.405

Geography achievement under Guided Discovery learning group and Reception learning - A comparison

The purpose of the study was to find out whether pupil taught under Guided-discovery learning differed considerably than those taught under Reception-Learning condition.

The study proceeded under the assumption that pupil taught under Guided-discovery learning condition are better than those under Reception learning condition and Traditional learning condition with respect to the total sample taken from the each group on the basis of their scores in pre-requisite test in Geography, socio-economic status and their intelligence.

The data obtained from the study were subjected to statistical analysis as follows.

1. Testing the significance of difference between the scores obtained in the achievement in Geography by the total experimental and control groups.

2. Testing the significance of difference between the pupils taught under Guided discovery learning and Reception learning condition in achievement in Geography.

3. Testing the significance of difference between experimental groups and control group on the basis of levels of cognition viz. Knowledge, Understanding and Application.

4. Testing the significance of difference between the experimental groups and control group on the basis of sex wise in achievement in Geography.

The difference is statistically significant when the probability is high. C.R. is used for to test the group difine.

$$C.R. = \frac{P_1 \sim P_2}{\sqrt{PQ\,(\,1/N_1 + 1/N_2)}}$$

Where N_1 is Guided discovery learning group P_1 is Reception group, N_2, P_2 are control group.

In the present investigation positive hypothesis were formulated ie. There exists difference of methods used in experimental and control group, hence the achievement in Geography will be different.

Effectiveness in Geography achievement in Experimental group (Guided discovery learning condition) and group 2 (Reception learning condition).

1. Comparison between GDL and RL

Table 4.3

Significance of difference of the mean achievement in Geography of pupils studying in Standard (IX comparison in guided discovery learning method and reception learning method)

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	43.45	7.47	14.23	1.73	8.22	78	.01
R.L	40	29.23	8.01					

The observed mean in the case of Guided discovery learning and meaningful reception learning method are 43.45 and 29.23 respectively. The 't' value found out is 8.22. The difference with the two groups is significant at .01 level (1%) of confidence. This leads the conclusion that Guided discovery learning method is superior to meaningful reception learning method in the scholastic achievement in geography. This shows that the difference in mean observed is not a chance happening but is actual and significant, that is the supremacy of GDL proved beyond doubt.

2. **Knowledge Level comparison between GDL and RL**

Table 4.4.

Significance of difference of the mean achievement in Geography of Standard IX pupils in comparison with level of cognition such as Knowledge among GDL and RL

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	14.03	1.59	1.78	.38	4.62	78	.01
R.L	40	12.25	1.84					

From the above table it is clear that significance of difference of mean in scholastic achievement in Geography in comparison with level of cognition such as Knowledge among GDL and RL are 14.03 and 12.25. The 't' value found is 4.62. The difference with the two group in cognitive level. "Knowledge" is 0.01 level of confidence. This shows that GDL is more effective than MRL in comparison with the level of cognition – Knowledge.

3. **Understanding level Comparison GDL and RL**

Table 4.5

Significance of difference of the mean achievement in Geography of Standard IX pupils in comparison with level of cognition such as Understanding among GDL and RL

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	16.68	3.77	5.93	.85	6.95	78	.01
R.L	40	10.75	3.85					

The above table sufficiently highlighted the significance of mean in scholastic achievement in Geography in comparison with level of cognition such as 'Understanding' among GDL and RL are 16.68 and 10.75. The 't' value found in 6.95. The difference with two methods in cognitive level understanding is .01 level of confidence. This clearly indicates that the experimental group 1 (GDL) is superior than experimental group 2 (RL) in comparison with level of cognition "understanding."

4. Application Level Comparison between GDL an RL

Table 4.6

Significance of difference of the mean achievement in Geography of Standard IX pupils in comparison with level of cognition such as Application among GDL and RL

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	12.75	2.43	6.53	.63	10.43	78	.01
R.L	40	6.23	3.13					

The above table clearly indicate that significance of difference of mean in scholastic achievement in Geography in comparison with level of cognition such as Application among two groups GDL and RL are 12.75 and 6.23. The 't' value found is 10.43. The difference with two group in cognitive level "application" is 0.01 level of confidence. GDL approach is more effective than RL in cognitive level "Application'. This may be due to the fact that pupils adopting ample scope for observation and analytical thinking by GDL method.

5. **Comparison between GDL and TL in Mean Achievement in Geography**

Table 4.7

Significance of difference of the mean achievement in Geography of Standard IX pupils in comparison with GDL and Traditional Learning Method

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	43.45	7.47	19.65	1.70	11.57	78	.01
R.L	40	23.80	7.72					

It can be seen from the table that Guided discovery learning method and traditional learning method are significantly difference in the mean score 43.45 and 23.80 respectively. The 't' value is 1.57 and significant at 0.01 level of confidence. This shows GDL is more effective than TL in scholastic achievement in Geography. This may be due to the actual time and chances were given to students by the GDL approach made them think analytically and compare and contrast and discover the facts by discussion but no scope in TL

6. **Comparison between Level of Knowledge among GLD and TL**

Table 4.8

Significance of difference of the mean achievement in Geography of Standard IX pupils in comparison with level of cognition such as Knowledge among GDL and TL Method

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	14.03	1.59	3.58	.50	7.14	78	.01
R.L	40	10.45	2.74					

From the above discussion significance of difference of Mean in scholastic achievement among GDL and TL in comparison with cognitive level such as Knowledge are 14.03 and 10.45 respectively and the 't' value is found to be 7.14. The difference between two method (GDL and TL) in cognitive level such as 'Knowledge' is .01 level of significance. This clearly indicate GDL is successful effective than TL in getting cognitive level 'Knowledge'. This may be due to the variety and pupils participation and self initiation given to pupils in the classroom through GDL method.

7. Comparison between levels of 'Understanding' among GDL and TL

Table 4.9

Significance of difference of the mean achievement in Geography of Standard IX pupils in comparison with level of cognition such as Understanding among GDL and TL Methods

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	16.68	3.77	7.88	.78	10.14	78	.01
R.L	40	8.80	3.15					

It can be seen from the table the significance of difference in Mean in Geography Achievement among GDL and TL in comparison with levels of cognition such as understanding are 7.88. The 't' value is found 10.14 and the level of significance difference is .01 level. This significant difference shows GDL: is profoundly successful than TL method. It may be due to the new classroom teaching through GDL made students to think it over and understand more.

8. Comparison between levels of 'Application' among GDL and TL

Table 4.10

Significance of difference of the mean achievement in Geography of Standard IX pupils in comparison with level of cognition such as Application among GDL and TL methods

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	12.75	2.43	8.20	.58	14.05	78	.01
R.L	40	4.55	2.78					

From the above table significance of the difference of mean in Geography achievement under Guided Discovery Learning method and Traditional learning method in comparison with levels of cognitive such as 'Application' are 12.75 and 4.55 respectively. 't' value is 14.05 and the level of significance of difference is 0.01. This indicate that GDL is more effective in Geography learning than TL method. This proved beyond doubts that the GDL approach is more enthusiastic and it gave chance to self thinking and assessment in the classroom.

9. Comparison between mean scores of Geography Achievement among GDL and TL

Table 4.11

Significance of difference in the mean scores in total of Geography achievement Standard IX pupils among GDL and TL

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	43.45	7.47	19.65	1.70	11.57	78	.01
R.L	40	23.80	7.12					

The above observed means in total group 1 (GDL) and group 3 (TL) are 43.45 and 23.80 respectively. The 't' value shows 14.05 and the level of significance of difference is .01. This clearly shows the experimental group 1 (GDL) is successfully effective than the control group tradition learning group. This is mere accidental but the approach given in the GDL classroom gave ample scope for self study, verification and analytical thinking to students. This paved way for high achievement in GDL classroom than Traditional classroom.

10. Comparison between total scores of Geography Achievement and scores with level of cognition 'Knowledge' among GDL and TL

Table 4.12

Significance of difference of the mean score in total of achievement in Geography of Standard IX pupils in comparison with total level of cognition such as Knowledge among GDL and RL

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	14.03	1.60	3.58	.50	7.14	78	.01
R.L	40	10.45	2.74					

From the above stated table significance of difference in mean score in total group 1 (GDL) and Group 3 (TL) in comparison with the level of cognitive 'knowledge' are 14.03 and 10.45 respectively. The 't' value is 7.14 and the level of significance of difference is .01. This undoubtfully clarifies the group 1 GDL is highly effective in Geography achievement in the level of Cognition 'knowledge' in total score in the secondary classroom than tradition learning approach. This not by accidental but the merit of the approach and this method gave enough chance to analytical thinking and understanding.

11. Comparison of mean achievement in Geography with 'Understanding' among GDL and RL

Table 4.13

Significance of difference of the mean scholastic achievement in Geography of Standard IX pupils in comparison with level of cognition such as Understanding among GDL and RL

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	16.68	3.77	7.88	.78	10.14	78	.01
R.L	40	8.80	3.15					

The above table shows significance of difference in Total means of group 1 GDL and group3 Traditional learning in comparison with levels of cognitive such as 'Understanding' in total mean score are 16.68 and 8.80. The 't' value is 7.88 and level of significance of difference is .01. This indicates GDL approach is more effective in getting understanding cognition than tradition approach. Students get more chance to work and think in the subject concerned by new learning method.

12. **Comparison of Total Mean Scores with 'Application' among GDL and RL**

Table 4.14

Significance of difference in the total mean scores of Geography achievement of IX Std pupils in comparison with level of cognition 'Application' in total Mean score of Group 1. GDL and Group 3. Tradition learning method.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
G.D.L	40	12.75	2.43	8.20	.58	14.05	78	.01
R.L	40	4.55	2.78					

From the above stated table significance of difference in the mean scores total group 1 and group 3 in comparison with the level of cognitive such as 'Application' are 12-75 and 4.55 respectively the 't' value is 14.05 and the level of significance of difference is .01. This shows highly effect of group1 approach than Traditional (group 3) in the Geography achievement. This is due to deliberate attempt of class room method adopted by the investigator namely GDL. It gave the pupil more time for analytical thinking and understanding and self discovering. All the above table reveals the effectiveness of Guided-discovery learning method employed by the researcher in IX standard Geography teaching.

13. Gender Difference within GDL

Table 4.15

Significance of difference in Mean Scores of Geography achievement of IX std pupils in comparison with gender difference male and female within Guided Discovery learning method.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
Male G.D.L	20	46.25	2.43	5.60	2.21	2.53	38	.05
Female R.L	20	40.65	9.59					

The above statement shows significance of difference in mean of Guided-discovery learning group in comparison with sex wise difference (male/female) are 46.25 and 40.65 respectively. The 't' value is 2.53 and level of significance is .05. This indicate significant difference in Boys and Girls in Guided-discovery learning method.

14. 'Knowledge' level comparison of boys and girls in the GDL and RL

]Table 4.16

Significance of difference in the Mean Score of Geography achievement of IX standard pupils in comparison with levels of cognitive as 'Knowledge' from Boys and Girls in the GDL and RL method.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
Male G.D.L	20	14.50	.83	.95	.49	1.95	38	Not significance
Female. R.L	20	13.55	2.01					

The above table indicates the mean score of achievement in Geography in comparison with Boys and Girls of GDL and RL in the level of cognitive "Knowledge" are 14.50 and 13.55 respectively. The 't' value is 1.95. Hence the level of significant is not seen significant. Hence no difference between male and female in group 1 (GDL) and 2 (RL). This is due to the new approach learned and the Reception learning practical meaningfully.

15. 'Understanding' level comparison between boys and girls in GDL and RL

Table 4.17

Significance of difference in the Mean Score of Geography achievement of IX standard pupils in comparison with levels of cognitive 'Understanding' between boys and girls in the GDL and RL method.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
Male G.D.L	20	18.15	1.42	2.95	1.11	2.66	38	.01
Female. R.L	20	15.20	4.75					

This clearly indicates the 't' value is found 2.66 and level of significance is .01. Hence in cognitive level 'Understanding' Boys and Girls from GDL and RL significance difference is seen.

16. Application Level Comparison between boys and girls in GDL and RL

Table 4.18

Significance of difference in the Mean score of Geography achievement of IX standard pupils in comparison with level of cognitive 'Application' from Boys and Girls in GDL and RL.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
Male G.D.L	20	13.60	1.05	1.70	.73	2.34	38	.05
Female. R.L	20	11.90	3.08					

The above table shows sex wise comparison from GDL and RL male with female Mean Score are 13.60 and 11.90 respectively 't' value is 2.34. The level of significance is .05 Hence significance difference is seen. In the 'Application' cognitive level both approaches are significantly difference in male female group. Almost all the above tables vehemently shows significant difference.

17. Comparison between males of RL and Females of GDL

Table 4.19

Significance of difference in the Mean Score of Geography achievement of IX standard pupils in comparison with male from Reception Learning and female from Guided-discovery learning method.

Groups	N	M	SD	Mean difference	SE of difference	T	Df	Level of significance
Male G.D.L	20	29.90	7.83	1.35	2.56	.53	38	Not significance
Female R.L	20	28.55	8.33					

The above table undoutfully substantiate the difference in MRL male mean is 29.90 and in GDL female is 28.55 't' value is found .53. The level of significance is seen not significant. This is not by chance but the effect of both method in boys and girls.

18. 'Knowledge' level comparison between males of RL and females GDL

Table 4.20

Significance of difference in the mean score of Geography achievement of IX standard pupils in comparison with the level of cognitive 'knowledge' from Males of RL and Females of GDL method.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
Male G.D.L	20	12.55	1.67	.60	.58	1.03	38	Not significance
Female R.L	20	11.95	1.99					

The above statement shows the difference in the level of cognition Knowledge MRL male, mean is 12.55 and GDL female is 11.95 respectively. The 't' valve is 1.03 and level of significance is not seen significant. This is due to the introduction of new method (GDL) and the meaningful practice of Reception learning I the class room (RL).

19. 'Understanding' level comparison between males of RL and females of GDL

Table 4.21

Significance of difference in the mean score of Geography achievement of IX standard pupils in comparison with level of cognitive 'Understanding' among Males from RL and Females from GDL method.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
Male G.D.L	20	11.95	3.68	2.4	1.17	2.05	38	.05
Female R.L	20	9.55	3.72					

The above table indicates the level of cognitive 'Understanding' among RL males and GDL females achievement mean are 11.95 and 9.55 respectively. 't' value found is 2.05 and level of significance is .05. Hence significant difference is seen but not highly significant difference. This shows both methods are effective in the classroom (RL).

20. 'Application' level comparison among males from RL and females from GDL

Table .4.22

Significance of difference in the mean score of Geography achievement of IX standard pupils in comparison with levels of cognitive 'Application' among Males from RL and Females from GDL method.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
Male G.D.L	20	5.40	3.07	-1.65	.97	-1.71	38	Not significant
Female. R.L	20	7.05	3.03					

The above stated table shows the level of cognitive 'Application' among RL males and GDL females achievement mean score are 5.40 and 7.05. 't' value is found –1.71 and level of significance is seen not significant. Hence in the cognitive level 'Application' Male, Female different is not significant.

21. Comparison with males and females within TL

Table 4.23

Significance of difference in the Mean Score of Geography achievement of IX std pupils in comparison with male and female within Traditional learning method (Control group)

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
Male G.D.L	20	24.80	6.80	2.00	2.451	.82	38	Not significant
Female R.L	20	22.80	8.60					

The above table clearly indicate the 't' value is .82 and the level of significance is not significance is not significant difference. Hence in the Control Group (T.L) both Female and Male achievement is seen not significant difference.

22. 'Knowledge' Level comparison among males and females within the TL

Table 4.24

Significance of difference in the mean score of Geography achievement of IX std pupils in comparison with the level of cognitive 'Knowledge' among Male and Female in the Control Group (TL).

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
Male G.D.L	20	11.35	2.35	1.80	.83	2.18	38	.05
Female R.L	20	9.55	2.00					

This shows that mean scores is seen 11.35 and 9.55 and 't' value is 2.18. The level of significant is .05, hence level of cognitive 'Knowledge' among both sex in Traditional group is significantly differs.

23. 'Understanding' level comparison among males and females within TL

Table 4.25

Significance of difference in the mean scores of Geography achievement of IX std pupils in comparison with the level of cognitive 'Understanding' among Male and Female in the Control Group (Traditional learning group)

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
Male G.D.L	20	9.85	2.10	2.10	.95	2.21	38	.05
Female. R.L	20	7.75	2.90					

The tale clarifies that the mean score for level of cognitive 'Understanding' from Male and Female within the Traditional Group are 9.85 and 7.75 respectively. The 't' value is 2.21. The level of significance is found .05. Hence significant difference is seen.

24. 'Application' level comparison between males and females within TL

Table 4.26

Significance of difference the mean score of achievement in Geography of IX std pupils in comparison with levels of cognitive 'Application' among Males and Females within the Traditional learning group.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
Male G.D.L	20	3.60	1.97	-1.90	.84	2.23	38	.05
Female R.L	20	5.50	3.26					

The table indicates that the mean score is 3.60 and 5.50 respectively. The 't' value is 2.23 and level of significant is found .05. Hence significant difference is existing

25. 'Knowledge' level comparison among boys from GDL and RL

Table 4.27

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive as 'Knowledge' among Boys from GDL group and RL group.

Groups	N	M	SD	Mean difference	SE of difference	T	Df	Level of significance
Boys G.D.L	20	14.50	.83	1.95	.42	4.68	38	.01
Boys R.L	20	12.55	1.67					

The above table indicates the mean difference of 'Knowledge' (Level of cognition) among Boys from GDL and RL are 14.50 and 12.55. The 't' value is 4.68 and the level of significance is found .01. Hence significant difference is seen between Boys in GDL and RL groups.

26. Understanding level comparison among boys from GDL and RL

Table 4.28

Significance of difference in the mean scholastic achievement in Geography of IX standard pupils in comparison with level of cognitive as 'Understanding' among Boys from GDL group and RL group.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
1. Boys G.D.L	20	18.15	1.42	6.20	.88	7.03	38	.01
2. Boys R.L	20	11.95	3.68					

The above table shows significant difference in the mean scores of Boys from GDL and RL in cognitive level 'Understanding' is 18.15 and 11.95 respectively. The 't' value is 7.03 and level of significance is .01. Hence significant difference exists.

27. Application level comparison among boys from GDL and RL

Table 4.29

Significance of difference in the achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Application' among Boys from GDL group and RL group.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
1.Boys G.D.L	20	13.60	1.05	8.20	.73	11.31	38	.01
2. Boys R.L	20	5.40	3.07					

The above discussion reveals that the mean score of achievement in 'Application' level of boys in GDL and RL are 13.60 and 5.40 respectively. The 't' value is 11.31 and level of significance is 0.01. Hence significance difference exists. This shows the relative effect of the two approaches in the classroom

28. 'Knowledge' level comparison among boys from RL and TL

Table 4.30

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Knowledge' among Boys from RL group and TL group.

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
1.Boys R.L.	20	12.55	1.67	1.20	.64	1.86	38	Not significant
3. Boys T.L	20	11.35	2.35					

This shows that comparison in the levels of cognitive as 'knowledge' among boys from 2 (RL group) and group 3 (TL group) is seen not significance in the mean scores. It is due to the knowledge level of cognitive both groups are not significant difference.

29. 'Understanding' level comparison among boys from RL and TL

Table 4.31

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Understanding' among Boys from RL group and TL group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
2.Boys R.L	20	11.95	3.68	2.10	1.08	1.95	38	Not significant
3. Boys T.L	20	9.85	3.10					

The above table indicates that there is no significant difference in the achievement in Geography for comparing cognitive level understanding of boys from Reception group and Traditional Learning group. Hence in the Understanding level significant difference is not seen so far.

30. 'Application' level comparison among boys from RL ant TL

Table 4.32

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Application' among Boys from RL group and TL group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
2.Boys G.D.L	20	5.40	3.07	1.80	.79	2.27	38	.05
3. Boys R.L	20	3.60	1.79					

The above table shows the 't' value as 2.27 and the level of significance is 0.05. Hence boys from RL and TL group in cognitive level "Application" exists significant difference. It is not high significant difference.

Table 4.33

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'knowledge' among Boys from Guided Discovery group and Traditional group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
1.Boys G.D.L	20	14.50	.83	3.15	.56	5.66	38	0.01
2. Boys R.L	20	11.35	.235					

The above table clearly show that the mean score are 14.50 and 11.35 respectively. 't' value is 5.66. Hence level of significance of difference is .01. Significant difference is vehemently proved.

Table 4.34

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Application' among Boys from GDL group and TL group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
1.Boys G.D.L	20	13.60	1.05	10.00	.46	21.58	38	0.01
3. Boys T.L	20	3.60	1.79					

The above table clearly indicate the level 'Application' of boys from GDL and TL groups differ significantly. The 't' value is 21.58 and level of significance is 0.01. This is not by chance but the effect of Guided discovery learning method in the classroom.

Table 4.35

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Knowledge' among Boys from GDL group and RL group

Groups	N	M	SD	Mean difference	SE of difference	T	Df	Level of significance
1.Boys G.D.L	20	13.55	2.01	1.60	.63	2.53	38	.05
2. Boys R.L	20	11.95	1.99					

From the above table the mean sore of girls from GDL and RL in the level of cognition knowledge are 13.55 and 11.95 respectively. The 't' value is 2.53 and level of significance is 0.05. Hence significant difference is exists but not so high. This shows the applicability of the two methods in the classroom teaching.

Table 4.36

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Understanding' among Girls from GDL group and RL group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
1.Girls G.D.L	20	15.20	4.75	5.65	1.35	4.19	38	0.01
2. Girls R.L	20	9.55	3.72					

The above stated table undoubtedly proved the significant of difference is exists in the level of cognition 'Understanding' of Girls from GDL group and RL group. 't' value is 4.19 and level of significance is 0.01

Table 4.37

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Application' among Girls from GDL group and RL group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
1.Boys G.D.L	20	11.90	3.08	4.85	.97	5.02	38	0.01
2. Boys R.L	20	7.05	3.03					

This shows significant difference exists in the level of cognitive 'Application' of girls from GDL group and RL group. The 't' value is 5.02 and level of significance is 0.01. It is due to the style of different approach in the classroom practice.

Table 4.38

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Knowledge' among Girls from GDL group and TL group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
1.Boys G.D.L	20	13.55	2.01	4.00	.78	5.12	38	0.01
2. Boys T.L	20	9.55	2.86					

From the above table significant difference exists in cognitive level 'Knowledge' of girls from GDL and RL. The mean score are 13.55 and 9.55 respectively. The 't' value is 5.12 and the level of significance is .01. This clearly shows the acceptancy and effectiveness of Guided discovery learning than Traditional learning method in girls also.

Table 4.39

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Understanding' among Girls from GDL group and TL group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
1.Boys G.D.L	20	15.20	4.75	7.45	1.25	5.98	38	.01
2. Boys T.L	20	7.75	2.90					

The above table clearly indicates that the level of cognitive such as 'Understanding' of girls in GDL and TL method exists significant difference. The 't' value is 5.98 and the level of significant is 0.01. This is not by chance but undoubtedly proved the effectiveness of GDL than Traditional method.

Table 4.40

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Application' among Girls from GDL group and TL group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
1.Girls G.D.L	20	11.90	3.08	6.40	1.01	6.36	38	0.01
2. Girls T.L	20	5.50	3.21					

Significant difference exists in the achievement of pupils (girls) in the cognitive level such as 'application'. The mean scores are 11.90 and 5.50 respectively. The 't' value is 6.01 and level of significant also is 0.01. This shows undoubtedly the acceptance and effect of GDL method than Traditional learning method in the class room application.

Table 4.41

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Knowledge' among girls from RL group and TL group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
2.Girls. M.R.L	20	11.95	1.99	2.40	.78	3.09	38	.01
3. Girls T.L	20	9.55	2.86					

This table shows Significant difference exists. The 't' value is 3.09 and level of significance is 0.01. This clearly indicate the Reception learning is effective than traditional method.

Table 4.42

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Understanding' among Girls from RL group and TL group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
2.Girls G.D.L	20	9.55	3.72	1.80	1.06	1.71	38	Not significant
3.Girls (T.L.)	20	7.75	2.90					

In the above table it is clearly mentioned that the scholastic achievement in Geography among girls from MRL group and TL group in comparison with level of cognitive 'understanding' no significant different exists 't' value is 1.71.

Table 4.43

Significance of difference in the mean achievement in Geography of IX std pupils in comparison with level of cognitive such as 'Application' among Girls from RL group and TL group

Groups	N	M	SD	Mean difference	SE of difference	t	Df	Level of significance
2. Girls G.D.L	20	7.05	3.03	1.55	1.00	1.55	38	Not significant
3. Girls R.L	20	5.50	3.29					

The above table clearly indicates that there is no significant difference exists in the cognitive level such as 'Application'. 't' value is 1.55 and hence both methods are same in this contest of classroom application. No significant difference exists.

Total marks

Group G1 – GDL

Group G2 – RL

Group G3 – TL

Table 4.44

Comparison of the effectiveness in Geography Achievement among GDL group, RL Group and TL group based on total marks

Source	Df	Sum of squares	Mean squares	F
Between Groups	2	8329.316	4164.658	69.517
Within groups	117	7009.275	59.908	-
Total	119	15338.591	-	-

Table No. is showing the comparison with the three groups G1, G2, G3. The calculated value of 'f' is 69.517. From the 'f' table the value of 'f' for (2, 117) degrees of freedom is 19.49. Since the calculated value is greater than the table value. The hypothesis is being accepted. There is no significant difference among the groups as far as 'total marks' is concerned.

By using the multiple range test (Schefe test with significance level at .05) arrived at the conclusion that Group I is the best as far as total marks is concerned. So we have the performance of students among the groups are G1 > G2 > G3.

Groups

G1 – Guided Discovery Learning

G2 – Reception Learning

G3 – Traditional Learning

Cognitive levels

1. Knowledge
2. Understanding
3. Application.

Table 4.45

Comparison of the effectiveness in Geography achievement among the GDL group, RL group and TL group with respect to cognitive variable Knowledge.

Source	Df	Sum of squares	Mean squares	F
Between Groups	2	270.15	135.075	28.9566
Within groups	117	545.775	4.667	-
Total	119	815.925	-	-

In Table 2 knowledge level is compared with the three different groups G1, G2 and G3 the calculated value of 'f' is 28.9566. From the 'f' table the value of 'f' for (2, 117) degrees of freedom is 19.49. Since the calculated value is greater than the table

value, the hypothesis is being accepted that there is no significant difference among the groups as far as knowledge level is concerned.

By using the multiple range test (Scheffe test with significance level .05) arrived at the conclusion that Group 1 is the best group as far as knowledge level is concerned and so we have the performance of students among the groups are G1 . G2 . G3.

Table 4.46

Comparison of the effectiveness in Geography Achievement among GDL group, RL Group and TL group with respect to the cognitive variable Understanding

Source	Df	Sum of squares	Mean squares	F
Between Groups	2	1345.650	672.825	51.835
Within groups	117	1518.675	12.980	-
Total	119	2864.325	-	-

In Table No. is compared with the three different groups G1, G2,and G3.The calculated value of 'f' is 51.835. From the F table the value of 'f' for (2, 117) degrees of freedom is 19.49. Since the calculated value is greater than the table value. The hypothesis is being accepted that there is no significance difference among the groups as far as 'Understanding' level is concerned.

By using the multiple range test (Scheffe test with significance level at 0.05) arrived at the conclusion that Group I is the best group as far as understanding level is concerned and so we have the performance of students among the groups are G1 >G2 >G3. Group 1 is more effective as far as understanding level is concerned.

Table 4.47

Comparison of the effectiveness in Geography Achievement among GDL group, RL Group and TL group with respect to the cognitive variable 'application'

Source	Df	Sum of squares	Mean squares	F
Between Groups	2	150.616	750.808	96.281
Within groups	117	912.375	7.798	-
Total	119	2413.991	-	-

Table No. shows that the comparison of three different groups G1, G2 and G3. The calculated value of 'f' is 96.281. From the 'f' table the value of 'f' for (2, 117) degrees of freedom is 19.49. Since the calculated value is greater than the table value. The hypothesis is being accepted. There is no significant difference among the groups as far as 'Application' level is concerned.

By using the multiple range test (Scheffe test with significance level.05) arrived at the conclusion that Group 1 is the best group as far as 'Application' level is concerned and so we have the performance of students among the groups are G1 > G2 > G3. Group 1 is more effective as far as application level is concerned.

Group3 is compared with G1 and G2 at different levels (0.01 and 0.05). It is found that group I is more effective as far as knowledge, understanding and application levels are concerned.

As far as total mark is concerned G1 is more effective as compared to the other groups G2 and G3.

TABLE 4.48

Interaction effect between groups and sex based on total marks

Source of variation	Sum of squares	Df	Mean squares	F
Main Effect	8608.392	3	2869.464	49.454
Group	8329.317	2	4164.658	71.776
Sex	279.075	1	57.775	.996
2 way interactions	115.550	2	57.775	.996
Group-sex	115.550	2	57.775	.996
Explained	8723.942	5	1744.788	30.071
Residual	6614.650	114	58.023	
Total	15338.592	119	128.896	

The above table No. 5 shows the interaction effect between group and sex based on total marks obtained the calculated value of 'f' is 0.996 and the table value of "F' with (2, 114) degrees of freedom at 5% level is 19.49. Therefore it is accepted that

there is no significant difference in interaction between Group and sex as far as total marks is concerned.

Since the calculated value of 'F' is 71.776 and the table value of 'F' with(2, 114) degrees of freedom at 5% level is 19.49. Therefore it is rejected that there is significant difference between group effects between total mark is concerned.

Since the calculated value of 'f' is 4.810 from the 'f' table (1, 114) degrees of freedom at 5% level is 253. Hence arrived the conclusion that there is no significant difference between sex effect as far as total marks is concerned.

Table 4.49

Significant difference in interaction between group, and sex with respect to the cognitive variable 'knowledge.'

Source of variation	Sum of squares	Df	Mean squares	F
Main Effect	312.158	3	104.053	23.889
Group	270.150	2	135.075	31.011
Sex	42.008	1	42.008	9.649
2 way interactions	7.217	2	3.608	.828
Group-sex	7.217	2	3.608	.828
Explained	319.375	5	63.875	14.665
Residual	496.550	114	4.356	-
Total	815.925	119	6.857	-

The above tables show, the interaction effect group and sex as far as 'Knowledge' level is concerned. The calculated value of 'f' is .828 and the table value of f with (2, 114) degrees of freedom at 5% level is 19.49 therefore there is no significant difference in interaction between group and sex as far as knowledge level is concerned.

Since the calculated value 'f' is 31.011 and the value of 'f' from the f table with (2, 114) degrees of freedom at 5% level is 19.49; we have the conclusion that the group effects are significantly different as far as knowledge level is concerned.

Since the calculated value of 'f' is 9.644 and the value of 'f' from the 'f' table with (1, 114) degrees of freedom at 5% level is 253, hence sex effects are not significantly different as far as knowledge level is concerned.

Table 4.50

Significant difference in interaction between group and sex with respect to the cognitive variable 'Understanding.'

Source of variation	Sum of squares	Df	Mean squares	F
Main Effect	1530/658	3	510.219	43.735
Group	1345.650	2	672.825	57.673
Sex	185.008	1	185.008	15.858
2 way interactions	3.717	2	1.858	.159
Group-sex	3.717	2	1.858	.159
Explained	1534.375	5	306.875	26.305
Residual	1329.950	114	11.666	-
Total	2864.325	119	24.070	-

The table No. 6 shows the interaction effect group and sex as far as 'understanding' level is concerned. The calculated value of 'f' is 0.159 and the total value of 'f' with (2, 114) degrees of freedom at 5% level is 19.49. Therefore no significant difference in interaction between group and sex as far as 'understanding level' is concerned.

Since the calculated value of 'f' is 57.673 and the value of 'f' from the 'f' table with (2, 114) degrees of freedom at 5% level is 19.49. Hence arrived the conclusion that no significant difference interaction between group and sex. Group effects are significantly different as far as 'understanding level' is concerned.

Since the calculated value of 'f' is 15.858 from the 'f' table (1, 114) degrees of freedom at 5% level is 253. It is accepted that sex effects are not significantly effect as far as understanding level is concerned.

Table 4.51

Significant difference in interaction between group and sex with respect to the cognitive variable 'Application'

Source of variation	Sum of squares	Df	Mean squares	F
Main Effect	1513.025	3	504.342	70.103
Group	1501.617	2	750.808	104.362
Sex	1.406	1	11.408	1.586
2 way interactions	80.817	2	40.408	5.617
Group-sex	80.817	2	40.408	5.617
Explained	1593.842	5	318.768	44.308
Residual	820.150	114	7.194	-
Total	2413.992	119	20.286	-

The above table shows the interaction effect of group and sex as far as 'application' level is concerned the calculated value of 'f' is 5.617 and the table value of 'f' with (2, 114) degrees of freedom at 5% level is 19.49, therefore no significant difference in interaction between group and sex as far as 'application' level is concerned.

Since the calculated value of 'f' is 104.362 and the value of 'f' from the 'f' table with (2, 114) degrees of freedom at 5% level is 19.49. Hence arrived the conclusion that group effects are significantly different as far as application is concerned.

Since the calculated value of 'f' is 1.586 from the 'f' table (1, 114) degrees of freedom at 5% level is 253. It is accepted that the sex effects are not significantly difference as far as application is concerned.

Table 4.52

Significant difference in mean scores between the two sex groups with respect to cognitive variable 'Knowledge.

Variable	No. of cases	Mean	SD	SE of mean	't'
Sex 1 (Boys)	60	12.8667	2.273	293	2.57
Sex 2 (Girls)	60	11.6833	2.819	.364	

From the table No. 9 it can be seen that the calculated value of 't' is 2.57. From the 't' value 't' for 118 degrees of freedom at 5% level is 1.657 hence we have the conclusion that for 'Knowledge level' there is significant difference in Mean scores as far as sex is concerned.

Table 4.53

Significant difference in mean scores between the two sex groups with respect to cognitive variable 'Understanding'

Variable	No. of cases	Mean	SD	SE of mean	't'
Sex 1 (Boys)	60	13.3167	4.553	.588	3.723
Sex 2 (Girls)	60	10.8333	4.968	.641	

The above table No.10 shows the calculated value of 't' is 3.723. From the 't' table value 't' is 118 degrees of freedom at 5% level is 1.657. Hence arrived the conclusion that the 'understanding' level there is significant difference in mean scores as far as sex is concerned for understanding level.

Table 4.54

Significant difference in mean scores between the two sex groups with respect to cognitive variable 'Application'

Variable	No. of cases	Mean	SD	SE of mean	't'
Sex 1 (Boys)	60	7.5333	4.666	.628	0.749
Sex 2 (Girls)	60	8.1500	4.129	.533	

Table No.11 shows the calculated value of 't' is o.749. From the 't' table value 't' is 118 degrees of freedom at 5% is 1.657 and hence we have the conclusion that the 'Application level' there is no significance difference scores in mean as far as sex is concerned.

Hence the 't' value calculated is 1.4524 and table value of 't' is 118 degrees of freedom at 5% level is 1.657. This indicate that there is no significant difference in performance as far as sex is concerned for total marks.

Table 4.55

Significant difference in Mean Scores between the sex groups based on total marks on performance

Variable	No. of cases	Mean	SD	SE of mean
Sex 1	60	33.7167	11.098	1.433
Sex 2	60	30.6667	11.493	1.484

Table 12 shows the calculated value of 't' is 1.4524. The table value of 't' at 5% level and 118 DF is 1.657. The calculated value is less than table value. This indicates that there is no significant difference in performance as far as the variable Sex is concerned for total marks.

It is clear that the guided discovery learning group is superior than Reception learning group in the achievement in Geography. The Reception learning group is superior than traditional learning group.

CONCLUSION

The factors studied maybe classified below:

1) The effectiveness of Guided discovery learning method in Geography.
2) The effectiveness of Reception Learning Method in Geography.

3) The comparative effect of Guided-discovery learning and Reception learning with the existing Traditional Learning Method in Geography.

4) To test the significance in experimental and control groups in total and sub sample and sex difference.

5) To test the significance in experimental and Control Group total and sub sample and difference in level of cognition Knowledge, Understanding and Application.

In the case of Guided Discovery Learning Method the pupil obtained superior score in Geography than Reception learning. The Guided-discovery learning method is superior than Reception learning method. The score obtain in Geography achievement is high in Reception learning than traditional learning method, hence Reception learning method is more superior than Traditional learning method.

SUMMARY, CONCLUSIONS AND SUGGESTIONS

Padmanabhan M. "Effectiveness in geography achievement under guided-discovery learning and reception learning conditions" Thesis. Department of Adult & Continuing Education and Extension services, University of Calicut, 2002

CHAPTER V

SUMMARY, CONCLUSIONS AND SUGGESTIONS

SUMMARY, CONCLUSIONS AND SUGGESTIONS

The present study stated earlier was intended to examine the effectiveness in Geography achievement under Guided Discovery Learning and Reception Learning conditions. This chapter reports the major findings, conclusive educational implications and suggestions for further research along with a summary of the methodology in conducting the study.

To test the relative effectiveness of Guided Discovery Learning and Reception Learning it appears to have enough pedagogical importance. The age old and monotonous method of learning in Geography made the classroom practice mechanical and less motivation. The lack of motivation as well as poor standard in secondary school geography achievement made the researcher to mold new method in learning Geography and to test its efficacy with reception learning and traditional learning. The inconclusive empirical evidence of failure of the learning methods in Geography of secondary schools gave inspiration for this experimental study. Methods can maximise the achievement by the pupils and hence Guided Discovery Learning method will be useful for modern classroom practice.

Restatement of the Problem

The study is entitled as "EFFECTIVENESS IN GEOGRAPHY ACHIEVEMENT UNDER GUIDED DISCOVERY LEARNING AND RECEPTION LEARNING CONDITIONS."

Variables

The study was designed with 'Achievement in Geography' as the dependent variable and Guided-Discovery learning, Reception Learning, and Traditional learning methods are independent variables. Controlled Variables are (I) sex, (ii) locale (iii) type of management, (iv) classroom climate and (v) teacher

Objectives

1. To develop comprehensive lesson plans for the three chapters of Ninth Standard Geography text book of Kerala, viz. Lithosphere, Hydrosphere and Biosphere in tune with.

   (a) Guided discovery learning condition

   (b) Reception learning condition

2. To study effectiveness in Geography achievement under Guided discovery learning condition by comparing it with the achievement under traditional learning condition.

3. To study the effectiveness in Geography achievement under Reception Learning Condition by comparing it with the achievement under Traditional Learning condition.

4. To study the effectiveness in Geography achievement under Guided Discovery Learning conditions by comparing it with the achievement under Reception Learning condition.

5. To test whether any sex difference exists in Geography achievement when compared with Guided Discovery Learning condition and Traditional Learning condition.

6. To test whether any sex difference exists in Geography achievement under Reception Learning condition by comparing it with the Achievement under Traditional Learning condition.

7. To test whether any significance difference exists in Geography achievement when compared it with Guided Discovery Learning and Reception Learning conditions.

8. To test whether any significant difference exists in Geography achievement in sex-wise and levels of cognition in total and sub samples.

Hypotheses

(1) There will be significant difference between pupils taught under Guided Discovery Learning condition, than those taught under Reception Learning condition in their mean achievement in Geography.

(2) There will be significant difference between pupils taught under Guided discovery learning condition than those taught under Traditional Learning condition in their mean achievement in Geography.

(3) There will be significant difference between pupils taught under Reception learning condition than those taught under Traditional Learning condition in their mean achievement in Geography.

(4) If Geography achievement in three cognitive levels, namely Knowledge, Understanding and Application are determined and the respective pairs of group (as mentioned above) compared, there will be significant difference in each of the three levels and between sex wise comparison with three cognitive levels.

Type of study

The present study comes under the purview of experimental design.

Methodology

The present study is intended to find out the effectiveness in Geography achievement under Guided discovery learning and Reception Learning Conditions.

Sample

The study was conducted on the sample of 120 pupils comprising three groups as experimental group G1 for Guided Discovery Learning with 20 boys and girls, G2 for Reception Learning with 20 boys and 20 girls and G3 the Control group with 20 boys and 20 girls of IX standard from Poilkave Secondary school, Calicut District, Kerala.

Tool

For controlling

(i) Pre-requisite test in geography (constructed and standardised by the investigator. 2000)

(ii) Verbal test of intelligence (Kerala University)

(iii) Socio Economic Data sheet (Kerala University)

For Treatments

i) Lesson plan for Guided Discovery Learning Method

ii) Lesson plan for Reception Learning method

iii) Traditional Learning Lesson plan

For testing

(i) Achievement test in Geography (constructed and standardised by the investigator 2000).

Statistical Techniques used

The data were analysed for the comparative effectiveness in Geography achievement by following Guided-Discovery Learning and Reception Learning Conditions.

(I) Test of significance of difference between mean scores for independent sample.

(ii) ANOVA.

MAJOR FINDINGS

The major conclusions emerged from the study by test of significance are summarised and given below. The differences in significance methods on comparison were studied for the total sample and the relevant sub-samples.

The major findings emerged from the study are:

(1) The experimental group taught through guided discovery learning method scored significantly higher than that of the traditional method group scored on the achievement test with respect to overall scores and scores at all the three levels of instructional objectives, namely, Knowledge, Understanding and Application.

(2) The experimental group taught through reception learning scored significantly higher than that of the traditional method group on the achievement test with respect to overall scores and scores at all the three levels of instructional objectives namely Knowledge, Understanding and Application.

(3) The experimental group taught through Guided discovery learning is found more effective than the experimental group taught through Reception learning on comparison with the instructional objective of cognition 'Knowledge'.

(4) The experimental group taught through Guided discovery learning is found more effective than the experimental group taught through Reception learning on comparison with the instructional objective of cognition 'Understanding'.

(5) The experimental group taught through Guided discovery learning is found more effective than the experimental group taught through Reception learning on comparison with the instructional objective of cognition 'Application'.

(6) This experiment showed that significant difference exists between boys and girls taught through guided discovery learning method.

(7) This experiment reveals no difference between boys and girls taught through guided discovery learning and reception learning method.

(8) This experiment shows that significant difference is seen between boys and girls in the in the cognitive level 'Understanding and taught through guided discovery learning and reception learning methods.

(9) This experiment clearly shows difference in the cognitive level, Application in boys and girls taught through guided discovery learning and reception learning.

Tenability of hypotheses

The tenability for four hypotheses set for the study come to be examined in the light of the findings.

1. The first hypothesis states that "there will be significant difference between pupils taught under Guided discovery learning condition in the mean achievement in geography". The findings reveals that there exist significant difference in the score

obtained by the pupils who were taught under guided discovery learning method. Hence hypothesis one is substantiated.

2. The second hypothesis states that" "there will be significant difference between pupils taught under guided discovery learning condition than those taught under traditional learning conditions. The study reveals that guided discovery learning is more effective than traditional learning method of the scores obtained in the achievement in Geography. Hence the second hypothesis is also substantiated.

3. The third hypothesis states that "there will be significant difference between pupils taught under reception learning conditions and those taught under traditional conditions in their mean achievement in geography. The study found that significant difference exists in their mean achievement in Geography when taught under reception learning and traditional learning method. Here Reception Learning method is better than traditional learning. Hence the third hypothesis is also substantiated.

4. The fourth hypothesis states that "if geography achievement in three cognitive levels of instructional objectives viz. Knowledge, Understanding and Application is determined and the respective pairs of groups (as mentioned above) compared, there will be significant difference in each of the three levels and between sex-wise comparison with three cognitive levels." The finding reveals that Guided Discovery Learning is vehemently more effective in getting 'Knowledge" Understanding and Application than getting them through Reception Learning and Traditional Learning

5. Significant difference exists in boys and girls in guided discovery learning method. Hence the hypothesis is substantiated.

6. Significant difference is not seen between boys and girls in group I Guided Discovery Learning and in group 2 Reception Learning. Hence the hypothesis is being rejected.

7. Study reveals that the difference in cognitive level 'Understanding' boys and girls from Guided Discovery Learning and Reception Learning are seen. Hence the hypothesis is substantiated.

8. Significant difference is seen in the cognitive level 'Application' in both Guided Discovery learning and Reception Learning method. Hence hypothesis is substantiated.

CONCLUSIONS

The major findings of the study are summarised below for arriving ;at conclusions.

1. The students taught under Guided Discovery Learning condition performed significantly better (at 0.05 level) condition and traditional learning condition in geography achievement G1 > G2 > G3.

2. Guided discovery learning group is the best group as far as the cognitive level of 'Knowledge' is concerned than other groups at 0.05 level.

3. Guided Discovery learning group is the better as far as the level of cognitive 'Understanding' is concerned than other two groups at 0.05 level.

4. Guided discovery learning is best as far as the level of cognitive 'Application' is concerned than other two groups at 0.05 level. Among the groups are G1 > G2 > G3. G1 is most effective as far as application level is concerned.

Suggestions for further research

Suggestions for further study will give more light for finding solutions of the problem. The study has many implications and various aspects of the problem can be studied.

1) The present study is restricted to one selected school in Kozhikode district. The study can be conducted on a large sample in different schools of different districts of Kerala.

2) Present study is confined to IX standard pupils only. This can be extend in VIIIth and Xth and college class also.

3) The study has been taken in the subject of Geography this can be conducted on other science and social science subjects.

4) This study is a post test only design. This can be done pre-test post design.

5) This study restricted to test the effects of cognitive levels of learning knowledge, understanding and application only. It can be extended further cognitive levels like interest, attitude and skills.

6) Different models of teaching can be utilise in teaching geography and other language.

Suggestions for improving classroom practice

The present study is aimed at developing Guided-discovery learning instructional method and to test its efficacy with reception learning and traditional learning method of the achievement in Geography. The important suggestions indicating the application of the result, of the study are given below

1) The study has brought light that there is significant difference between students taught under guided discovery learning condition than those taught and reception learning condition in geography achievement.

The optimum conditions to improve the learning methods may be provided by

1. Facilitating suitable democratic classroom environment.
2. Providing more individual and group activities in the classroom.
3. Diagnosing the backward students those who are not co-operative with the classroom learning activities.

4. Avoiding lecture methods or direct teaching in the classroom.

5. Adopting suitable methods in different subjects and situations.

6. Providing proper guidance and support in self inquiry and discovery

7. Establishing continuous rapport and molding the subject matter more transparent and more interesting.

8. Provide scope for self initiation and induce the pupils to self learning and discovering.

9. Providing opportunities for collecting materials and information for their study.

10. Facilitating group work and peer group learning.

11. Providing frequent checking and diagnosing the errors

12. Providing rooms for exhibit their works and collections like models and charts, papers, stamps, coins and posters.

13. Arranging symposiums, seminars quiz programmes about the topic.

14. Provide chances to review books, collecting information from local places and peoples.

15. Chance the methodology in tune with changing nature of subject and time.

16. Provide more time to observation, verification and to develop inquiry skill.

17. Provide problematic situations for promoting spirit of inquiry and discovery.

18. Suitable tools may be devised to assess their achievement.

19. Teachers should encourage the free play and free expression of the students

20. Apt construction of lesson plans and prompt use of support materials with the aids of computers to be developed by the teachers.

21. Care should be taken to appreciate the ability of student in art, scholastic achievement, literature painting, drama, etc.

22. Periodical meetings of subject teachers to discuss the progress of achievement and changing the repertoire of their strategy.

23. Educational institution should chalk out programmes to nourish their creativity, self initiation and make them active citizens.

24. Provide chances for field trip, personal contacts and collecting relevant information for their learning.

25. Teachers should verify the ever changing scenario of teaching learning process through in-service course and internet facilities to remold their methods and strategies.

26. Hence as there is no single appropriate method in instructing the teenagers, teachers can select and connect different methods suitable for the subjects in tune with learning theories of psychology.

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APPENDICES

APPENDIX I(a)

UNIVERSITY OF CALICUT
DEPARTMENT OF ADULT AND CONTINUING EDUCATION

GUIDED DISCOVERY LEARNING LESSON PLAN

Prepared by Dr. K. Karunakaran and Padmanahnan, M.

Guided discovery learning lesson plan is a new method developed by the investigator in tune with the discovery learning theory of Jerome S., Bruner who was a great cognitive psychologist. The investigator judiciously gives guide lines to pupils to become self discover in the subject matter. Three chapters from IX standard Geography test book of Kerala was selected for the construction of the lesson plan. Twenty lesson plans are prepared.

FIRST DAY

PLANNING AND ARRANGEMENT

PHASE I:

(a) Rapport. The investigator introduces himself and he asks pupils their name, hobbies and subject of interest and thus makes good rapport.

(b) Classroom arrangement: All the forty pupils of the class are grouped into four comprising of ten pupils each (5 boys + 5 girls). Face to face seating arrangement is made, the position of each group being changed every day. A shape of seating as shown with the diagram below.

(c) Selection of groups: The groups are A, B, C and D. Then each group elects a monitor, time keeper, recorder (a student who records the activities in the classroom) in a democratic way.

(d) Division of duty:

(i) Leader: Leaders should be the head of the group and should timely report the work and discovered matters of the whole group.

(ii) Monitor: The duty of the monitor is to help and encourage the group members.

(iii) Time keeper: Keeping time schedule. He uses buzzer for starting, warning and stopping. Timer will common for all groups for a day.

(iv) Recorder: All the learning tasks are recorded then and there.

PHASE II: INTRODUCTION OF SUBJECT AND TOPIC.

The investigator introduces that the topics for discussion are Lithosphere, Hydrosphere and Biosphere from IX standard Geography text book 'The changing face of the earth and tectonic movements' this heading is written on the black board and the introduced the topic to pupils.

SECOND DAY

Major objectives:

(1) The pupils gather information about earth's surface and various facts, terms, concepts also.

(2) The pupils develop understanding about tectonic movement and its various aspects.

(3) The pupils develop practical skills in various movements of earth.

(4) The pupils take interest in learning more about earth quake and volcanoes.

Major, curricular content: Lithosphere – tectonic movements, vertical and horizontal movements, changing face of the earth.

Social system: Low social system – Guidance and motivation by teacher and greater participation of the pupils.

Support system: Reference book, text book, maps, pictures leaflets, paper cuttings and charts.

Phases	Activities – topic – Lithosphere	Time
I	Reading the specific portion from the text book by the pupils. Noting down the new terms, concepts and principles etc. regarding guidance by the investigator	10 minutes
II	Exploring examples, resorting	5 minutes
III	Filling up the blanks in given statements	5 minutes
IV	Group discussion	5 minutes
V	Classifying and arranging the pictures and giving underline for specific points in the booklets	5l minutes
VI	Discovering questions	10 minutes
VII	Assignment given by the teacher	5 minutes

Phase I: The investigator asks the pupils to read the relevant topic in the text book, then he asks them to note the terms, concept and principles. The pupils observe and exploring. The group leaders report. The investigator gives clarification for the difficult areas.

Phase II: The teacher gives this statement – "The surface of the earth is undergoing changes," and asks them to write one example each. They are noting down the examples by using support materials. Group leaders report as given below.

(1) Earthquake affected area in Lathur (Maharastra)
(2) Volcanic explosion in Fujiyama (Japan)
(3) Erosional plains (Ganges and Indus vallies)
(4) Weathering Residuary mountains of Neelgiris (Tamil nadu)
(5) Pupils write down in their note books.

Phase III

The investigator shows the charts and then asks the pupils to fill up the following statements after referring support materials.
(1) The slow continental building movements are called. . . . . .
(2) The wearing away and sculpturing of the land forms are called . . . . . .

Time keeper gives bell, the pupils read, discuss. The leaders report the discovered answers. Answers after correction pupils noted down. The answers are: (1) endogenic forces, (2) Exogenic forces.

Phase IV

The investigator guides them to discuss the various forces, which change the Earth's crust. Giving leaflets the investigator asks them to discover the points of discussion in brief. Leaders reports accordingly. The investigator corrects them and awards marks. The following discovered answers are taken down by pupils.

"The changes in the earth's crust are due to earth movements. They are of two types (1) Endogenic (internal))ii) Exogenic (external).

Phase V

The investigator gives the groups pictures of the place of earth quake, volcanoes, erosional plains, mountains and rocks and he requires them 'to classify the picture according to external and internal forces. The time keeper gives bell. The pupils observe, discuss, write and the leaders report them. After necessary correction the investigator exhibits them on the flannel board which is given below.

By endogenic force	By extogenic force
-- volcanoes	-- Erosional plains
-- Earth quake	-- Gradation of earth surfaces
	-- Weathering of rocks

Phase VI

The investigator asks them to read the marked reference book and observe the content and pictures and to discover two questions each. They read, observe, discuss and discover questions. The leaders report them. The pupils are writing the explored question on the black board. They are:

1) What is tectonic movement?
2) Which force is responsible for the rise and fall of earth's surface?
3) What are two types tectonic movements?
4) What is up lift?
5) What is subsidence?
6) What is horizontal movement?
7) Which type of horizontal movement cause breaking of rock strata?
8) Which movement cause for continental building?

Phase VII

The investigator gives instruction to write answers at home for the questions already discovered.

THIRD DAY

Major objectives:

(1) The pupils gather information about the new terms and concepts like gradation, weathering etc.
(2) To develop understanding about reason for earth quake.
(3) To discover more details about gradation and weatherings
(4) To locate the earthquake affected areas
(5) To develops a positive attitude to towards the study of the movement of earth

Major contents:

Earthquake, Kathiawar, uplift coast gradation, aggradation, weathering, different types and reason for weathering.

Social System:

Low social system – student participation is given more importance

Support system:

Charts, maps, books, encyclopaedia, pictures and newspaper cuttings, etc.

Phases	Activities – topic – Lithosphere	Time
I	Reporting the Assignment – Correction and discussion	10 minutes
II	Correcting and displaying charts	5 minutes
III	Observing, reading, noting specific concepts and terms by open book system	15 minutes
IV	Discovering questions	10 minutes
V	Evaluation of discovered questions and giving assignment	5 minutes

Open book system:

Books are selected and page marked in such a way that some of the will have pictures of the concept concerned, some with description and some pages with allied matters. They are required to examine the marked pages in the specified time.

Phase I

The investigator asks to report the answers of the previous day's assignment. Group leaders report them. The investigator evaluates. The answers are shown below:

1) The earth movement which bring about the vast changes originated within the earth are called tectonic movements.
2) Vertical and horizontal movements are the two types of tectonic movements.
3) Vertical movements are responsible for rise and fall.
4) A part of earth's crust rises relative to surrounding portion is uplift
5) A sinking portion of the earth's crust relative to the surrounding portion is called subsidence
6) The horizontal movements involve compression and tension. They apply tangential forces to the earth's spherical surface. They are known as tangential movements.
7) Tensional forces cause braking of rocks
8) Vertical movements cause continental plateau building.

Phase II:

The investigator supplies four chart papers and sketch pens and ask them to prepare a chart each. The chart should contain instances of sudden movements. They observe the support system and prepare the charts. The investigator verifies them and display on the wall. They are given below:

Sudden movements	Slow movements
Kutch earth quake (1819) affected area of : 5180 sq. kms earth's surface : 5 meters depth sank by about adjoining area : about 1554 sq.kms was uplifted	Beaches along the Kathiawar coast uplifted above the sea Coast of Andra, Orissa and Tamil Nadu have been elevated to a height of 15 to 30 meters above the seal level.

Phase III

The investigator supplies paper sheets, books and pictures to groups and asks them to read and observe the marked area and note the important points. Pupils write down what is seen in the picture. They observe, read and discover main concepts and note them down, then the investigator asks them write the main points discovered by them in the paper sheet. The answer sheets are exchanged among groups evaluated by them according to the direction of the investigator. They are: earthquake affected areas of the world, Magma because lava which is spreading into the surface, volcanic explosions and its smoke, some important volcanoes etc.

Phase IV

The investigator asks each group to discover two questions from the given area of the topic pupils explore the books, discuss and discover. The leaders report the findings as follows:

1) What is gradation?
2) Give the difference between gradation and aggradation.
3) What is weathering?
4) Why does mechanical weathering happens?
5) Give two examples for mechanical weathering?
6) How does chemical weathering happens?
7) Give some examples for chemical weathering?
8) What is oxidation?

Phase V

The investigator gives clarification about the questions and asks them to write the answers at home and bring the next day.

FOURTH DAY

Major objectives:

1) To collect more information about chemical weathering, oxidation, hydration and solution.
2) The pupils develop understanding about the different aspects of changes of the earth's crust.
3) Pupils applying this understanding in his surroundings

4) To pupils develop practical skills.
5) To develop interest in learning more about gradation and weathering
6) To develop positive attitude towards Geography especially Lithosphere.

Major contents: Chemical weathering, oxidation, hydration, solution, running water and river valley stem.

Special system: Low social system. Active participation of pupil are involved.
Support system: Maps, charts, papers, books and sketch pens.

Phases	Activities (topic – Lithosphere)	Time
I	Reporting the assignment - correcting noting down	10 minutes
Ii	Finding examples	10 minutes
III	Drawing diagrams of river system	10 minutes
IV	Writing foot notes to the given pictures – making course of river	10 minutes
V	Assignment	5 minutes

Phase I

Group leaders report the assignment. The investigator gives sufficient clarification and awarding marks to the discovered answers. They are given below:

1) All the process which tend to bring the surface of the Lithosphere to a common level are known as gradation.
2) Gradation stands for leveling down the earth's elevated featur3es but aggradation is filling up the depression of the surface.
3) Weathering is disintegration and decomposition of rocks
4) Mechanical weathering is brought about mainly by the chances in temperature freezing action of water and by plants and animals.
5) The granite domes of Mahabalipuram (Tamil Nadu) and the dolerite dykes in Singhbum (Bihar) are the examples of mechanical weathering.
6) The process of decay of rocks due to the action of water air and minerals is known as chemical weathering.
7) Rock salt, gypsum (solution) and rusting of iron (oxidation) are examples of chemical weathering.
8) The oxygen in the atmosphere and rain water enter into chemical union and results the decomposition of rock and rusting of iron.

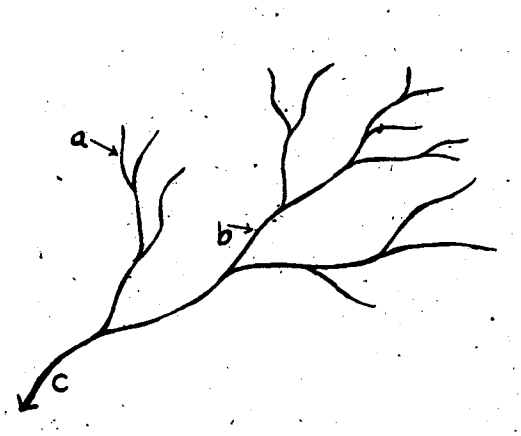
Phase II

The investigator gives one example each and asking them to find out more similar examples on oxidation, hydration and solution pupils find out enough examples. They evaluate themselves and noted down in the note book.

Phase III

The investigator requires them to draw diagram of River system. Drawing sheets and sketch pens are supplied by the investigator. After the diagram of river system is drawn the investigator asks them to mark channel, tributary and main rivers. After completing the work they display them It is given below.

River system



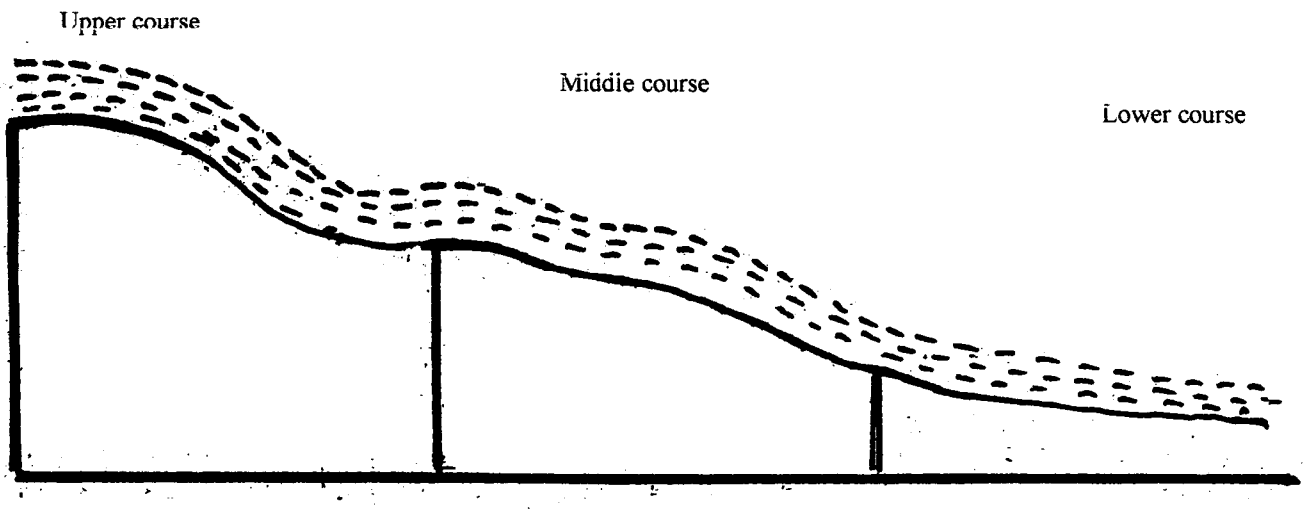
a. Channel
b. Tributary
c. Main River

Phase IV

The investigator gives each groups copies of different pictures connected with the topic and asks them to write titles and foot notes. They observe the pictures with help of support materials, discuss and discover and give title and foot notes. The investigator collects the pictures and verifies. They are affixed in the album.

Phase V

The investigator requires them to draw a diagram of the course of a river and mark the upper course, middle course and lower course by referring the book. They display the diagram shown below



Phase V

The investigator gives the following as work at home.

1) Where is grand canyon?
2) What is meanders?
3) Give short note on waterfall, cascades, rapids,
4) What is oxbow lake?
5) How does ground water form?

FIFTH DAY

Major objectives:

1) The pupils collect information of facts and concept and places in associated with this topic
2) To develop understanding the different aspects of springs and geysor
3) To apply understandings to his own sorroundings
4) To develop attitude towards the study of water falls g round watger and so on

Major contents:

Canyon, water fall, meanders, oxbow lake,load, delta, ground water, water table, springs, artisian wells, geysors, old faithfull, mmanikiran and Jwala Mugkhi.

Social system:

Low social system – pupils active participation and initiation are given importance.

Support system:

Charts, models, books, lots, maps, pictgures, etc.

Phases	Activities (topic – Lithosphere)	Time
I	Discussing the assignment – reporting and evaluating	10 minutes
Ii	Showing improvised models of canyon, water fall, meanders and oxbow lake – observing exploring recording	5 minutes
III	Book reading, observing – discussion of terms principles and concepts	15 minutes
IV	Discovering the answer on the lots *	10 minutes
V	Evaluating and giving assignment	5 minutes

*Four questions are prepared in separate lots (bits of paper) and each group is required to pick one the answer to the question to be scribed overleaf and presented.

Phase I:

After discussion exchanges the assignment they evaluate the mistake by the direction of the investigator. They are given below

1) The greatest canyon in the world is grand canyon (Colarado – USA)
2) Water fall: The flow of river in the upper course vertically falls along its course
3) Rapids : Slopping segments of swift streams
4) Cascade : It represents all degrees of slops
5) Oxbow lake: Meandors left behind completely cut from the main channel
6) Meandors: The winding section of a stream
7) Underground water: some portion of rain water and snow on the surface gradually reaches in the underground.

Phase II

The investigator shows the still models of caynon, water fall, meanders and oxbow lake and he asks them to find out its name. They observe and write the names of each.

Phase III

The investigator gives instructions to read the specific pages of the text book and the pupils do. So and then asks them to discover new terms, concept and principles. Each groups discuss and note the above items. Leaders report them. The investigator provides more information about the discovered terms and concepts. Then he asks to expand them. After discussion the leaders report. The expanded terms are the following (Load, permeability, water table, springs, artisian well, gaysers)

Phase IV

The investigator gives a lot containing a question to each group and he then asks to discover the answers. Each group discuss and prepare answers. Leaders report the same. The investigator makes necessary correct and asks them to note down.

They are

a) Where was the artisian well dug? (Artoei- France)
b) Where is manikiran and Jwalamugkhi? (Manikiran Hot spring in Kulu valley, Jwalamugkhi, H.P.
c) Give the name of the greatest geyser in the world, (the old faithful – yellow stone park – Rockies – USA).

The investigator awards marks. Appreciates their quickness in finding out the answers.

Phase V

The investigator gives the following as work at home.

1) What is permeability?
2) Hot spring Geysers generally occur in.....
3) What is a water table?
4) List out the agent of gradation?
5) What are called acquifers?

SIXTH DAY

Major objectives

1) The pupils gather information connected with the topic
2) To develop understanding about glaysers, hanging valley and so on.
3) To apply the understanding in future life
4) The pupils develop attitude to study more about glaysers and so on.

Major content:

Moving ice, gaysers, hanging valley, cirque, continental glaciers.

Social system

Still models, pictures, books, maps, charts, etc.

Phases	Activities (topic – Lithosphere)	Time
I	Reporting the assignment – discussing – noting the answers	10 minutes
Ii	Discovering objective type questions for quiz competition among groups	5 minutes
III	Conducting quiz competition, awarding marks appraisal	20 minutes
IV	Naming the pictures – exhibiting =- interpreting – noting – assignment	10 minutes

Phase V

Each group reports the assignment. After discussion, correction and about clearing. Points are noted down as follows:

1) The capacity of rock to transmit water is called permeability
2) In active or recent volcanic regions hot spring gaysers generally occur
3) The level below which the rocks are completely saturated in this water is called water table.
4) River, running water, moving ice, winds are the agents of gradation.
5) Sand, gravel, sandstone are acquifers (hold and permit free passage of water)

Phase II

The investigator asks groups to discover two objective type questions for a quiz competition. Groups explore questions with the help of support materials.

Phase III

The investigator exchanges the questions and assigns to each groups to avail three minutes to ask questions. The investigator is the quiz master. Scores obtained are shown M.B.B. The group which gained to scores is congratulated and prized. Questions and their answers are as below.

1) Greatest Geyser in the Rockies (old faithful)
2) A famous river without delta – (Amazone)
3) Greatest area of artisian water (Australian basin)
4) A famous Chinese river consisting excessive flood (Hwang Ho)
5) The rock which are of low porosity? (Granite, quartzite)
6) An example impermeable rock (clay)
7) The cause of 'U' valley and hanging valley ?(Glacial erosion)
8) The rock fragments falling in to ice from the mountain slops (Morain)

Phase IV

The investigator supplies pictures two each to four groups and asks them to write correct remarks about the pictures. They refer support materials and discuss before noting remarks. Leaders report and the investigator verifies and exhibits them. The investigator requires them to do the following at home.

1) draw a picture of hanging valley, cirque and morains
2) Why is earth called unstable earth.

SEVENTH DAY

Major objectives:
1) The pupils gather information about wind
2) To develop understanding the different aspects of wind
3) To apply understanding to his own life
4) To develop attitude towards study more about wind.

Major content

Wind, wind erosion, wind depositions, dunes, loess, Mushroom rocks and sand dune.

Social system – Low social system – more chances to students activity.

Support systems – maps, pictures, books, charts etc.

Phases	Activities (topic – Lithosphere)	Time
I	Reporting –discussing and evaluating assignment	10 minutes
Ii	Discovering answers of the given questions	10 minutes
III	Giving suitable names of the distributed pictures	5 minutes
IV	Speech by representatives of groups	16 minutes
V	Appraisal and assignment	4 minutes

Phase I

The leaders of respective groups report the assignment. The investigator verifies the pictures drawn by pupils, give clarifications. They are then stored in the album.

Discovered questions

Earth undergoes changes due to wind, running water, moving ice and due to the influence of animals and plants. Forests become deserts, the height of the mountains become low, new plains, plateaus and lakes are formed.

Phase II

The investigator gives one question each to the four group to discover the answers of the given questions. They are displayed on the wall. The question and answers are given below.

1) A typical example of wind erosion (Mushroom rock)
2) How are dune create? (by wind deposition)
3) What is a Barkhan? (A typical dune with crescent shaped front)
4) What is Loess? (wind born deposit)

The leaders report and the pupils note them down in the note book.

Phase III

The investigator supplies three same sets of pictures to each groups and asks them to observe and find out what is. They observing it, discuss and find out. The leaders report the same. The investigator verifies and awarded marks for them. The pictures are 1) Mushroom rocks, 2. Sand dune 3. Barkhans.

Phase IV

The investigator requires the groups to elect a representative each to speak for three minutes. They get the subject to lots. Groups got the following subject a) wind erosion b) wind deposition c) Loess d) Dunes. The investigator awards marks according to their performance. Then the investigator clarifies their doubts.

Phase V

The investigator gives the following exercise to be done at home.

Match the following

1	Loess	--	Tendency to migrate
2	Mushroom rock	--	Kiaghis steppe
3	Dune	--	Wind born deposit
4	Barkhan	--	Wind erosion
		--	Cirque

EIGHTH DAY

Major objectives

1) The pupils collects information about sea waves, marine erosions, etc.
2) To develop understanding the different aspects of sea waves.
3) To apply the understanding in nearest surroundings
4) To develop attitude towards the study of marine biology and emergency.

Major contents

Sea waves, marine erosion, sea cliffs, sea caves, stacks and arches, marine deposition, beach, day-head beach, spits and bar.

Social system:

Low social system, pupils involvement is great.

Support system:

Maps, charts, photos, pictures, books and still models.

Phases	Activities (topic – Lithosphere)	Time
I	Reporting the assignment - discussing – evaluating	5 minutes
Ii	Discovering examples of marine erosion – observing the support materials	10 minutes
III	Finding out example for sea cliff in Kerala	5 minutes
IV	Selecting flash card of rock forms	5 minutes
V	Write foot notes and interpreting pictures	10 minutes
VI	Finding out Indian east coast, west coast, lagoons in the map	5 minutes
VII	Appraisal and assignment	5 minutes

Phase I:

Leaders report the assignment. The investigator clarifies and gives marks. The chart made by them are shown below:

1.	Loess	--	Wind born deposit
2	Mushroom rock	--	Wind erosion
3	Dunes	--	Tendency to migrate
4	Barkhan	--	Kiaghis steppe

Phase II

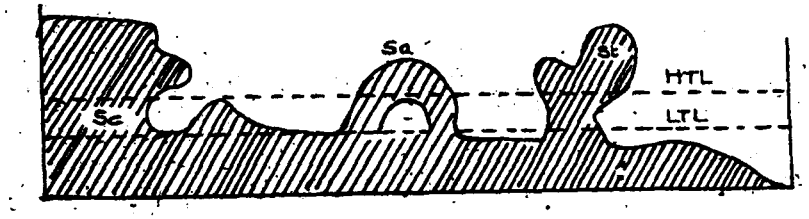
The investigator gives a reference book with marked area and asks them to observe, discuss and find out examples of marine erosion. Pupils observe, discuss and write the examples. Leaders report them. The investigator evaluate and asks them to noted down the examples found out by them.

Phase III

The investigator asks them to observe and refer the reference book to discover and example for sea-cliffs in Kerala coast. They find out and the leaders report. The investigator repeats the answer and writes on the black board. Pupils copy it in their note book as 'Kovalam beach in west coast'

Phase IV

The investigator gives a picture each to the groups and asks them to observe and discover rock forms formed by wave erosion and to write the names of them. Observing the picture and with support of support materials leaders exhibit them for general observation which is shown below.



High tidal level

Low tidal level

Phase V

The investigator gives a picture each to the four groups and asks them to write the name foot notes and their marks. They observe the pictures, refer support materials and discover as required. The leaders report. The investigator verifies and gives marks, then pupils take down the following.

1. Sand dune – wind direction, wind eroded, deposition.
2. Waves built terrace
3. Features due to wave erosion
4. Features due to deposition of sea waves.

Phase VI

The investigator showing Indian political map and asks to the groups to point out, east coast, west coast, south coast and lagoons of Kerala. They do so.

Phase VII

The investigator congratulates the best performance of the students and gives the following assignment.

1) Give examples of west coast and east coast lagoons.
2) Prepare a list of land sculpturing work of sea waves.

NINTH DAY

Major objectives

1) To gather more information about sea waves and its sculpturing works.
2) To develop understanding about the works of sea waves
3) To apply the understanding in his future life
4) To develop attitude to study more about sea waves.

Major contents:

Sea waves and its sculpturing works.

Social system:

Low social system – pupils activities and participation is given prime importance.

Support system:

Four teachers, twenty objective type questions four score sheets, table and chairs and whistle.

Phases	Activities (topic – Lithosphere)	Time
I	Reporting the assignment - discussion and evaluation	10 minutes
II	Instruction and preparation for out door evaluation	5 minutes
III	Outdoor branching evaluation game appraisal and giving rewards *	30 minutes

Phase 1

The group leaders report the assignment. The investigator verifies and asks them take down note the following.

1) Vembanattu lake and Ashtamudi lake – Indian west coast.
2) Pulicat and chilka – Indian east coast

3) Sea cliffs, sea caves , stakes and arches are sculpturing work of sea waves.

Phase II

The investigator gives instructions to four teachers and pupils about the branching evaluation game and doing necessary arrangements.

Phase III Branching evaluation game*

Out door branching
Evaluation game

* Four teachers are seated in the four corners of an open ground at a distance of ten meters each. Each teacher is entrusted with five questions with a scoring sheet along with the key. Both the teachers and the pupils were given proper guidance by the investigator about the game. When the investigator gives a long whistle the pupils run and queue up at the point five meters away from the teacher to avoid crowding. Then they proceed one by one to the teacher concerned on hearing the second whistle to get a question to be answered for scoring three marks. Then they rush up to another teacher to get the second question and this action goes on till the stipulated time of twenty minutes is over, when the third whistle is given by the investigator. In the meanwhile whenever a pupil feels any difficulty in the question he can approach the investigator who is seated at the centre of the ground under an umbrella, controlling the game for getting clarification for the question. After which he can again proceed to the concerned teacher as his second chance for which he can score only two marks for the correct answer. In the same way, for the third chance for the same question he can scor3ee only one mark .in this way only the brilliant and smart students can score the maximum of sixty marks within twenty minutes.

The pupils are informed of their scores at the end at the same venue.

This evaluation game has been repeated for the other two topics Hydrosphere and Biosphere also dealt with by the investigator.

APPENDIX 1 (b)

RECEPTION LEARNING LESSON PLAN

Name of the teacher	:	Padmanabhan, M	Time	: 45 minutes
School	:	Poilkave secondary school	Strength	: 40 pupils
Class	:	IXth standard		
Subject	:	Geography		
Unit	:	Lithospere		
Topic	;	Earth movements		

CONTENT ANALYSIS

Terms and names	Surface of the earth, earth, earth quake, volcanic explosion, changes in the crust, sea level, populated areas, sea shores bay valleys, mountains, plateaus, continents, exogenic and endogenic movements.
Places	India, Dwaraka, Kathiawar
Facts	The surface of the earth is undergoing changes due the inconsistent nature of the earth. The land has arisen from the sea level Vertical movements are responsible for a rise or fall of a portion of the earth's surface. Continental building movements are called endogenic forces. The wearing away and sculpturing of the land forms are called exogenic forces.
Concept	The surface of the earth is changing

INSTRUCTIONAL OBJECTIVES

(1) Knowledge	The pupils gather information in various facts, terms, concepts associated with the topic
(2)Understanding	The pupil develop understanding of different aspects of the changes going on the earth's surface.
(3) Application	The pupil applies the understanding to understanding to the sorroundings
(4) Skill	The pupil develops practical skill in observing and utilising the various movements of the earth

(5) interest — The pupil takes personal interest in learning more about relief features of earth
(6) Attitude — A student develops positive attitude towards the study of other movements of earth
Teaching aids — Charts, maps, glob, bullatin board, etc.
Previous knowledge — It is assumed that the pupils of IX standard know some thing about the earth

Content	Specification	Learning experience	Evaluation
Introduction	Recall	Asking some questions for to introduce the topic. How many planets are in the solar system? What are the special features of earth? Is the earth's surface constant? The changing faces of earth is our topic for today	Give some examples for the changes going on the earth's surface.
Presenstation Earth's surface continuously changing due to the different works going on the surface		Earth's surfae going continuous change. Volcanic explosion and earthquakes makes sudden change sin the surface. Slow changes are also going on the earth due to exogenic forces, its effects can be seen	What is uplift?
	Explains	hundreds of years later	
The movement in the crest uplifted some places and lowered some places		The earth movements are of two types. Vertical and horizontal. Vertical movements are responsible for fall of a portion of the earth surface	Which is continental building movement?
Tectonic movements	Explain	The earth movements which bring about the vast changes originated within the earth is tectonic movement	What is tectonic movement?
Vertical movement Uplift – subsidence Horizontal movements		Horizontal movements involving compression and tension. They apply tangential forces to earth's surface	Give examples for an uplifted coast in India?

Sudden movement Sudden movements Slow movements Kathiawar – Orissa Gradation Aggradation Exogenic and Endogenic movements	Illustrate Recognise Compare Explain	Learthquakes and volcanic explosion cause sudden changes in the earth's surface Slow movements uplift the surface over long period. Examples; Kathiawar, orissa coast Gradation is leveling down the earth's elevated feature. Filling up the depression of the earth's surface is called aggradation Slow continental building movements are endogenic movements and the wearing away and sculpturing of the land forms are exogenic movements. Illustrates again about Horizontal and vertical movements. Pupils understanding. Asking questions. Clearing doubts	Give the name of the recent earth quake effected area in India? What is gradation? What is aggradation? Compare the difference between endogenic and exogenic movements? What are the exogenic forces?

Review questions

1. Why sudden changes are going on the earth's surface?
2. The major changes are due to……
3. Give an example in India for the fall of earth portion in the sea?
4. What is exogenic movement?
5. What you mean by endogenic movement?
6. What is tectonic movement?

Home assignment

1. Write a whort note on the changes going on the earth's surface due to different forces in the crest

APPENDIX II.

UNIVERSITY OF CALICUT Dept: of Adult Education
Pre- Requisite Test
In Geogra phy for IX Standard, Kerala

Time:40 mts **Marks:25**

(ബ്രാക്കറ്റിൽ നിന്നും ശരിയുത്തരം തെരഞ്ഞെടുത്തെഴുതുക. എല്ലാശരിയുത്തരങ്ങൾക്കും ഓരോ മാർക്കു വീതം)

1. ജലത്തിന്റെ വാതകരൂപം (മഞ്ഞ്, മഴ,നീരാവി, മേഘം)
2. മഴയുടെ തോത് അഴക്കുന്ന ഉപകരണം (തെർമോമീറ്റർ, റെയിൻ ഗേജ് , സീസ്മോഗ്രാഫ്, ബാരോമീറ്റർ)
3. അന്തരീക്ഷ വായുപിണ്ഡത്തിന്റെ ഏകദേശം 97% ഉൾക്കൊള്ളുന്നത് ഭൂമിയുടെ ഉപരിതല ത്തിൽനിന്ന് മുകളിലോട്ട് (25 കി.മി., 38 കി.മി. , 29കി.മി., 40 കി.മി.)
4. അൾട്രാ വയലറ്റ് റേഡിയേഷനിൽ നിന്നും നമ്മെ രക്ഷിക്കുന്നത് (ഓക്സിജൻ, ഹൈഡ്രജൻ, വനങ്ങൾ, ഓസോൺ)
5. ഭൂമിയിലെ ജലത്തിന്റെ 97% കേന്ദ്രീകരിക്കപ്പെട്ടിരിക്കുന്നത് (നദികൾ,കായൽ, സമുദ്രങ്ങൾ, ഭൂഗർഭ ജലം
6. ഓസോൺ ഉൾക്കൊള്ളുന്ന അന്തരീക്ഷ പാളി (ട്രോപ്പോസ്ഫിയർ, മെസോസ്ഫിയർ, സ്ട്രാറ്റോസ്ഫിയർ, തെർമോസ്ഫിയർ)
7. അന്തരീക്ഷ വായുവിന്റെ രാസഘടന ഏകദേശം തുല്യമായി നിലകൊള്ളുന്ന ഭൂമിയുടെ ഉപരിതലത്തിൽ നിന്നുള്ള ഉയരം (100 കി.മി., 90കി.മി., 80കി.മി., 40കി.മി.)
8. ട്രോപ്പോസ്ഫിയറിൽ മുകളിലോട്ട് പോകുന്തോറും ചൂടു കുറയുന്നു. അതിന്റെ തോത് ഏതാണ്ട് (1 കി.മീറ്ററിന് 4.6° c, 1 കി.മീറ്ററിന് 6.4° c, 1 കി.മീറ്ററിന് 8.64° c, 1 കി.മീറ്ററിന് 4.4° c)
9. അന്തരീക്ഷ വായുമർദ്ദം അളക്കുന്ന ഉപകരണം (ഹൈഗ്രോമീറ്റർ, തെർമോമീറ്റർ, ബാരോമീറ്റർ,ക്രോണോമീറ്റർ)
10. ഭൂമദ്ധ്യ രേഖ നിമ്ന മർദ്ദ മേഖലയാണ് (അക്ഷാംശം 35° N-30° S, അക്ഷാംശം 15° N- 10° S, അക്ഷാംശം 0° S- 10° N, അക്ഷാംശം 30° N-30° S)
11. അന്തരീക്ഷവായുവിന്റെ ആർദ്രത അളക്കുന്ന ഉപകരണമാണ് (ക്രോണോ മീറ്റർ ,ബാരോമീറ്റർ, ഹൈഗ്രോമീറ്റർ, തെർമോമീറ്റർ)
12. സമുദ്ര വിതാനത്തിലെ സാധാരണ വായുമർദ്ദം ഏകദേശം (80 സെ.മി. ,76സെ.മി, 100സെ.മി, 102സെ.മി
13. ഉഷ്ണ- ശൈത്യ ജലപ്രവാഹങ്ങൾ സന്ധിക്കുന്ന സമുദ്ര ഭാഗത്ത് എപ്പോഴും കാണപ്പെടുന്നതാണ് (ഐസ്, മൂടൽമഞ്ഞ് , പുക, ചുഴലിക്കാറ്റ്)
14. നാലുമണി മഴ ഉണ്ടാവുന്ന പ്രദേശമാണ് (ധ്രുവപ്രദേശം, മിതോഷ്ണ പ്രദേശം , മദ്ധ്യരേഖക്കടുത്തുള്ള പ്രദേശം, മരുഭൂമിപ്രദേശം)
15. അന്തരീക്ഷത്തിൽ ഏറ്റവു കുറച്ചുള്ള വാതകം (മീഥൈൽ, ഹൈഡ്രജൻ, സെനോൺ, ക്രിപ്ടോൺ
16. സൂര്യനിൽനിന്നും ഭൂമിയിലേക്ക് പതിക്കുന്ന പ്രകാശം (ദീർഘ തരംഗ രൂപത്തിൽ, ഹ്രസ്വതരംഗ രൂപത്തിൽ, തിരശ്ചീന രൂപത്തിൽ, ലംബ രൂപത്തിൽ)
17. സൂര്യാസ്തമനത്തിന് ശേഷം ഇരുട്ടു വ്യാപിക്കുന്നതിന് മുമ്പുള്ള മങ്ങിയ വെളിച്ചമാണ് (പശ്ചിമ സന്ധ്യ, പൂർവ്വ സന്ധ്യ, ചക്രവാള സന്ധ്യ, അസ്തമന സന്ധ്യ)
18. ഭൂമിയുടെ യഥാർത്ഥ ആകൃതി (ഗോളം, ജിയോയിഡ്, ദീർഘ വൃത്തം, വൃത്തം)
19. ചന്ദ്രൻ ഭൂമിക്കു ചുറ്റും ഒരു പ്രാവശ്യം പരിക്രമണം പൂർത്തിയാക്കുന്നത് 3651/4 ദിവസം, 30 ദിവസം, 29.53 ദിവസം, 27.5 ദിവസം)

വിട്ട ഭാഗം ബ്രാക്കറ്റിൽ നിന്ന് തെരഞ്ഞെടുത്ത് പൂരിപ്പിക്കുക

[സൂര്യൻ, പ്രകാശ വർഷം, ഹാലീസ് കോമെറ്റ് , പ്ലാസ്മ, ക്ഷീരപഥം]

20. നമ്മുടെ സൗരയൂഥം ----- എന്ന ഗ്യാലക്സിയിൽ ഉൾപ്പെടുന്നു.
21. ദ്രവ്യത്തിന്റെ നാലാമത്തെ അവസ്ഥയാണ്------
22. ------ഭൂമിയുടെ ഏറ്റവും അടുത്തുള്ള നക്ഷത്രമാണ്.

ചേരുംപടി ചേർക്കുക

23.	വെസുവിയസ്	വടക്കുദിശ
24.	ഗ്ലോബ്	സൂര്യന് ഏറ്റവും അടുത്തുള്ള നക്ഷത്രം
25.	അന്തരീക്ഷം	അഗ്നിപർവ്വതം ഭൂമിയുടെ മാതൃക രക്ഷാകവചം

40

APPENDIX II B

DEPARTMENT OF ADULT AND CONTINUING EDUCATION
UNIVERSITY OF CALICUT

PRE-REQUISITE TEST IN GEOGRAPHY FOR IX STANDARD
2000

Prepared by Dr. K. Karunakaran and Padmanabhan,M.

Time: 40 mts.
Marks: 25

Select the correct answer given in bracket. All answers carry equal marks)

1. Gas form of water (snow, rain, vapour, cloud)
2. The instrument which can measure the intensity of rain (Thermometer, rain guage, seismograph, barometer)
3. About 97% mass of atmosphere is situated up to the surface of earth

   (25k.m, 38 k.m, 29 k.m, 40 k.m)
4. Which protect us from Ultraviolet radiation

   (Oxigen, Hydrogen, Forests, Ozone)
5. 75% of earth water is occupied in

   (Rivers, Lagoons, Oceans, underground water)
6. The atmospheric layer which contain ozone

   (Atmosphere, Mesosphere, Stratosphere, Thermosphere)
7. Almost equal chemical composition of air can be seen up to the height from the surface of the earth

   (100 km, 90 k.m, 80 k.m, 50 k.m)
8. When we go upward to the troposphere the temperature is decrease. The rate of decrease of temperature is

   (1k.m/4.6°c, 1.k.m/6.4°c,1.k.m/8.64°c, 1.k.m 4.4°c)
9. The instrument which can measure atmospheric pressure

   (Chronometer, Barometer, Hygrometer, Thermometer)
10. Equatorial low pressure belt

    (Latitude 35°N-30°S, Latitude 15°N-10°S, Latitude 0°S-10°N)

11 The instrument which can measure atmospheric humidity

(Chronometer, Barometer, Hygrometer, Thermometer)

12 The air pressure in the ocean surface

(80cms, 76 cms, 100cms, 102cms)

13 The phenomena which can be seen in the area where the hot stream and cold ocean currents meet together

(ice, smoke, fog, whirl winds)

14 4.P.M. rain take place

(Polar regions, semi-polar region, near equatorial region, desert region)

15 The lowest air seen in the atmosphere

(Methane, Hydrogen Senon, Cripton)

16 The rays coming from the sun to earth

(Horizontal wares, Vertical wares, Short wares, Long wares)

17 The dim light can be seen before sunset is

(Western sunset, dusk, Twilight, eastern sunset)

18 The real shape of earth is

(Round, Geoide, circle, eleptical)

19 The time needed for the moon for a revolution to earth

(365¼ days, 30 days, 29.53 days, 27.5 days)

(Fill in the blanks by correct answer given in bracket)

(Sun, Light year, Hali's commet, plasma, Milkyway)

20 Our solar system includes in the ----------

21 The fourth state of substance is ----------

22 ---------- is the nearest star to earth.

[Match the following]

23	Vesuvius	-	North direction
24	Globe	-	Nearest planet from sun
25	Atmosphere	-	Volcano model of earth protecting helnet.

APPENDIX II (c)

PRE-REQUISITE TEST IN GEOGRAPHY (SCORING KEY)

No.		No.	
1	Vapour	21	Plasma
2	Rain gage	22	Sun
3	29 km	23	Volcano
4	Ozone	24	Model of earth
5	Oceans	25	Protecting as helmet
6	Stratosphere		
7	90 km		
8	1 km/6.4°C		
9	Barometer		
10	Latitude 15°N to 10° S		
11	Hygrometer		
12	76 cms		
13	Fog		
14	Nearest place in the equatorial region		
15	Senon		
16	Short waves		
17	Twilight		
18	Geoid		
19	29.53 days		
20	Milky way		

APPENDIX III

KERALA UNIVERSITY GROUP TEST OF INTELLIGENCE

Name _____ _____ Std. _____ Divi. _____ School _____ _____

	Test I	Test II	Test III	Test IV	Test V
1	a b **c** d	a b c d **e**	a b **c** d	a **b** c d	a **b** c d
2	a b c **d**	a b c **d** e	a b c **d**	a **b** c d	a **b** c d
3	a **b** c d	a b c d **e**	a **b** c d	**a** b c d	**a** b c d
4	a b **c** d	a **b** c d e	a **b** c d	a b **c** d	**a** b c d
5	a b **c** d	a b c d **e**	**a** b c d	**a** b c d	a b c **d**
6	a b **c** d	a b c d **e**	a b c **d**	a b **c** d	a **b** c d
7	a b c **d**	a b c **d** e	a **b** c d	a **b** c d	a **b** c d
8	a **b** c d	a b c **d** e	**a** b c d	a **b** c d	a b c **d**
9	a **b** c d	a b **c** d e	**a** b c d	a b **c** d	a b c **d**
10	**a** b c d	a b c **d** e	a b c **d**	a **b** c d	a b **c** d
11	a **b** c d	a b c **d** e	**a** b c d	a **b** c d	a **b** c d
12	a b **c** d	a b **c** d e	**a** b c d	a **b** c d	a b **c** d
13	a b c **d**	a b c **d** e	**a** b c d	**a** b c d	a b c **d**
14	a b **c** d	a b c d **e**	**a** b c d	**a** b c d	**a** b c d
15	**a** b c d	**a** b c d e	a **b** c d	**a** b c d	**a** b c d
16	**a** b c d	a b c d **e**	a **b** c d	**a** b c d	**a** b c d
17	a b **c** d	a b c **d** e	**a** b c d	a **b** c d	a b c **d**
18	a b **c** d	a b c **d** e	**a** b c d	a b **c** d	a b c **d**
19	a **b** c d	a b c d **e**	a **b** c d	a b **c** d	a b c **d**
20	a b c **d**	**a** b c d e	**a** b c d	**a** b c d	**a** b c d

APPENDIX IV

DEPARTMENT OF EDUCATION
UNIVERSITY OF KERALA
GENERAL DATA SHEET

നിർദ്ദേശങ്ങൾ :

താഴെപറയുന്ന ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിച്ച് ഉത്തരം എഴുതേണ്ടിടത്ത് എഴുതുക, ഉത്തരങ്ങൾ കൊടുത്തിട്ടുള്ളിടത്ത് ശരിയായ ഉത്തരത്തിനെതിരെ ശരി അടയാളം ഇടുക.

1. പേര്.....
2. ആൺകുട്ടി/പെൺകുട്ടി
3. സ്കൂൾ/സ്ഥാപനം.....
4. തിയ്യതി.....
5. കുടുംബാംഗങ്ങളെക്കുറിച്ചുള്ള വിവരം താഴെ [1] മുതൽ [9] വരെയുള്ള കോളങ്ങളിൽ സൂചിപ്പിക്കാവുന്നതാണ്. അതിൽ ആവശ്യമുള്ള കോളത്തിൽ ശരി [| ⁄] അടയാളപ്പെടുത്തുക.

അംഗങ്ങൾ	അക്ഷരാഭ്യാസം ഇല്ല	Std. I to IV	Std. IV to VII	Std. VIII to X	Pre University, Pre Degree, I T C Intermediate	BA, BSc, Bcom Eng. Diploma etc.	MA, MSc, MEd, BL, BSc [Engg], MSc [Engg], MBBS, BSc [Tech], Ph. D. etc.	ജോലിയുണ്ടെങ്കിൽ ജോലിയുടെ പേര്	പ്രതിമാസ വരുമാനം
	1	2	3	4	5	6	7	8	9
പിതാവ് (രക്ഷാകർത്താവ്)									
മാതാവ്									

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APPENDIX 5 (A)/I

UNIVERSITY OF CALICUT
Dept of Adult and Continuing Education
Achievement Test in Geography
(Draft)

Time:1 Hour **Marks:60**

(ബ്രാക്കറ്റിൽ നിന്നും ശരിയുത്തരം തെരഞ്ഞെടുത്തെഴുതുക. എല്ലാശരിയുത്തരങ്ങൾക്കും ഓരോ മാർക്കു വീതം)

1. ഭൂവൽക്കത്തിലെ താഴ്ന്ന ഭാഗങ്ങൾ നിറക്കപ്പെടുന്ന പ്രക്രിയ
(അപക്ഷയം, ഡിഗ്രഡേഷൻ,അഗ്രഡേഷൻ,ഗ്രഡേഷൻ)
2. വിപുലമായ ആന്തരിക മാറ്റങ്ങൾക്കിടയാക്കുന്നതും ഭൂഗർഭത്തിൽ നിന്നുടലെടുക്കുന്നതുമായ ഭൂചലനങ്ങൾ (ദ്രുത ചലനം,ലംബചലനം, ടെക്ടോണിക് ചലനം,തിരശ്ചീന ചലനം)
3. കേരളത്തിലെ ഒരു തിരാവൈദ്യുതോൽപാദന കേന്ദ്രം
(കൊച്ചി, വിഴിഞ്ഞം, ബേപ്പൂർ, നീണ്ടകര)
4. ഭൂകമ്പം മൂലമുണ്ടാവുന്ന വിനാശകാരികളായ തിരമാലകൾ
(വാവുവേലി, സപ്തമിവേലി, സുനാമികൾ, വേലായഭിത്തി)
5. ഭൂഖണ്ഡ രൂപീകരണ ചലനങ്ങൾ
(ബാഹ്യജന്യ ചലനം, അന്തർജന്യ ചലനം, തിരശ്ചീന ചലനം, ലംബചലനം)
6. ഇരുമ്പിന്റെ തുരുമ്പിക്കലാണ്
(ഹൈഡ്രേഷൻ, ഓക്സിഡേഷൻ, കാർബണേഷൻ, സൊലൂഷൻ)
7. ഒരു ആവാസ വ്യവസ്ഥയിലെ സുപ്രധാന ആരോഗ്യ പ്രവർത്തകരാണ്
(ഉൽപാദകർ, വിഘാടകർ, പ്രാഥമിക ഉപഭോക്താക്കൾ, മദ്ധ്യമ ഉപഭോക്താക്കൾ)
8. കല്ലുപ്പ്, ജിപ്സം എന്നിവ ജലത്തിൽ ലയിക്കുന്ന പ്രവർത്തനമാണ്
(ഓക്സിഡേഷൻ, ഹൈഡ്രേഷൻ, സൊല്യൂഷൻ, ഗ്രഡേഷൻ)
9. രണ്ട് വേലിയേറ്റങ്ങൾക്കിടയിലുള്ള സമയം
(12 മണിക്കൂർ, 12.30 മണിക്കൂർ, 12.25 മണിക്കൂർ, 11.30 മണിക്കൂർ)
10. ഇന്ത്യയിൽ ഉത്ഥാനത്തിന് നല്ലൊരുദാഹരണമാണ്
(ദ്വാരക, കത്തിയവാർ, രാമേശ്വരം, പാരദ്വീപ്)
11. ചല്ലിക്കൂമ്പാരങ്ങൾക്കു കാരണം
(തരുലതാദികൾ, ജലത്തിന്റെ തണുത്തുറയൽ, മണ്ണൊലിപ്, ഊഷ്മാവ്)
12. ഐസോ ഹൈലൈൻ എന്നാൽ
(തുല്യ ലവണത്വമുള്ള സമുദ്രഭാഗം, തുല്യ മഴ പെയ്യുന്ന സ്ഥലം, സമതാപ മേഖല, തുല്യ ആഴമുള്ള സമുദ്രഭാഗം)
13. വേലിയേറ്റ സമയത്ത് നദീമുഖങ്ങളിൽ ഇരച്ചു കയറുന്ന ജലം
(വാവുവേലി, സപ്തമിവേലി, വേലായഭിത്തി, വേലിയേറ്റം)
14. മദ്ധ്യ രേഖാ പ്രദേശങ്ങളിൽ നിന്നും ധ്രുവങ്ങലിലേക്ക് പോകുന്തോറും ജലത്തിന്റെ ലവണത്വം
(കൂടുന്നു, കുറയുന്നു, അല്പം കൂടുന്നു, തുല്യമായിരിക്കും)
15. നദി വക്രവലയത്തിൽ നിന്നും നേരെ ഒഴുകുമ്പോൾ ഒറ്റപ്പെട്ടുണ്ടാകുന്നതാണ്
(വക്രവലയം, ഓസ്ബോ തടാകം, ശുദ്ധ തടാകം, കാസ്കേഡ്)
16. ഇന്ത്യയിലെ ഏറ്റവും വലിയ ജലപാതം
(ജ്യാലാമുഖി, നയാഗ്ര, ജോഗ്, അതിരപ്പള്ളി)
17. മലമ്പ്രദേശത്ത് കൂടി താഴോട്ടൊഴുകുന്ന നദി അടിത്തട്ടിലെ പദാർത്ഥങ്ങളെ കാർന്നെടുക്കുന്ന പ്രവർത്തനമാണ്
(ഗിരികന്ദരം, ജലപാതം, ഡൗൺകട്ടിങ്ങ്, ശൈലതടം)
18. കടൽക്കരയിൽ നിന്നും പുറംകടലിലേക്കെത്തുന്ന ആഴം കുറഞ്ഞ സമുദ്രത്തറയാണ്
(വൻകരത്തട്ട്, വൻകരച്ചരിവ്, വൻകരകയറ്റം, ദ്വീപുകൾ)
19. വായു, ജലം എന്നിവയുടെ പ്രവർത്തനഫലമായി ശിലകൾക്കുണ്ടാവുന്ന വിഘടനം
(ബലകൃതം, രാസായനികം, ഖാദനം, കാർന്നെടുക്കൽ)
20. ജൈവമരുഭൂമി എന്നറിയപ്പെടുന്ന സമുദ്രഭാഗം
(പ്യൂർട്ടോറിക്കോ, വാർട്ടൺ ഗർത്തം, സർഗ്ഗാസോ, ചാലഞ്ചർ ഗർത്തം)
21. ഏറ്റവുമധികം സസ്യജാലങ്ങൾ കാണപ്പെടുന്ന മേഖല
(മിതോഷ്ണ മേഖലാ വനങ്ങൾ, ടൈഗാവനങ്ങൾ, ഉഷ്ണമേഖലാ മഴക്കാടുകൾ, ടെണ്ട്റാ വനങ്ങൾ)
22. സൂര്യചന്ദ്രന്മാർ ഭൂമിയുടെ 90^0 അകലത്തായിരിക്കുമ്പോഴുള്ള വേലിയേറ്റം
(വാവുവേലി, സപ്തമിവേലി, വേലായഭിത്തി, വേലിയേറ്റം)
23. കരമേഖലയിലെ ആവാസവ്യവസ്ഥയ്ക്കടിസ്ഥാനമായ പ്രത്യേകതരത്തിലുള്ള ജീവിസമുദായത്തെ വിളിക്കുന്നത്
(ഇക്കോസിസ്റ്റം, ബയോംസ്, ലോട്ടിക്, ലാന്റിക്)
24. താഴെ ക്കൊടുത്തവയിൽ ഉല്പാദകർ
(മുയൽ - എലി, പുല്ല് - മരം, ബാക്ടീരിയ - ഫംഗസ്, കടുവ - കുറുക്കൻ)
25. താഴെപറയുന്ന ഗണത്തിൽപ്പെടാത്തത്
(ബർഖൻ, കുമിൾശില, പീഠഗർത്തം, ലോയിസ്
26. 'S' അടയാളവുമായി സാമ്യമുള്ള സമുദ്രം
(ഇന്ത്യൻ മഹാസമുദ്രം, ആർട്ടിക്, അന്റാർട്ടിക്ക്, പെസഫിക്, അത്ലാന്റിക്)

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27. താഴെ കൊടുത്ത പ്രസ്താവനകളിൽ പ്ലവകങ്ങളുമായി **(PLAKTONS)** ബന്ധപ്പെട്ടത്
(മത്സ്യബന്ധന മേഖല, മത്സ്യങ്ങൾക്കു പറ്റിയ തീറ്റ, പ്രവാഹങ്ങൾ സന്ധിക്കുന്നു, സമുദ്രാന്തർ ഭാഗം)
28. ഹിമകൃത ഖാദനം വഴിയുണ്ടാകുന്ന ഭൂരൂപങ്ങൾ
(ഹിമാനി - ശിലാഖണ്ഡം, ലോയിസ് - ബർഖൻ, തൂക്കു താഴ് വര - പീഠഗർത്തം, ശൈലതടാകം - ഓസ്ബോ)
29. കാറ്റ് ഉത്തരാർദ്ധഗോളത്തിൽ വലത്തോട്ടും ദക്ഷിണാർദ്ധഗോളത്തിൽ ഇടത്തോട്ടും ചരിഞ്ഞുവീശുന്നു. ഇതുമായി നേരിട്ട് ബന്ധമില്ലാത്തത്
(കോറിയോലിസ് ബലം, ഫെറൽ നിയമം, ഭൂഭ്രമണം, ടെക്ടോണിക് ചലനം)
30. ഉത്തര അത്ലാന്റിക് സമുദ്രത്തിൽ 5.2 മില്യൺ ച.കി.മി. വ്യാപിച്ചു കിടക്കുന്ന കടൽപ്പായൽ നിറഞ്ഞ സ്ഥലം
(മറിയാന കിടങ്ങ്, വാർട്ടൺ ഗർത്തം, സർഗ്ഗാസോ, പ്യൂർട്ടോറിക്കോ)
31. ഒരുനിശ്ചിത വ്യാപ്തം വായുവിൽ അടങ്ങിയിരിക്കുന്ന ജലബാഷ്പത്തിന്റെ മൊത്തം അളവാണ്
(സ്പഷ്ട ആർദ്രത, സമ്പൂർണ ആർദ്രത, ആപേക്ഷിക ആർദ്രത, ആർദ്രത)
32. സമുദ്ര ജലത്തിന്റെ ലവണത്വം കണക്കാക്കുന്നത്
(35 ഗ്രാം/1000കി.ഗ്രാം,35 $^{1}/_{100}$കി.ഗ്രാം, 10.9 %, 77.7 %)
33. ശൈവാലം, ലിച്ചൻസ് തുടങ്ങിയ നൈസർഗ്ഗിക സസ്യജാലങ്ങൾ കാണപ്പെടുന്നത്
(ഭൂമദ്ധ്യ രേഖാ പ്രദേശത്ത് , പുൽപ്രദേശത്ത്, മഴക്കാടുകളിൽ, ആർട്ടിക് പ്രദേശത്ത്
34. പരിസ്ഥിതി വിജ്ഞാനത്തിന്റെ **(ECOLOGY)** ഉപജ്ഞാതാവ്
(ലൂയി പാസ്റ്റർ, ഏണെസ്റ്റ് ഹൊയ്ക്കൽ, സുന്ദർലാൽ ബഹുഗുണ, ആർണോൾഡ് ഗയോട്ട്)
35. ഏറ്റവും ആഴമുള്ള സമുദ്ര ഗർത്തം
(വാർട്ടൺ, പ്യൂർട്ടോറിക്കോ, ചാലഞ്ചർ, സർഗ്ഗാസോ)
36. 'ജിയോമോർഫോളജി'
(സമുദ്രപഠനശാസ്ത്രം, ഭൂമിശാസ്ത്രം ശിലാപഠനശാസ്ത്രം, ഭൂഗർഭ ശാസ്ത്രം)
37. ഇന്ത്യൻ മഹാസമുദ്രത്തിലെ ദ്വീപുകളല്ലാത്തത്
(മെഡഗാസ്കർ, മാലി, ലക്ഷദ്വീപ്, വെസ്റ്റ് ഇൻഡീസ്)
38. ടൈഗാ കാലാവസ്ഥക്ക് യോജിച്ച പ്രസ്താവന
(ഹ്രസ്വമായ വേനലുള്ള മഞ്ഞുപ്രദേശം, ഏകപത്ര സസ്യ മേഖല, സ്തൂപികാഗ്രിത വനങ്ങൾ കാണുന്നു, ഇലപൊഴിയുന്ന വൃക്ഷങ്ങൾ കാണുന്നു)
39. അക്വിഫറുകൾക്ക് ഉദാഹരണം
(ഗ്രാനൈറ്റ് - മാർബിൾ, കളിമണ്ണ് - ക്വാർട്ടസൈറ്റ് ,മണൽ - മണൽക്കല്ല്, ഇൽമിനൈറ്റ് - മോണോസൈറ്റ്)
40. ഉഷ്ണ മരുഭൂമിപ്രദേശത്തെ കാലാവസ്ഥക്ക് യോജിക്കാത്ത പ്രസ്താവന
(കള്ളിച്ചെടികൾ വളരുന്നു, മഴ കുറവാണ്, ഫിഗ്സ് - സ്പ്രൂസ് മരങ്ങൾ വളരുന്നു, ചൂടിനെ അതിജീവിക്കുന്ന മൃഗങ്ങളുണ്ട്)
41. ഭൂമിയിൽ ഉന്നത ലവണത്വമുള്ള സമുദ്ര ഭാഗങ്ങൾ കാണപ്പെടുന്നത്
(0°അക്ഷാംശം, 30° അക്ഷാംശം, 35° അക്ഷാംശം, 22° അക്ഷാംശം)
42. ആസ്ട്രേലിയയുടെ കിഴക്കൻ തീരങ്ങളിൽ കാണുന്ന പവിഴപ്പുറ്റുകൾ
(പവിഴചക്രം, പ്രാകാരപവിഴനിര, മഹാപ്രാകാര പവിഴനിര, തൊങ്ങൽ പവിഴപ്പുറ്റുകൾ)
43. ഇംഗ്ലണ്ടിലെ സതാംപ്ടൺ തീരത്ത് ഒരുദിവസം 4 വേലിയേറ്റം അനുഭവപ്പെടുന്നത്
(സൂര്യചന്ദ്രന്മാരുടെ ആകർഷണം, കാറ്റ് ,നദീജലം തള്ളിക്കയറുന്നതിനാൽ, തിരമാലകളാൽ)
44. വക്രദിശയിലൂടെ വായുപ്രവാഹം കേന്ദ്രത്തിൽനിന്ന് പുറം ദിശയിലേക്ക് വേഗത്തിൽ കറങ്ങുമ്പോഴുണ്ടാവുന്ന ബലമാണ്
(കോറിയോലിസ് ബലം, ഗുരുത്വാകർഷണ ബലം, അപകേന്ദ്രബലം, ഭൂഭ്രമണബലം)
45. അത്ലാന്റിക്കിലെ ഏറ്റവും വലിയ സമുദ്രാന്തർവിള്ളൽ
(ഹഡ്സൺ, ബെറിങ്ങ്, മറിയാന,ഡോഗർ)
46. സ്വാഭാവിക വാസ സ്ഥാനത്തിലുള്ള ജീവീയ - അജീവീയ ഘടകങ്ങൾ ചേർന്ന ചുറ്റുപാട്
(പരിസ്ഥിതി, ആവാസവ്യവസ്ഥ, അതിജീവന സാഹചര്യം, കാടുകൾ)
47. ബാങ്ക്, ഷൗവൽ, റീഫ് എന്നിവ രൂപപ്പെടുന്നത്
(തിരമാലകളുടെ പ്രവർത്തനത്തിലൂടെ, അപദനവും ജൈവീയവുമായ പ്രക്രിയയിലൂടെ, പ്രവാഹങ്ങളുടെ പ്രവർത്തനം മൂലം, ലവണത്വം മൂലം)
48. പ്രത്യേകതരത്തിലുള്ള ജീവസമുദായങ്ങളെ വിളിക്കുന്നത്
(ഇക്കോസിസ്റ്റം, ബയോംസ്, എൺവിറോൺമെന്റ്, ബയോളജി)

ബ്രാക്കറ്റിൽനിന്നും ശരിയുത്തരം തെരഞ്ഞെടുത്ത് പൂരിപ്പിക്കുക

[ജ്വാലാമുഖി, അനിമോമീറ്റർ, വാർട്ടൺ, ബോംബെഹൈ, ചാവുകടൽ,ചാലഞ്ചർ]

49. ഇന്ത്യയുടെ പശ്ചിമതീരത്തെ ഒരു എണ്ണഖനന കേന്ദ്രമാണ്- - - - –
50. ഇന്ത്യൻമഹാസമുദ്രത്തിലെ ആഴം കൂടിയ ഭാഗമാണ്- - - - –
51. – – – – – ഇന്ത്യയിലെ പ്രസിദ്ധ ഉഷ്ണനീരുറവയാണ്.
52. ഏറ്റവും കൂടുതൽ ലവണത്വമുള്ള ജലാശയമാണ്- - - –
53. – – – – – കാറ്റിന്റെ വേഗത അളക്കുന്ന ഉപകരണമാണ്.

ചേരുംപടി ചേർക്കുക

54.	മാർബിൾ	അത്ലാന്റിക്
55.	കോറൽ പോളിപ്സ്	ഉഷ്ണജലപ്രവാഹം
56.	മെഡഗാസ്കർ	ലഗൂൺ
57.	പ്യൂർട്ടോറിക്കോ	ആസ്ട്രേലിയ
58.	കുറോഷിയോ	വൻകരാ അവശിഷ്ട ദ്വീപ്
59.	ചിൽക്ക	ചുണ്ണാമ്പുകല്ല്
60.	ഓൾഡ് ഫെയിത്ത് ഫുൾ	പവിഴപ്പുറ്റ്

5 (A) Malay

APPENDIX 5 (A)/II

UNIVERSITY OF CALICUT

Dept of Adult and Continuing Education

Achievement Test in Geography
For IX th Standard, Kerala.

Time:1 Hour **Marks:50**

(ബ്രാക്കറ്റിൽ നിന്നും ശരിയുത്തരം തെരഞ്ഞെടുത്തെഴുതുക. എല്ലാശരിയുത്തരങ്ങൾക്കും ഓരോ മാർക്കു വീതം)

1. വിപുലമായ ആന്തരിക മാറ്റങ്ങൾക്കിടയാക്കുന്നതും ഭൂഗർഭത്തിൽ നിന്നുടലെടുക്കുന്നതുമായ ഭൂചലനങ്ങൾ
(ദ്രുത ചലനം,ലംബചലനം, ടെക്ടോണിക് ചലനം,തിരശ്ചീന ചലനം)
2. കേരളത്തിലെ ഒരു തിരാവൈദ്യുതോൽപാദന കേന്ദ്രം
(കൊച്ചി, വിഴിഞ്ഞം, ബേപ്പൂർ, നീണ്ടകര)
3. ഭൂകമ്പം മൂലമുണ്ടാവുന്ന വിനാശകാരികളായ തിരമാലകൾ
(വാവുവേലി, സപ്തമിവേലി, സുനാമികൾ, വേലായഭിത്തി)
4. ഭൂഖണ്ഡ രൂപീകരണ ചലനങ്ങൾ
(ബാഹ്യജന്യ ചലനം, അന്തർജന്യ ചലനം, തിരശ്ചീന ചലനം, ലംബചലനം)
5. ഒരു ആവാസ വ്യവസ്ഥയിലെ സുപ്രധാന ആരോഗ്യ പ്രവർത്തകരാണ്
(ഉൽപാദകർ, വിഘാടകർ, പ്രാഥമിക ഉപഭോക്താക്കൾ, മദ്ധ്യമ ഉപഭോക്താക്കൾ)
6. കല്ലുപ്പ്, ജിപ്സം എന്നിവ ജലത്തിൽ ലയിക്കുന്ന പ്രവർത്തനമാണ്
(ഓക്സിഡേഷൻ, ഹൈഡ്രേഷൻ, സൊല്യൂഷൻ, ഗ്രഡേഷൻ)
7. രണ്ട് വേലിയേറ്റങ്ങൾക്കിടയിലുള്ള സമയം
(12 മണിക്കൂർ, 12.30 മണിക്കൂർ, 12.25 മണിക്കൂർ, 11.30 മണിക്കൂർ)
8. ഇന്ത്യയിൽ ഉത്ഥാനത്തിന് നല്ലൊരുദാഹരണമാണ്
(ദ്വാരക, കത്തിയവാർ, രാമേശ്വരം, പാരദ്വീപ്)
9. ചല്ലിക്കൂമ്പാരങ്ങൾക്കു കാരണം
(തരുലതാദികൾ, ജലത്തിന്റെ തണുത്തുറയൽ, മണ്ണൊലിപ്, ഊഷ്മാവ്)
10. വേലിയേറ്റ സമയത്ത് നദീമുഖങ്ങളിൽ ഇരച്ചു കയറുന്ന ജലം
(വാവുവേലി, സപ്തമിവേലി, വേലായഭിത്തി, വേലിയേറ്റം)
11. മദ്ധ്യ രേഖാ പ്രദേശങ്ങളിൽ നിന്നും ധ്രുവങ്ങലിലേക്ക് പോകുന്തോറും ജലത്തിന്റെ ലവണത്വം
(കൂടുന്നു, കുറയുന്നു, അല്പം കൂടുന്നു, തുല്യമായിരിക്കും)
12. നദി വക്രവലയത്തിൽ നിന്നും നേരെ ഒഴുകുമ്പോൾ ഒറ്റപ്പെട്ടുണ്ടാകുന്നതാണ്
(വക്രവലയം, ഓസ്ബോ തടാകം, ശുദ്ധ തടാകം, കാസ്കേഡ്)
13. ഇന്ത്യയിലെ ഏറ്റവും വലിയ ജലപാതം
(ജ്വാലാമുഖി, നയാഗ്ര, ജോഗ്, അതിരപ്പള്ളി)
14. മലമ്പ്രദേശത്ത് കൂടി താഴോട്ടൊഴുകുന്ന നദി അടിത്തട്ടിലെ പദാർത്ഥങ്ങളെ കാർന്നെടുക്കുന്ന പ്രവർത്തനമാണ്
(ഗിരികന്ദരം, ജലപാതം, ഡൗൺകട്ടിങ്ങ്, ശൈലതടം)
15. വായു, ജലം എന്നിവയുടെ പ്രവർത്തനഫലമായി ശിലകൾക്കുണ്ടാവുന്ന വിഘടനം
(ബലകൃതം, രാസായനികം, ഖാദനം, കാർന്നെടുക്കൽ)
16. ഏറ്റവുമധികം സസ്യജാലങ്ങൾ കാണപ്പെടുന്ന മേഖല
(മിതോഷ്ണ മേഖലാ വനങ്ങൾ, ടൈഗാവനങ്ങൾ, ഉഷ്ണമേഖലാ മഴക്കാടുകൾ, ടെണ്ട്റാ വനങ്ങൾ)
17. സൂര്യചന്ദ്രന്മാർ ഭൂമിയുടെ 90^0 അകലത്തായിരിക്കുമ്പോഴുള്ള വേലിയേറ്റം
(വാവുവേലി, സപ്തമിവേലി, വേലായഭിത്തി, വേലിയേറ്റം)
18. കരമേഖലയിലെ ആവാസവ്യവസ്ഥയ്ക്കടിസ്ഥാനമായ പ്രത്യേകതരത്തിലുള്ള ജീവിസമുദായത്തെ വിളിക്കുന്നത്
(ഇക്കോസിസ്റ്റം, ബയോംസ്, ലോട്ടിക്, ലാന്റിക്)
19. താഴെ ക്കൊടുത്തവയിൽ ഉല്പാദകർ
(മുയൽ - എലി, പുല്ല് - മരം, ബാക്ടീരിയ - ഫംഗസ്, കടുവ - കുറുക്കൻ)
20. താഴെപറയുന്ന ഗണത്തിൽപ്പെടാത്തത്
(ബർഖൻ, കുമിൾശില, പീഠഗർത്തം, ലോയിസ്
21. 'S' അടയാളവുമായി സാമ്യമുള്ള സമുദ്രം
(ഇന്ത്യൻ മഹാസമുദ്രം, ആർട്ടിക്, അന്റാർട്ടിക്ക്, പെസഫിക്, അത്ലാന്റിക്)
22. താഴെ കൊടുത്ത പ്രസ്താവനകളിൽ പ്ലവകങ്ങളുമായി (PLAKTONS) ബന്ധപ്പെട്ടത്
(മത്സ്യബന്ധന മേഖല, മത്സ്യങ്ങൾക്കു പറ്റിയ തീറ്റ, പ്രവാഹങ്ങൾ സന്ധിക്കുന്നു, സമുദ്രാന്തർ ഭാഗം)
23. ഹിമകൃത ഖാദനം വഴിയുണ്ടാകുന്ന ഭൂരൂപങ്ങൾ
(ഹിമാനി - ശിലാഖണ്ഡം, ലോയിസ് - ബർഖൻ, തൂക്കു താഴ് വര - പീഠഗർത്തം, ശൈലതടാകം - ഓസ്ബോ)
24. കാറ്റ് ഉത്തരാർദ്ധഗോളത്തിൽ വലത്തോട്ടും ദക്ഷിണാർദ്ധഗോളത്തിൽ ഇടത്തോട്ടും ചരിഞ്ഞുവീശുന്നു. ഇതുമായി നേരിട്ട് ബന്ധമില്ലാത്തത്
(കോറിയോലിസ് ബലം, ഫെറൽ നിയമം, ഭൂഭ്രമണം, ടെക്ടോണിക് ചലനം)
25. ഉത്തര അത്ലാന്റിക് സമുദ്രത്തിൽ 5.2 മില്യൺ ച.കി.മി. വ്യാപിച്ചു കിടക്കുന്ന കടൽപ്പായൽ നിറഞ്ഞ സ്ഥലം
(മറിയാന കിടങ്ങ്, വാർട്ടൺ ഗർത്തം, സർഗ്ഗാസോ, പ്യൂർട്ടോറിക്കോ)

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26. സമുദ്ര ജലത്തിന്റെ ലവണത്വം കണക്കാക്കുന്നത്
(35 ഗ്രാം/1000കി.ഗ്രാം,35 $^{1}/_{100}$കി.ഗ്രാം, 10.9 %, 77.7 %)
27. ശൈവാലം, ലിച്ചൻസ് തുടങ്ങിയ നൈസർഗ്ഗിക സസ്യജാലങ്ങൾ കാണപ്പെടുന്നത്
(ഭൂമദ്ധ്യ രേഖാ പ്രദേശത്ത് , പുൽപ്രദേശത്ത്, മഴക്കാടുകളിൽ, ആർട്ടിക് പ്രദേശത്ത്
28. പരിസ്ഥിതി വിജ്ഞാനത്തിന്റെ (ECOLOGY) ഉപജ്ഞാതാവ്
(ലൂയി പാസ്റ്റർ, ഏണെസ്റ്റ് ഹൊയ്ക്കൽ, സുന്ദർലാൽ ബഹുഗുണ, ആർണോൾഡ് ഗയോട്ട്)
29. ഏറ്റവും ആഴമുള്ള സമുദ്ര ഗർത്തം
(വാർട്ടൺ, പ്യൂർട്ടോറിക്കോ, ചാലഞ്ചർ, സർഗ്ഗാസോ)
30. 'ജിയോമോർഫോളജി'
(സമുദ്രപഠനശാസ്ത്രം, ഭൂമിശാസ്ത്രം ശിലാപഠനശാസ്ത്രം, ഭൂഗർഭ ശാസ്ത്രം)
31. ടൈഗാ കാലാവസ്ഥക്ക് യോജിച്ച പ്രസ്താവന
(ഹ്രസ്വമായ വേനലുള്ള മഞ്ഞുപ്രദേശം, ഏകപത്ര സസ്യ മേഖല, സ്തൂപികാഗ്രിത വനങ്ങൾ കാണുന്നു, ഇലപൊഴിയുന്ന വൃക്ഷങ്ങൾ കാണുന്നു)
32. അക്വിഫറുകൾക്ക് ഉദാഹരണം
(ഗ്രാനൈറ്റ് - മാർബിൾ, കളിമണ്ണ് - ക്വാർട്ടസൈറ്റ് ,മണൽ - മണൽക്കല്ല്, ഇൽമിനൈറ്റ് - മോണോസൈറ്റ്)
33. ഉഷ്ണ മരുഭൂമിപ്രദേശത്തെ കാലാവസ്ഥക്ക് യോജിക്കാത്ത പ്രസ്താവന
(കള്ളിച്ചെടികൾ വളരുന്നു, മഴ കുറവാണ്, ഫിഗ്സ് - സ്പ്രൂസ് മരങ്ങൾ വളരുന്നു, ചൂടിനെ അതിജീവിക്കുന്ന മൃഗങ്ങളുണ്ട്)
34. ഭൂമിയിൽ ഉന്നത ലവണത്വമുള്ള സമുദ്ര ഭാഗങ്ങൾ കാണപ്പെടുന്നത്
(0^{0}അക്ഷാംശം, 30^{0} അക്ഷാംശം, 35^{0} അക്ഷാംശം, 22^{0} അക്ഷാംശം)
35. ആസ്ട്രേലിയയുടെ കിഴക്കൻ തീരങ്ങളിൽ കാണുന്ന പവിഴപ്പുറ്റുകൾ
(പവിഴചക്രം, പ്രാകാരപവിഴനിര, മഹാപ്രാകാര പവിഴനിര, തൊങ്ങൽ പവിഴപ്പുറ്റുകൾ)
36. ഇംഗ്ലണ്ടിലെ സതാംപ്ടൺ തീരത്ത് ഒരുദിവസം 4 വേലിയേറ്റം അനുഭവപ്പെടുന്നത്
(സൂര്യചന്ദ്രന്മാരുടെ ആകർഷണം, കാറ്റ് ,നദീജലം തള്ളിക്കയറുന്നതിനാൽ, തിരമാലകളാൽ)
37. വക്രദിശയിലൂടെ വായുപ്രവാഹം കേന്ദ്രത്തിൽനിന്ന് പുറം ദിശയിലേക്ക് വേഗത്തിൽ കറങ്ങുമ്പോഴുണ്ടാവുന്ന ബലമാണ്
(കോറിയോലിസ് ബലം, ഗുരുത്വാകർഷണ ബലം, അപകേന്ദ്രബലം, ഭൂഭ്രമണബലം)
38. അത്ലാന്റിക്കിലെ ഏറ്റവും വലിയ സമുദ്രാന്തർവിള്ളൽ
(ഹഡ്സൺ, ബെറിങ്ങ്, മറിയാന,ഡോഗർ)
39. സ്വാഭാവിക വാസ സ്ഥാനത്തിലുള്ള ജീവീയ - അജീവീയ ഘടകങ്ങൾ ചേർന്ന ചുറ്റുപാട്
(പരിസ്ഥിതി, ആവാസവ്യവസ്ഥ, അതിജീവന സാഹചര്യം, കാടുകൾ)
40. ബാങ്ക്, ഷൗവൽ, റീഫ് എന്നിവ രൂപപ്പെടുന്നത്
(തിരമാലകളുടെ പ്രവർത്തനത്തിലൂടെ, അപദനവും ജൈവീയവുമായ പ്രക്രിയയിലൂടെ, പ്രവാഹങ്ങളുടെ പ്രവർത്തനം മൂലം, ലവ ണത്വം മൂലം)

ബ്രാക്കറ്റിൽനിന്നും ശരിയുത്തരം തെരഞ്ഞെടുത്ത് പൂരിപ്പിക്കുക

[ജ്വാലാമുഖി, അനിമോമീറ്റർ, വാർട്ടൺ, ബോംബെഹൈ, ചാവുകടൽ,ചാലഞ്ചർ]

41. ഇന്ത്യയുടെ പശ്ചിമതീരത്തെ ഒരു എണ്ണഖനന കേന്ദ്രമാണ്- - - - -
42. ഇന്ത്യൻമഹാസമുദ്രത്തിലെ ആഴം കൂടിയ ഭാഗമാണ്- - - - -
43. - - - - - ഇന്ത്യയിലെ പ്രസിദ്ധ ഉഷ്ണനീരുറവയാണ്.
44. ഏറ്റവും കൂടുതൽ ലവണത്വമുള്ള ജലാശയമാണ്- - - -
45. - - - - - കാറ്റിന്റെ വേഗത അളക്കുന്ന ഉപകരണമാണ്.

ചേരുംപടി ചേർക്കുക

46. മെഡഗാസ്കർ	ലിയോസ്റ്റോൺ പാർക്ക്
47. പ്യൂർട്ടോറിക്കോ	ഉഷ്ണജലപ്രവാഹം
48. കുറോഷിയോ	വൻകരാ അവശിഷ്ട ദ്വീപ്
49. ചിൽക്ക	അത്ലാന്റിക്
50. ഓൾഡ് ഫെയിത്ത് ഫുൾ	പവിഴപ്പുറ്റ്
	ലഗൂൺ

APPENDIX V (B)

UNIVERITYOF CALICUT

DEPARTMENT OF ADULT AND CONTINUING EDUCATION

ACHIEVEMENT TEST IN GEOGRAPHY – 2000

Standard : IX Marks : 60

Time : 1 hour

Prepared by Dr.K. Karunakaran and Padmanabhan, M

(Select the correct answer given in the bracket. All answers carry equal marks)

1 The movements brings about wide changes to the earth's surface originated within the earth.
[Sudden movements, vertical movements, horizontal movements, tectonic movement)

2 A place in Kerala where wave energy is using for to produce electricity
[Cochin, Vizhinjham, Beypore, Neentakara]

3 Destructive waves occur on the time of earthquake
[Spring tide, neap tide, tidal bore, sunamis]

4 Contingent building movements
[Internal movements, external movements, vertical movements, horizontal movements]

5 Who acts a vital role in maintaining healthy eco system?
[producers, decomposes, primary consumers, secondary consumers]

6 Rock salt and gypsum are dissolved by water is
[Oxidation, hydration, solution, gradation]

7 The time between two tides
[12 hours, 12.30 hours, 12.25 hours, 11.30 hours]

8 A best example in India for uplift
[Dwaraka, Kathiawar, Rameswar, Paradweep]

9 Reason for morains
[plants, freezing action of water, erosion temperature]

10 When tidal waves enter into the river mouth like a vertical wall pushing the stream is known as
[spring tide, neap tide, tidal bore, high tide]

11 A salinity of ocean water from equatorial region to poles
[increases, decreases, equal, little increase]

12 The river meanders is completely cut of from the main channel forming a
[Meander, oxbow lake, poor water lake, cascade]

13 The biggest water fall in India

[Jwalamukhi, Nayagra, Jog, Athirappally]

14 When the river flows through hilly steeps, bites in to its bed is called
[cascades, down cutting, water fall, canyon]

15 The process of decomposition of rocks by air and water
[mechanical, chemical, erosion, weathering]

16 The variety of plants are found in
[Tiga forests, Tundra forest, the tempe rate deciduous forests, tropical rain forests]

17 The tide when the position of sun and moon in 90^{o}
[Spring tide, neap tide, tidal bore, low tide]

18 All living being in the land of an eco system
[Lantic, lotic, Bioms, ecosystem]

19 Producers in the following group
[Rabbit-rat, grass-tree, bacteria-fungus, tiger-fox]

20 Which is not related in the following group
[Burkhan, Mushroom rock, Loess, cirque]

21 The shape of an ocean in the form of 'S'
[pacific ocean, Indian ocean, Atlantic ocean, Artic ocean]

22 The statement which related to Plaktons
[Fishing area, eatables to fishes, submarine deep, meeting of ocean currents]

23 Earth forms by glacial erosion
[Glacier-rock fragments, Loess-Burkhan, Hangingvalley-cirque, meanders-oxbow lakes]

24 "In northern hemisphere wind blows in right curve and in southern hemisphere it blows in left curve" not related about this statement is
[coriolis force, ferrel's law, rotation of earth, tectonic movement]

25 In north atlantic ocean 5.2 million sq. km area of sea lies in
[Montana trench, Warton trench,sargaso, peurto Rico

26 The unit of measruing salinity of sea water
[35 gram/1000 km, 35 1/100 kg, 10.9%, 77.7%]

27 Plants like shaivalam and lichens are seen in
[Equatorial region, tropical forest, artic region, taiga region]

28 The proponent of science of ecology
[Louis paster, Earnest Howkal, Sunderlal Bahuguna, Arnold Gayott]

29 The deepest ocean trench
[Wharton, Peurto-Rico, Challenger, Sargaso]

30 Geomorphology
[Science of ocean, geography, science of liths or rocks, Geology]

31 Statement showing relation to tiga climate
[ice area of brief summer, the nature single species plantation coniferous tres are seen]

32 An example for a acuifers

[Granite-marble, clay-quartzite, sand-sandstone, ilminite-monosite]

33 Not related statement about equatorial desert region
[Thorny plants without leaves can see, scanty rainfall, trees like figs and sprus grow, animals which can adjust with heat]

34 The sea water with high salinity can be seen
[0^{o} altitude, 30^{o} altitude, 35^{o} altitude, 22^{0} altitude

35 Coral reefs of Australian east coast
[Fringing reefs, atoll, corals, great barrier reef]

36 In Southampton coast experiences tides four times a day
[Gravitation force of moon and sun, wind, sea water of English channel comes to tidal water, Waves]

37 The force came when the wind flows rounfrom the centre
[Coriolus, centrifugal force, centripetal force, gravitational force]

38 The gfreat ridge in the Atlantic
[Hudson, Berring, Montana, Doger]

39 The atmosphere for the presence of specific living and non living animals communities
[Eco system, environment, forests, habitat]

40 Bank, showel and reefs are formed
[By wind, by ocean current, by salinity, by accumulation of remains of sea creatures and plants]

Fill in the blanks given in bracket

[Jwalamukhi, Animometer, Wharton, Bombay High, Ded sea, Challenger]

41 An oil mining centre ;in Indian west coast is……

42 The deepest place in Indian ocean is……

43 ……. Is the famous Indian gayser

44 The highest salinity of water can be seen in…..

45 By …… we can measure the pressure of the wind

Match the following

46	Medagasker	Leostone park
47	Puerto-Rico	Hot ocean current
48	Kuroshio	Contingental residuary island
49	Chilka	Atlantic
50	Old faithful	Coral reef
		Lagoon

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APPENDIX V (C)

ACAHIEVEMENT TEST IN GEOGRAPHY – SCORING KEY

1	Tectonic movement	26	35 gran/1000 kg
2	Vizhinjam	27	Artic region
3	Sunamis	28	Challenger
4	Vertical movements	29	Science of liths or ocks
5	Decomposers	30	Coniferous trees
6	Solutions	31	Sand-sand stone
7	12 hours and 25 minutes	32	Figs and sprus trees are growing
8	Kathiawar	33	30° Altitude
9	Freezing action of water	34	The great barrier reaf
10	Tidal bore	35	Sea water from English channel
11	Decreases	36	Centrifugal force
12	Oxbow lake	37	Bering
13	Jog	38	Ecosystem
14	Down cutting	39	Accumulation of sea creatures
15	Chemical	40	Bombay hgh
16	Tropical rain forests	41	Wharton trench
17	Neap tide	42	Jwalamukhi
18	Bioms	43	Dead sea
19	Grass-tree	44	Anemometer
20	Cirque	45	Centinental residuary island
21	Atlantic	46	Atlantic
22	Eatables to fishes	47	Hot ocean current
23	Hanging vallys-cirques	48	Lagoon
24	Tectonic movement	49	Leostone park
25	Sargoso sea	50	

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APPENDIX VI (a)
ACHIEVEMENT TEST IN GEOGRAPHY (SCORES)

GUIDED DISCOVERY LEARNING (Group 1)

Sl.No.	Group	Sex	Knowledge	Understanding	Application	Total
1	1	1	15	20	15	50
2	1	1	15	19	13	47
3	1	1	15	17	14	46
4	1	1	15	18	13	46
5	1	1	15	18	14	47
6	1	1	15	19	13	47
7	1	1	15	18	14	47
8	1	1	15	19	13	47
9	1	1	15	17	14	46
10	1	1	15	20	15	50
11	1	1	15	20	14	49
12	1	1	15	20	13	48
13	1	1	14	19	14	47
14	1	1	14	18	13	45
15	1	1	13	18	12	43
16	1	1	12	16	13	41
17	1	1	14	18	11	43
18	1	1	15	19	14	48
19	1	1	14	16	12	42
20	1	1	14	18	13	45
21	1	2	15	20	15	50
22	1	2	15	19	15	49
23	1	2	15	19	14	48
24	1	2	15	18	14	47
25	1	2	15	19	14	48

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26	1	2	15	18	13	45
27	1	2	15	19	14	48
28	1	2	15	20	15	50
29	1	2	15	19	14	48
30	1	2	14	18	13	45
31	1	2	14	18	14	46
32	1	2	15	17	13	45
33	1	2	14	13	12	39
34	1	2	13	12	10	35
35	1	2	12	10	9	31
36	1	2	12	13	11	36
37	1	2	13	12	10	35
38	1	2	10	7	9	26
39	1	2	11	6	5	22
40	1	2	8	7	5	20

APPENDIX VI (b)
ACHIEVEMENT TEST IN GEOGRAPHY (SCORES)

RECEPTION LEARNING (Group 2)

Sl.No.	Group	Sex	Knowledge	Understanding	Application	Total
1	2	1	15	19	10	44
2	2	1	15	18	11	44
3	2	1	14	16	9	39
4	2	1	14	15	8	37
5	2	1	13	14	10	37
6	2	1	13	12	8	32
7	2	1	14	16	9	39
8	2	1	12	12	5	29
9	2	1	14	15	4	33
10	2	1	12	13	3	28
11	2	1	11	10	3	24
12	2	1	13	8	4	25
13	2	1	11	6	4	21
14	2	1	10	9	3	22
15	2	1	11	10	2	23
16	2	1	14	9	3	26
17	2	1	13	11	3	27
18	2	1	12	10	4	26
19	2	1	11	9	3	23
20	2	1	9	7	2	18
21	2	2	15	19	14	48
22	2	2	15	17	12	44
23	2	2	15	12	10	37
24	2	2	14	13	11	38

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25	2	2	13	12	10	35
26	2	2	12	12	9	33
27	2	2	13	10	8	31
28	2	2	14	9	7	30
29	2	2	13	7	6	26
30	2	2	1`2	7	4	23
31	2	2	11	8	5	24
32	2	2	10	9	6	25
33	2	2	10	8	5	23
34	2	2	10	7	4	21
35	2	2	9	8	7	24
36	2	2	11	9	6	26
37	2	2	12	8	5	25
38	2	2	10	7	5	22
39	2	2	11	5	4	20
40	2	2	9	4	3	16

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APPENDIX VI (c)

ACHIEVEMENT TEST IN GEOGRAPHY (SCORES)

TRADITIONAL LEARNING GROUP (3)

Sl.No.	Group	Sex	Knowledge	Understanding	Application	Total
1	3	1	15	14	8	37
2	3	1	15	15	7	37
3	3	1	14	13	6	33
4	3	1	13	14	5	32
5	3	1	12	13	5	30
6	3	1	13	12	4	29
7	3	1	12	11	4	27
8	3	1	13	12	3	26
9	3	1	12	13	3	28
10	3	1	11	10	2	23
11	3	1	10	8	2	20
12	3	1	10	9	3	22
13	3	1	11	6	3	20
14	3	1	9	7	2	18
15	3	1	10	8	2	20
16	3	1	12	7	4	23
17	3	1	12	9	3	24
18	3	1	10	7	2	19
19	3	1	7	6	2	15
20	3	1	6	5	2	13
21	3	2	15	16	13	44
22	3	2	15	14	11	40

A16

23	3	2	12	10	12	34
24	3	2	13	9	8	30
25	3	2	13	8	8	29
26	3	2	12	9	6	27
27	3	2	10	7	6	23
28	3	2	9	8	5	22
29	3	2	9	6	4	29
30	3	2	8	7	3	18
31	3	2	9	7	5	121
32	3	2	8	6	4	18
33	3	2	8	7	5	20
34	3	2	9	5	3	17
35	3	2	8	4	3	15
36	3	2	7	5	2	14
37	3	2	6	6	3	15
38	3	2	5	7	3	15
39	3	2	7	8	4	19
40	3	2	8	6	2	16

Group 1. G.D.L
2. R.L.
3. T.L.

Sex 1. Boys (Nos.20)
Sex 2. Girls (Nos. 20)

Knowledge – Total marks :15
Under standing " : 20
Application " : 15
Total : 50

NB 3264

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