EFFECTIVENESS OF METACOGNITIVE LEARNING STRATEGIES

ON THE ACHIEVEMENT IN GEOGRAPHY OF

STANDARD IX PUPILS

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Farook Training College AMEER ALI. M

## DECLARATION

I, AMEER ALI. M, do hereby declare that this dissertation entitled “EFFECTIVENESS OF METACOGNITIVE LEARNING STRATEGIES ON THE ACHIEVEMENT IN GEOGRAPHY OF STANDARD IX PUPILS”, has not been submitted by me for the award of any Degree, Diploma, Title or Recognition before.

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## CERTIFICATE

I, **Mr. K.P. MOHAMED ISHAQ**, do hereby certify that the dissertation entitled “**EFFECTIVENESS OF METACOGNITIVE LEARNING STRATEGIES ON THE ACHIEVEMENT IN GEOGRAPHY OF STANDARD IX PUPILS”**, is a record of bonafide study carried out by **Mr. AMEER ALI. M,** under my supervision and guidance. The report has not been submitted by him for the award of a Degree, Diploma, Title or Recognition before.

Farook Training College Mr. K.P. MOHAMED ISHAQ

 /12/2010  *(Supervising teacher)*

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##  Chapter I

# Introduction

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##

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INTRODUCTION

 Education has immense impact on the human society. One can safely assume that a person is not in the proper sense till he is educated. It trains the human mind to think and take the right decision. In other words, man becomes a rational animal when he is educated.

 The quality of human resource of a nation is easily judged by the number of literate population living in it. This is to say that education is a must if a nation aspires to achieve growth and development and more importantly to sustain it.

 The importance of education cannot be neglected by any nation. And in today’s world, the role of education has become even more vital. The socio-economic development of a nation is dependent on the quality and type of education that is offered from the school level to the research level. Good citizens are the backbone of any nation. It is the duty of the nation, that should provide good education to all citizens. It’s essential to take correct decisions, and to accept the democratic values in life. Otherwise, it will affect the future development of the country negatively. In the report of the Education Commission, 1964-66 stated that, “the destiny of India is now being shaped in her classrooms”.

 Education is the structuring of a situation in ways that help students change through learning, in intentional and sometimes unintentional ways. Learning is a change within the student that is brought about by observing the instructional programme of a school. Only changes that are due to experience are called learning. As far as teaching is concerned, learning is a change observed in the student after instruction has taken place. Teachers assess learning by observing the students performance is observed again. If changes have taken place, the teacher concludes that learning has occurred. It should be remembered, however, that learning is a private process and can only be assessed by observing the student performance.

 Teachers are expected to implement, and sometimes build instructional systems so that student learning is facilitated. Instruction can be defined as the process of arranging the learning situation in such a way that student learning is facilitated. Theories of instruction prescribe procedures concerning the most effective way of facilitating student acquisition of knowledge, attitudes and skills. The theory of instruction states that successful instruction depends upon some components. They are specifying desired outcomes for the students and setting appropriate instructional goals. Education rests upon the assumptions that the application of knowledge leads to productive problem solving and effective living.

 The existing method of instruction is child centred. Teacher is a facilitator in the classroom. It is found that activity oriented is much better than teacher centered. But group learning is criticized on the basis that active students are only getting opportunities for betterment and participation. It is also doubtful that how far students are able to grasp the ideas. So opportunities must be created for checking their memory as well as creativity. Thus we can build up a promising future generation.

**I. NEED AND SIGNIFICANCE**

 Education is not the one word or one ideal. It is a multifaceted ideal comprising culture, ethics, and aesthetics and even a dash of philosophy and with differing and often conflicting ideals and perceptions. Education is being imparted through the study of different subjects. Among the various subjects included in the school curriculum, social studies has greater importance.

 Social studies is a generic term that envelops a body of knowledge and thought relating to human affairs, human activities, human interactions and relationships and human responses to environment (Michaelis, 1980).

 The scope of social studies is very vast and wide and infact, as wide as the world itself and as lengthy as the history of man. The main focal points of the social studies are

* Social studies include the study of relationships between man and man, man and institutions, man and earth and man and goods and also the interrelationship of historical, geographical and social aspects.
* How the people meet different needs depend upon their environment and culture and their interdependence for satisfaction of these basic needs.
* The ways in which people solve the problems of today and tomorrow.
* It traces the story of how man has developed through ages, how is life has been influenced by environment, how institutions grown out and how he is struggling today.
* The study of actual working of social institutions, structure of society, social forces, current affairs and the study of international affairs based on mutual respect, understanding and brotherhood.

 The generally accepted group of disciplines that is classified as social science includes, History, Geography, Economics, Political Science, Anthropology and Sociology. The disciplines that are grouped under ‘Social Studies’ especially History, Geography and Civics have been included as school subjects for several years perhaps over a century and so now. A more recent addition has been the subject social studies which has divergent approaches in its presentation. In one approach in several school system in India, the subject social studies is a combination of History, Geography and Civics with a tinge of Economics, but these are taught as separate subjects under the umbrella social studies (Jarolimek, 1990).

**a) The Place of Geography in Social Studies**

 The importance of Geography is by and large, being recognized in modern times as the study of Geography has paved useful in many ways and it has paved useful in many ways and it has a prominent place in the social studies curriculum. Today the knowledge of geography with all its accompanied methods and techniques is increasingly employed in solving many of the national problems allover the world. Today, geography is a link between the physical science on the one hand and the social studies on the other. Consequently, it stands midway between the two. Geography is the study of spatial relationships. Geography is the physical social science which describes maps and seeks to explain the interrelation between man and physical environment (Zoe, 1958). It follows that geography is an important constituent in social studies curriculum. It is desirable then that the subject should be correlated with other school subjects. Geography comes to the rescue of this drawback by acting as a bridge among different subjects. A geography teacher can very conveniently talk in terms of history, politics, economics, sciences and fine arts, provided he has made a thorough study of geography. The immense value of geography in our everyday life made us to provide good geographical education to our students not only in quantity but in quality (Jerolinek, 1990).

 The study of geography helps in the assessment of agricultural productivity, regional planning and economic rehabilitation as well as in the preparation and social welfare of the country. Geography provides useful basic material for the techno-economic survey which are undertaken to make an assessment at development potentialities of the resource of different states (Yajnik, 1965).

 Today the knowledge of Geography with all its accompanied methods and techniques is increasingly employed in solving many of the national problems all over the world. The knowledge of Geography can be immense value for planning the economy of a country on a regional basis. It has a utilitarian value in so far as it elucidates and re-interprets the complex relations between the physical environments on the one hand and distribution, mode of life and economic and social activities of man on the other hand, both in present and in the past (Varma, 1970).

**b) Major Problems of Geography Teaching**

 The investigator have many occasions to know that social studies teachers are facing a number of problems while teaching Geography. Many at the teachers are teaching the Geographical concepts and ideals by way at giving information through lecturing. Usually the things that are to be taught might be made by heart and reproduced in the class, but the students were not introduced properly in any other occasions. Geography has been treated in the same way as History, Civics and Economics. Lecture method is unsuitable for teaching Geography, but majority at the social studies teachers use only lecture method or grouping method to teach geography. The absence of interesting and truthful came at borring teaching geography. Geography is more a science that an art, hence appropriate techniques should be used to teach Geography. Thus a new and completely effective strategies of teaching Geography should be developed.

For one well known North American educational psychologist David Ausubel, effective teaching depends on rooting new materials firmly into existing knowledge. According to him, “Find out what the learner already knows…. and teach accordingly”.

 Ausubel called this process of learning as meaningful learning. Meaningful learning takes place when we try to make sense of new information or new concepts by creating links with our existing sets at concepts and factual knowledge or with previous experience.

 Flavell (1979) suggests metacognitive strategies as a better way to achieve meaningful learning. Metacognition is “one’s knowledge and beliefs regarding his/her own cognitive processes and one’s attempts to regulate his/her cognitive processes to maximize learning and memory” (Ormrod, 2000). Activities such as planning how to approach a given learning task, monitoring comprehension, and evaluating progress towards the completion of a task are metacognitive in nature. Because metacognition plays a critical role in successful learning. It reduces short term memory and also an effective tool in reducing the anxiety of students learning. Studies also revealed that metacognitive strategies can be used as an effective tool to increase the achievement of students and as an evaluation tool.

 Review shows that not many studies are conducted in India on metacognition and its strategies. Moreover, the studies on metacognitive strategies were mainly concentrated on language learning and science subjects. Hence the researcher investigates on the effectiveness of metacognitive learning strategies on the achievement in Geography.

#### II. STATEMENT OF THE PROBLEM

 The present study is entitled as “EFFECTIVENESS OF METACOGNITIVE LEARNING STRATEGIES ON THE ACHIEVEMENT IN GEOGRAPHY OF STANDARD IX PUPILS”

**III. DEFINITION OF THE KEY TERMS**

 The definition of key terms used in the statement of the problem is given in the following sub-headings.

**a) Effectiveness**

 Good (1959) defines Effectiveness as use of a plan for instruction or presentation, which causes a desired change in learner’s behaviour.

**b) Metacognitive Learning Strategy**

 Higher order executive skills that may entail planning for monitoring, or evaluating the success of a learning activity (O’Malley & Chamot, 1990).

**c) Achievement in Geography**

 Achievement in Geography refers to tangible accomplishment or proficiency of performance in geography as measured using an Achievement test.

#### IV. VARIABLES SELECTED FOR THE STUDY

 The independent, dependent and control variables selected for the present study are the following.

**a) Independent Variable**

 The independent variable selected for the study was two methods of teaching- metacognitive learning strategy and existing method of teaching.

**b) Dependent Variable**

 Achievement in Geography of IX standard pupil as the dependent variable.

**c) Control Variable**

 The variable controlled for the present study was the initial status of the students in terms of achievement in Geography as measured by a pre-test.

#### V. OBJECTIVES OF THE STUDY

 The present study includes the following objectives:

1. To compare the mean pre-test scores of experimental and control groups.
2. To compare the mean post-test scores of achievement in geography for experimental and control groups for total sample and subsamples formed on the basis of sex.
3. To compare the mean gain scores of experimental and control groups for total sample and subsamples formed on the basis of sex.
4. To study the effectiveness of metacognitive learning strategies over the existing method of teaching on the achievement in geography of standard IX pupils.

#### VI. HYPOTHESES OF THE STUDY

 Based on the objectives the following hypotheses were formulated for the study.

1. There will be significant difference in the pre-test scores of the experimental and control groups.
2. There will be significant difference in the mean scores of the post-test of the experimental and control groups for total sample and subsamples formed on the basis of sex.
3. There will be significant difference in the mean gain scores of the experimental and control groups for total sample and subsamples formed on the basis of sex.
4. Pupils taught through metacognitive learning strategy will significantly differ in Achievement in Geography than pupils taught through the existing method of teaching.

#### VII. METHODOLOGY

 Suitability of methods and tools and techniques determine the success of research work because adequate data is very important while a research work is concerned.

 The methodology of the present study is outlined as follows.

**a) Design of the Study:**

 The present study has been conducted by employing the Quasi-experimental design. The design used is the present study was the pre-test post-test, non-equivalent group design. The notation of the study is as follows.

 O1 x O­2

 O3 x O4

Where,

 O1 O3 – pre-tests

 O2 O4 – Post-tests

 X – Application of experimental treatment

 C – Application of control treatment

 The experimental group was taught through metacognitive learning strategy and control group was taught through the existing method of teaching.

**b) Sample for the study**

 The sample of the study consists of 32 pupils in the experimental group and 32 in the control group. The sample for both experimental and control groups were two divisions of standard IX students drawn from the Islahiya E.M.H.S.S, Malappuram.

**c) Tools Used for the Study**

 The following tools were used to collect the data for the study.

1. Lesson Transcript Based on Metacognitive Learning Strategy

 The investigator prepared lesson plan on Geography for the Metacognitive Learning Strategy.

2. Lesson Transcript Based on Existing Method (Constructivist Method) of Teaching

 The investigator prepared lesson plan on Geography for existing method of teaching (constructivist method).

3. Achievement Test in Geography

The investigator constructed an achievement test in Geography, used as pre-test and post-test on the topic selected for treatment namely ‘The Earth Which Supports Man’.

**d) Statistical Techniques Used for Analysis**

 In the present study, the collected data were analysed using the following statistical techniques.

1. **Test of Significance of Difference between Means for Large and Small Independent Samples**

 For the present study, test of significance of difference between means for large and small independent samples were used to compare the relevant variables between the experimental and control groups.

1. **Single Factor ANCOVA**

 To examine the effectiveness of metacognitive learning strategy over the existing method of teaching on the Achievement in Geography of Standard IX pupils, single factor ANCOVA with one co-variate is used. Analysis of covariance serves the purpose of statistically removing the effects of extraneous variables from the dependent variable.

**VIII. SCOPE AND LIMITATIONS OF THE STUDY**

 The main purpose of the present study was to find out the relative effectiveness of metacognitive learning strategy in teaching a selected topic in Geography of Standard IX over the existing method of teaching. Appropriate tools were used for collect the data from the experimental and control groups. The study was conducted on two divisions of IX standard students of the Islahiya E.M.H.S.S., Malappuram. The topic selected for the experiment was ‘The Earth which supports man’. The investigator himself taught in both experimental and control groups.

 The investigator hopes that the results obtained from the present study may help educationists to reform existing techniques or strategies of teaching Geography. It is expected that this study would help to reach at valid generalizations and assumptions.

 Eventhough precautions were taken to make the study objective, certain limitations have crept into the study. They are the following:

1. This study concentrated on the constructivist method of teaching-learning as the present system of instructional method in secondary level. It did not take into account critical pedagogy and issue based teaching as the part of it.
2. The study was confined to a small sample of two class divisions of standard IX as considered as the representative of standard IX students.
3. The topic selected was a small unit and study was limited to geography only.
4. Shortage of time has necessitated the investigator to limit the study to one independent variable only, namely teaching method.

#### IX. ORGANIZATION OF THE STUDY

 The report has been presented in five chapters.

#### Chapter I

 This chapter of the report contains a brief introduction of the problem, need and significance of the study, statement of the problem, definition of key terms, variables, objectives of the study, brief methodology, scope and limitation of the study and organization of the report.

#### Chapter II

 It gives the theoretical overview of the important concept of the study and review of the related studies. A summary of the related literature is also presented.

#### Chapter III

 Methodology of the present study was discussed in detail consisting of the description of tools employed, sample for the study, data collection procedure, scoring and consolidation of data and statistical techniques used for analysis.

#### Chapter IV

 Details of the analysis of the data along conclusions are presented in this chapter.

#### Chapter V

 This chapter provides a summary of study along with major findings, tenability of hypotheses, educational implications, and suggestions for further research in this area.

REVIEW OF RELATED LITERATURE

 Review of related literature is an important aspect of research study. In educational research review of literature provides the investigator means of getting to the frontier in his particular field of knowledge. The researcher must become familiar with his problem through related studies. It will help him to have a complete picture of his problem and will direct him through the right path.

 A literature review is an evaluative report of information found in the literature related to selected area of study. The review should describe, summarize, evaluate and classify the literature. It should give a theoretical base for the research and help to determine the nature of the research.

 In the words of Good (1973) “The key to vast shore house of published literature may open doors to sources of significant problems and explanatory hypotheses and provides helpful orientation for the definition of the problems, background for selection of procedure and comparative data for interpretation of results. In order to be truly creative and original, one must read extensively and critically as a stimulus to thinking”.

 The review of literature also provides an insight into the methods, measures, subjects and approaches used by other research workers and can thus lead to significant improvement of the design. The literature gives an integral to success of academic research. It is a critique of the status of knowledge on a carefully defined educational topic.

 The literature reviewed in the present study has been classified into the following headings.

I. THEORETICAL FRAMEWORK OF VARIABLES

II. STUDIES RELATED WITH METACOGNITION AND METACOGNITIVE STRATEGIES

#### I. THEORETICAL FRAMEWORK OF VARIABLES

 During the last 40 years metacognition has become one of the major fields of cognitive developmental research. Research activity in metacognition began with John Flavell, who is considered to be ‘father of the field’ and thereafter a considerable amount of empirical and theoretical research dealing with metacognition can be registered.

 Moreover, a number of strategies aiming to enhance children’s metacognitive abilities have been suggested, which teachers through all educational levels can apply in their instruction. Such strategies are set out in the relevant section dealing with the development of metacognition in practice and contribute to the promotion of critical thinking in education. Theoretical overview has been classified in to the following headings.

1. The Concept of Metacognition
2. Vygotsky as Precursor to Metacognitive Theory
3. Metacognitive Strategies
4. Development of Metacognitive Strategies
5. Strategies for Developing Metacognitive Behaviours.
6. Importance of Creating a Metacognitive Environment

**a) The Concept of Metacognition**

 Metacognition is a concept that has been used to refer to a variety of epistemological process. “Metacognition” essentially means cognition about cognition; that is, it refers to second order cognitions; thoughts about thoughts, knowledge about knowledge or reflections about actions. So if cognition involves perceiving, understanding, remembering, and so forth, then metacognition involves thinking about one’s own perceiving, understanding, remembering, etc. These various cognitions about cognitions can be labelled “Metaperception”, “metacomprehension” and “metamemory” with ‘metacognition” remaining the superordinate term.

 Flavell (1979) referred to it as “knowledge” that takes as its object or regulates any aspect of any cognitive endeavor. Moore (1982) defines it as “an individual’s knowledge about various aspects of thinking” and it has also been described as “the abilities of individuals to adjust their cognitive activity in order to promote more effective comprehension” (Gavelek & Raphael, 1985).

 In a more recent review Flavell (2000) divides metacognitive theory into two areas of study: knowledge and processes. Metacognitive knowledge includes understanding of how minds work in general and how your own mind works in particular. The processes of planning, monitoring, and regulating thoughts are generally known as executive processes, which involve the interaction of two levels: at one level is the creative, associative, wandering mind and above it is the executive, trying to keep it on task.

 Gradually, the concept has been broadened to include anything psychological, rather than just anything cognitive. For instance, if one has knowledge or cognition about one’s own emotions or motives concerning a cognitive enterprise (e.g. being aware of his anxiety while solving a problem in an exam paper), this can be considered metacognitive. In fact, the recent literature completes the term, by adding to its cognitive domain, the emotional one-referring to the emotions that accompany the cognitive processes and the person’s ability to monitor them, as well as the domain of cognitive habits. Similarly, Flavell (1979), when trying to define the concept of metacognition, refers to all those conscious cognitive or affective experiences that accompany and pertain to an intellectual enterprise. Moreover, a definition of ‘metacognition’ according to Paris and Winograd (1990) “captures two essential features….: self-appraisal and self-management of cognition. Self-appraisals are people’s personal reflections about their own knowledge states and abilities, and their affective states concerning their knowledge, abilities, motivation, and characteristics as learners. Such reflections answer questions about “what you know, how you think, and when and why to apply knowledge strategies”. Self-management refers to “metacognition in action”, that is, mental processes that help to “orchestrate aspects of problem solving” including “the plans that learners make before tackling a task”, “the adjustments they make as they work”, and “the revisions they make afterwards”. It is important to note, here, that “theoreticians seem unanimous-the most effective learners are self-regulating” (Butler & Winne, 1995). Key to effective self-regulation is accurate self-assessment of what is known or not known (Schoenfeld, 1987). Only when students know the state of their own knowledge can they effectively self direct learning to the unknown.

 Shortly, the definition of metacognition has been broadened and includes, not only “thoughts about thoughts” as it was before considered, but the following notions as well: knowledge of one’s knowledge, processes, and cognitive and affective states; and the ability to consciously and deliberately monitor and regulate one’s knowledge, processes and cognitive and affective states.

 Although metacognition may have sometimes indistinct boundaries, key distinctions can be made and a scheme offered that will be useful for organizing and assessing the experimental literature.

 First, we can distinguish between knowledge and skills-between “knowing that” and “knowing how”, the old distinction between theory and practice, between competence and performance. One may “know that” he/she should distinguish relevant from irrelevant information in a problem, and another has the ability to do this in practice, perceiving what is relevant in a “noisy” environment. Similarly, one may know that different strategies can be applied in different problems, and another has the ability to select the suitable strategy, when needed, to resolve a problem.

 Ann Brown (1987) distinguishes between knowledge about cognition, and regulation of cognition. Knowledge about cognition can be “stable, stable but fallible or late developing”. Information that human thinkers have about their own cognitive processes, which usually remains relatively consistent within individuals. Regulation, on the other hand, can be “relatively unstable, rarely stable, and age independent”; Regulation of cognition refers to the activities used to regulate and oversee learning. One may show self-regulatory behaviour in one situation but not another, and a child may show self-regulatory behaviour where an adult does not. Regulation may be also affected by patterns of arousal (anxiety, fear, interest) and self-concept (self-esteem, self-efficacy). These processes include planning activities (predicting outcomes, scheduling strategies and various forms of vicarious trial and error, etc.) prior to undertaking a problem; monitoring activities (monitoring, testing, revising, and re-scheduling one’s strategies for learning) during learning; and checking outcomes (evaluating the outcome of any strategic actions against criteria of efficiency and effectiveness) at the end (Brown, 1983).

 Kluwe (1982) brought further definition to the concept of ‘metacognition’ describing activities referred to as ‘metacognitive’: (a) the thinking subject has some knowledge about his own thinking and that of other persons; (b) the thinking subject may monitor and regulate the course of his own thinking, i.e., may act as the causal agent of his own thinking’. Moreover, Kluwe uses the term ‘executive processes’ to denote both monitoring and regulating strategies. Executive monitoring processes involve one’s decisions that help: (a) to identify the task on which one is currently working, (b) to check on current progress of that work, (c) to evaluate that progress, and (d) to predict what the outcome of that progress will be. Executive regulation processes are those that are “directed at the regulation of the course of one’s own thinking”. They involve one’s decisions that help (a) to allocate his or her resources to the current task, (b) to determine the order steps to be taken to complete the task, and (c) to set the intensity or (d) the speed at which one should work the task (Hacker, 1997).

 Flavell (1981) makes a second important distinction between metacognitive experiences and metacognitive knowledge. “Metacognitive experiences” are conscious feelings during some cognitive activity that relate to the process- for example, during a communication task, feeling that you do or do not understand; or feeling hesitant about the choice you have made. “Metacognitive knowledge” on the other hand, is described by Flavell (1981) as “that part of your accumulated world knowledge that has to do with people as cognitive agents an their cognitive tasks, goals, actions and experiences”. Some examples of this kind of metacognition are: when you are able to describe your understanding of what goes on, to explain and recognize feelings of uncertainty or confusion in some people, etc.

 Briefly, ‘metacognition refers to all processes about cognition, such as sensing something about one’s own thinking, thinking about one’s thinking and responding to one’s own thinking by monitoring and regulating it.

 As for whether the term ‘metacognitive’ should be used to describe thoughts that were once metacognitive but have since become non-conscious and automatic remains a datable issue. Nevertheless, many researchers adopt a convention that reserves the term ‘metacognitive’ for conscious and deliberate thoughts that have as their object other thoughts (e.g. Borkowski & Muthukrishna, 1992; Bracewell, 1983; Carr, Alexander & Folds-Bennett, 1994; Davidson, Deuswer & Sternburg, 1994; Paris & Winograd, 1990).

 On the other hand, Koriat (2000) proposes that although metacognitive feelings appear to be an integral part of conscious, explicit cognition, they are actually two sided: They serve to interface between implicit-unconscious-automatic processes on the one hand, and explicit-conscious-controlled processes on the other. Therefore, this double sided nature of metacognition shades some light on the relationship between two layers of consciousness.

 Koriat (2000) therefore, distinguishes between two levels of experience, each with its own mode of operation. “The higher level involves an explicit mode of operation, characterized by relatively high degrees of consciousness and control, whereas the lower level involves an implicit mode of operation, characterized by relatively low degrees of consciousness and by automatic influences” (p. 153). And as Koriat (2000) continuous “it would seem natural to place metacognitive monitoring and control at the heart of the notion of consciousness” (p.151). Therefore, she sees “surprising that some leading experts arrived at the conclusion that metacognitive processes are, in fact, more properly seen as being part of unconscious and implicit functioning”.

 It seems that in our cognitive system there are at least two hierarchical levels, with cognitions of the first level serving as the object of cognitions at the second level. However, the existence of a two-level does not necessarily imply conscious awareness (of the first level by the second level). Classical developmental theorists, such as Vygotsky (1934, 1962) and Piaget (1976, 1978) included conscious awareness as a defining attribute of metacognition. In contrast, in an information-processing theory such as Sternberg (1984, 1985) ‘meta’ components played a major role in the absence of any attribution of conscious awareness (Kuhn, 1999). Koriat and Levy-Sadot (1999) used the terms noetic judgements (or judgement of knowing) and noetic feelings (or feeling of knowing) to refer to the types of subjective feeling and showed how this distinction applies to the various forms of monitoring one’s own knowledge.

 Basic components of metacognition are follows (Wikepedia, 2008 and Efklides, 2002).

1. Metacognitive knowledge (also called metacognitive awareness) refers to what individuals know about themselves and others as cognitive processors.
2. Metacognitive regulation- is the regulation of cognition and learning experiences through a set of activities that help people control their learning.
3. Metacognitive skills-refer to conscious control processes such as planning, monitoring of the progress of processing, effort allocation, strategy use and regulation of cognition.
4. Metacognitive experiences-are those experiences that have something to do with the current, on-going cognitive endeavor.

#### b) Vygotsky As Precursor to Metacognitive Theory

 According to Brown (1987), Vygotsky’s (1978) influence on metacognitive theory has primarily been effected through his discussion of transference from other regulation to self-regulation. Basic to Vygotsky’s approach is the assumption that social interaction plays a major role in the origin and development of higher mental (e.g., metacognitive) functions. These functions appear first on the interpsychological (i.e., social) plane and only later on the intrapsychological (i.e., individual) plane. Vygotsky (1978) states:

 Every function in the child’s cultural development appears twice: first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of ideas. All the higher functions originate as actual relationships between individuals.

 This means that a great deal of learning occurs in the presence of, and is fostered by, the activity of others. So many cognitive acts are initially experienced in social settings, but in time, the results of such experiences become internalised. Initially, supportive others, such as parents, teachers, peers, and so on, act as interrogators, leading the child to more powerful rules and generalisations and guiding the novice to mastery; and there seems to be a systematic regularity in how this guidance works. The interrogative, regulatory role, however, becomes internalised during the process of development and children become able to fulfil some of these functions for themselves through self-regulation and self-interrogation. To put it plainly, this process of internalisation goes like this:

 ‘…. first the adult (parent, teacher, etc.) controls and guides the child’s activity, but gradually the adult and the child come to share the problem solving functions, with the child taking initiative and the adult correcting and guiding when he/she falters. Finally, the adult cedes control to the child and functions primarily as a supportive and sympathetic audience (Brown & French, 1979, cited in Brown *et al*., 1983).

 An important concept in relation to this is the notion of scaffolding, defined by Bruner, which has come to be used for interactional support, often in the form of adult-child dialogue that is structured by the adult to maximize the growth of the child’s intrapsychological functioning (Clay & Cazden, 1990). In other words, ‘Scaffolding’ refers to the gradual withdrawal of adult control and support as a function of children’s increasing mastery of a given task.

 Another aspect of Vygotsky’s theory is the idea that the potential for cognitive development is limited to a certain time span which he calls the ‘Zone of proximal development’. ZPD refers to the gap between what a given child can achieve alone, their ‘potential development as determined by independent problem solving’, and what they can achieve ‘through problem solving under adult guidance or in collaboration with more capable peers’ (Wood, D. & Wood, H., 1966).

 In time, children become mature thinkers who provide conflict trials for themselves, question their own basic assumptions, provide counter examples to their own rules etc. In short, although a great deal of thinking and leading may remain a social activity, through the process of internalization children become capable of providing the supportive other role for themselves. In this way, progressively, children learn not only how to get a particular task done independently, but also how to set about learning new problems. In other words, children learn how to learn. It is important however to note here, that ‘metacognition’ is not equated with ‘learning’ or ‘development’, but the conscious and deliberate regulation of that ‘learning’ and ‘development’.

 Moreover, Vygotsky’s theory of language plays an important role in thinking, mediating and directing the individual’s cognitive endeavors. Together with this mediating role of language, Vygotsky’s emphasis on social interactions stresses the socio-cultural basis of self-regulation and leads to the fourth metacognitive issue discussed by Brown (1987); “The transference from other-regulation to self-regulation”.

 As to the question of how the individual eventually reaches reflective awareness (knowledge about cognition) and deliberate control of his own cognition (regulation of cognition), Vygotsky’s theory (1986) focuses our attention on verbalized self-observation (introspection). This implies that the child perceives his/her own cognitive processes as meaningful. This view, of a close connection between knowledge about cognition and control of cognition is made clearer in his study ‘Mind in Society” (1978). What is apparent, however, is that many topics discussed in contemporary metacognitive research are integral parts of Vygotsky’s (1978, 1986) theory of cognitive development; undoubtedly he pioneered an approach to metacognition that cannot be easily disputed.

#### c) Metacognitive Strategies

 “A metacognitive strategy is a systematic cognitive technique to assist students in recognizing, planning, implementing and monitoring solutions to problems” (Smith Steven, W., 1992).

 The basic metacognitive strategies are:

* Connecting new information to former knowledge
* Selecting thinking strategies deliberately
* Planning, monitoring, and evaluating thinking process (Dirkes, 1985).

 A thinking person is in charge of his/her behaviour. He/she determines when it is necessary to use metacognitive strategies. He/she selects strategies to define a problem situation and researches alternative solutions. He/she tailors this search for information to constraints of time and energy. He/she monitors, controls and judges his/her thinking. He/she evaluates and decides when a problem is solved to a satisfactory degree or when the demands of daily living take a temporary or permanent higher priority.

 There are so many metacognitive strategies are using in learning. Important metacognitive learning strategies are.

a) Meaningful learning

 A process of relating new material to knowledge already stated in long term memory.

b) Elaboration

 A process of using prior knowledge to interpret and expand on the new material.

c) Organization

 Organize materials early.

d) Note taking

e) Identifying important information

f) Comprehension monitoring

g) Summarizing

**d) Development of Metacognitive Strategies**

 Studies show that increases in learning have followed direct instruction in metacognitive strategies. These results suggests that direct teaching of these thinking strategies may be useful, and that independent use develops gradually (Scruggs, 1985).

 There are three critical steps to be achieved before directly teaching metacognition.

#### Step I: Teach students that the ability to learn is not a fixed quantity

 The key to a student’s ability to become a self-regulated learner is to understand that one’s ability to learn is a skill that develops over time rather than a fixed trait, inherited at birth. Students who believe that the ability to learn can improve overtime earn higher grades, even after controlling for prior achievement (Henderson & Dweck, 1990).

#### Step 2: Teach students how to set goals and plan to meet them

 Students who received as little as half an hour of training on the process of self-regulated learning, outperformed students who did not receive the training. They planned how they would spend their time in the learning task, spent more of their time in goal-oriented searching and periodically reminded themselves of their current goal (Azevedo and Cromely, 2004).

#### Step 3: Give students opportunities to practice self-monitoring and adapting

 Most of the students are over confident. Their expectations are not realistic. Opportunities to practice self-testing and self-monitoring can help them set realistic goals and improve their performance.

#### e) Strategies for Developing Metacognitive Behaviours

####  Here are some strategies which teachers can use in their classroom to help students to develop metacognition.

#### i) Identifying “What you know” and “What you don’t know”

####  At the beginning of a research activity students need to make conscious decisions about their knowledge. Initially students write “what I already know about….” and “What I want to learn about …”.

####  As students research the topic, they will verify, clarify and expand, or replace with more accurate information, each of their initial statements.

#### ii) Talking about thinking

####  Talking about thinking is important because students need a thinking vocabulary. During planning and problem-solving situations, teachers should think aloud so that students can follow demonstrated thinking processes. Modeling and discussion develop the vocabulary students need for thinking and talking about their own thinking. Labeling thinking processes which student use them is also important for student recognition of thinking skills.

####  Paired problem-solving is another useful strategy. One student talks through a problem, describing his thinking processes. His partner listens and asks questions to help clarify thinking. Similarly, in reciprocal teaching (Palinscar, Ogle, Jones, Carr and Ransom, 1986), small groups of students take turns playing teacher, asking questions and clarifying and summarizing the material being studied.

#### iii) Exposure to Problem-Solving Strategies

####  Other sources of metacognitive instruction especially with older students can be the biographies, journals, letters and other personal writings of famous experts in the field they are studying. Such exposure to the problem-solving strategies of legendary thinkers can be inspirational and informative for students.

#### iv) Using Prompts

####  Using prompts such as “What can you do first?”, “What else might you try?” and “How well is your strategy working?” reminds the students to think about their thinking while they are working.

#### v) Keeping a thinking journal

####  Another means of developing metacognition is through the use of a journal or learning log. This is a diary in which students reflect upon their thinking, make not of their awareness of ambiguities and inconsistencies, and comment on how they have dealt with difficulties. This journal is a diary of process.

#### vi) Planning and self-regulation

####  Students must assume increasing responsibility for planning and regulating their learning. It is difficult for learners to become self-directed when learning is planned and monitored by someone else.

####  Students can be taught to make plans for learning activities including estimating time requirements, organizing materials, and scheduling procedures necessary to complete an activity. The resource centre’s flexibility and access to a variety of materials allows the student to do just this. Criteria for evaluation must be developed with students so that they learn to think and ask questions of themselves as they proceed through a learning activity.

#### vii) Debriefing the thinking process

####  Closure activities focus student discussion on thinking processes to develop awareness of strategies that can be applied to other learning situations.

####  A three step method is useful. First, the teacher guides students to review the activity, gathering data on thinking processes and feelings. Then, the group classifies related ideas, identifying thinking strategies used. Finally, they evaluate their success, discarding inappropriate strategies, identifying those valuable for future use, and seeking promising alternative approaches.

#### viii) Self-evaluation

####  Guided self-evaluation experiences can be introduced through individual conferences and checklists focusing on thinking processes. Gradually self-evaluation will be applied more independently. As students recognize that learning activities in different disciplines are similar, they will begin to transfer learning strategies to new situations.

#### f) Importance of Creating a Metacognitive Environment

####  A metacognitive environment encourages awareness of thinking. Planning is shared between teachers, school library, media specialists, and students. Thinking strategies are discussed. Evaluation is ongoing.

####  The metacognitive abilities of students grow and thrive in an environment where the actual processes of thinking are an important part of the instruction and conversation during the day. To create this environment teachers and students must develop a language of thinking that they all use consistently. When teachers use terms like “Strategy”, “Process”, and “metacognition” frequently, they communicate their importance to students and emphasize the processes that are important for effective learning.

####  Tishman, Jay and Perkins (1992) suggest hanging posters around the room to remind students to think about their thinking. Prompts such as “Is this the best strategy for the task?” help students remember to be metacognitive.

####  Metacognitive strategies are already in teachers’ repertoires. We must become alert to these strategies, and consciously model them for students.

####  Problem-solving and research activities in all subjects provide opportunities for developing metacognitive strategies. Teachers need to focus student attention on how tasks are accomplished. Process goals, in addition to content goals, must be established and evaluated with students to enable them to discover that understanding and transferring thinking processes improves learning.

**II. STUDIES RELATED WITH METACOGNITION AND METACOGNITIVE STRATEGIES**

 A careful review of research journals, books, dissertations, theses and other sources of information on the problems to be investigated is one of the important steps in the planning of any research study. Since effective research is based upon past knowledge, this helps to eliminate duplication of what has been done and provides useful hypotheses for investigation. Review of related literature is a valuable guide in defining the problem, recognizing its significance, suggesting promising data gathering devices, appropriate study design and for the sources of data.

 Literature review related with metacognition, and metacognitive strategy are following.

 Flavell introduced and defined the term metacognition and made a metacognitive theory through his books “Metacognitive Aspects of Problem Solving” (1976), “Metacognition and Cognitive Monitoring: A New Area of Cognitive Developmental Inquiry” (1979) and “Speculation About the Nature and Development of Metacognition” (1987). He viewed metacognition as learners ‘knowledge of their own cognition, defining it as knowledge and cognition about cognitive phenomena’.

 Elaine and Sheila (1990) conducted a study entitled ‘Developing Metacognition’ show that metacognitive strategies can be increase learning skills and that independent use of these metacognitive strategies can be gradually developed in people. The school library media center is the ideal place for students to learn how to develop metacognitive strategies; that is they can learn how to connect new information to former knowledge, deliberately select thinking strategies, and plan, monitor, and evaluate these thinking processes. They suggested six basic strategies for developing metacognitive behaviour in students.

 Robert and Erdos (1993) prepared and article, strategy selection and metacognition, asserts that metacognition is one of the most important development in the contemporary study of learning. Proposes a theoretical analysis of a number of interrelated issues with regard to their importance for metacognition. Focuses on strategy selection in light of the impasse-based theories of problem solving.

 Janet and Arthur (1996) edited, ‘metacognition-knowing about knowing’ was a different study about the concept metacognition. It discusses, memory monitoring, problem solving monitoring, metacognition development and some classic methodological issues.

 Livingston (1997) prepared an article, metacognition: An overview and he used metacognition as one of the buzz words in educational psychology. He discussed that, metacognition plays a critical role in successful learning, it is important to study metacognitive activity and development to determine how students can be taught to apply their cognitive resources through metacognitive control.

 Robert Fisher’s (1998) article, Thinking about thinking: Developing metacognition in children, explores what metacognition is, why it is important and how it develops in children. It argues that teachers need to help children develop metacognitive awareness, and identifies the factors which enhance metacognitive development. Metacognitive thinking is a key element in the transfer of learning. The article draws upon research currently being undertaken in London schools on raising achievement in thinking and learning through developing the metacognition of children as learners in schools.

 Michael (1999) prepared a study and opinioned, metacognition represent a strategy of acquiring knowledge, namely the ability to understand your method for learning and assimilating information. Metacognitive learning strategy offers help for individuals who struggle to analyze, utilize, memorize and retain information. He suggested several strategies for the purpose.

 Rampp and Guffey (1999) prepared an article entitled ‘A new implementation model for learning’ describes an extensive literature review on metacognition which examined the problems and promise that metacognition presents to educators. The article defines metacognition, discussing several examples of successful models for teaching metacognition. It also explains the two major methods of teaching and training metacognition techniques (stand alone and infused into content). And also suggests an alternative theory to support training in metacognition for high school students. This theory is called the Composite Theory of Intellectual Development (CTID).

 Sheila’s (1999) article, metacognitive learning strategies for students with learning disabilities, describes research on metacognition has strong possibilities and opportunities to influence our understanding of learning strategies for students with learning disabilities. A strategies is a systematically thought out approach which enables us to get from one point to another. The goal of a strategy is to teach students how to become purposeful, effective and independent learners. Self assessment and self monitoring is thought to facilitate strategic functioning.

 Fernandez *et al*., (2000) on their ‘Executive attention and metacognitive regulation’ refers metacognition as to any knowledge or cognitive process that monitors or control cognition. They highlights similarities between metacognitive and executive control functions, and ask how these processes might be implemented in the human brain.

 Koriat and Levy Sadot (2000) in their study conscious and unconscious metacognition: A rejoinder, classified several issues raised by the commentators with the hope of resolving some disagreements. Study addresses the distinction between information-based and experience based metacognitive judgements and the idea that memory monitoring may be mediated by direct access to internal representations. Then examine the possibility of unconscious metacognitive processes and expand on the critical role that conscious metacognitive feelings play in mediating between unconscious activations and explicit controlled action. Finally, several open questions are articulated for further scrutiny.

 Kuhn (2000) in his study, metacognitive development-current directions in psychological science, describes during its extended developmental course, metacognition becomes more explicit, powerful and effective, as it comes to operate increasingly under the individual’s conscious control. Enhancing (a) Metacognitive awareness of what one believes and how one knows and (b) Metastrategic control in application of the strategies that process new information is an important developmental and educational goal.

 Hartman (2001) conducted a study metacognition in learning and instruction: theory research and practice, he analysed that high achieving students are more metacognitive than low achieving students.

 Pintrich and Schunk (2002) is discussed in their study, the role of metacognitive knowledge in Learning, Teaching and Assessing, the role of metacognitive knowledge in the revised taxonomy, and its importance in the learning, and they concluded that, it is a welcome and much needed addition.

 Timothy and Bennet’s (2002) book ‘Applied Metacognition’ provides a coherent and up-to-date overview of the relation between theories in metacognition and their application in real-world situations. As well as a theoretical overview, there are substantive, chapters covering metacognition in three areas of application: metacognition in education, metacognition in everyday life memory and metacognition in different populations.

 William Pierce (2003) presented a paper, ‘Metacognition: study strategies, monitoring and motivation’ are mainly opinioned, instructors should explicitly teach the reading, note-taking, and study strategies that will be effective in their courses and instructors should teach students how to monitor and self assess their use of study strategies.

 Savithri (2006) conducted a research entitled ‘Impact of metacognitive strategies in enhancing perceptual skills among high school students on learning geometry. The study explores the effectiveness of metacognitive strategies in such students and it makes a great achievement in learning geometry.

 Fox Emily and Michaelle (2008) prepared an article entitled ‘Meta cognition and self-regulation in James, Piaget and Vygotsky’ investigates the interwined constructs of metacognition and self regulation as they emerge in the works and theories of James, Piaget and Vygtosky. This article explore how metacognition and self regulation function within the realm of human behaviour and development as described in the works of each of these theorists. Key questions or issues that emerge for current research are outlined, and the limitations and benefits of each theorists perspective vis-à-vis metacognition and self regulation are discussed.

 Ian, Conrnford’s (2008) study, cognitive and metacognitive strategies as a basis for effective lifelong learning: How far have we progressed?, examines the changes that have occurred concerning adoptation of cognitive and metacognitive skills as a basis for effective life long learning at school and post-compulsory education levels over approximately the last seven years. It is concluded that while there is evidence of the effectiveness of the teaching of learning to learn approaches.

 Noushad’s (2008) article, cognition about cognition: The theory of metacognition’, proposes a theoretical review of the term “metacognition”. It was introduced by John Flavell in the early 1970’s based on the term ‘Metamemory’ previously conceived by the same scholar (Flavell, 1971). Metacognition is usually related to learner’s knowledge, awareness and control of the processes by which they learn and the metacognitive learner is thought to be characterized by ability to recognize, evaluate and whenever needed, reconstruct existing ideas.

 Ramganesh (2008) conducted a study, ‘Effect of metacognitive strategy on enhancing teaching competency in Mathematics among prospective teachers’, makes an attempts to determine the effectiveness of metacognitive strategy on enhancing the teaching competency among B.Ed. students. Results reveals that trainees could strengthen their teaching competency through metacognitive control.

 Clayton B. Larson (2009) edited a book, entitled ‘Metacognition: New research development, higher order thinking’, enquires the needs of planning, monitoring and evaluation in each processes. They concludes that, the metacognition has a great role in the successful learning. They defines and compare the similarities and differences of some similar terms (self regulation, executive control, etc.) to metacognition. Also explores the new research trends in the field of metacognition.

 Douglas *et al.* (2009) edited a handbook of metacognition in education. Provides comprehensive coverage of the theoretical bases of metacognition and its applications to educational practice, this compendium of focused and in-depth discussions from leading scholars in the field, comprehension strategies, metacognitive strategies, metacomprehension, individual differences, self regulated learning, tutoring and measurement.

 Marlow Ediger (2009) in his study metacognition strategies in the social studies, discusses how to apply metacognition strategies in the teaching and learning of social studies with some interesting examples.

 Shareeja Ali (2009) prepared an article, metacognition-concepts and its developments, explores what metacognition is, why it is important and how it develops in children. It argues that teachers need to help children to develop metacognitive awareness, and identities the factors which enhance metacognitive development. Metacognitive thinking is a key element in the transfer of learning.

 Shirley Larkin’s (2009) metacognition in Young Children, refers metacognition is an important factor in academic achievement and in a wider life context. This book addresses how metacognition might be fostered in young children. Examining theories of particular relevance to primary school age children the author combines her empirical work over the last 8 years with the work of other researchers to show that children of all ages display metacognitive processing, given the right kind of environment.

 Tora *et al*., (2009) investigated effects of metacognitive instruction at different phases of reading scientific texts on elementary school students scientific literacy and metacognitive awareness. Findings indicates that, metacognitive students significantly outer performed all other groups and control group scored lowest. The authors discuss theoretical and practical implications of this preliminary study.

 Harriet Salatas and Wolfgang Schneider’s (2010) ‘metacognition, strategy use and instruction’ discusses the developmental process of metacognition in the early childhood and adolescense period, and the development of thinking process through metacognitive strategies, and how much helpful are these for the self learning. The book also points out the need of metacognitive thinking in learning.

 John Dunloksy and Janet Metcalfe’s (2010) ‘Metacognition-A textbook for cognitive, educational, lifespan and applied psychology’ is a complete study on the concept and scopes of metacognition. As it is a new concept in educational psychology, they includes the opinions of great educators and psychologists.

 The studies related to metacognition and metacognitive strategy reveals that metacognitive strategy has been a useful strategy for meaningful and successful learning at various school levels. Studies also revealed that metacognitive strategy can be used as an effective tool to increase the achievement of students and as an evaluation tool. The review shows that it can be used as an effective tool in reducing the anxiety of student in learning.

 Reviews show that not many studies are conducted in India on metacognition, and most of the studies in western conditions are concentrated on Mathematics and science subjects. Hence the investigator felt a need to investigate on the effectiveness of metacognitive strategies on the achievement in Geography, as it is a science related subject.

METHODOLOGY

 Methodology is the technique or procedure adopted in a research study or investigation. The success of research depends upon the suitability of methods adopted. The method should always be appropriate to the problem under investigation, feasible, pre-planned and well understood.

 The main purpose of the present study is to investigate the effectiveness of metacognitive learning strategy over the existing method of teaching on the achievement in Geography of standard IX pupils. Here achievement in geography is treated as the dependent variable and metacognitive learning strategy and existing method of teaching are treated as the independent variables. Pre-experimental status of the groups considered as the control variable.

 The methodology of the present study is classified and presented in the following headings:

I. DESIGN OF THE STUDY

II. TOOLS USED FOR THE STUDY

III. SAMPLE USED FOR THE STUDY

IV. DATA COLLECTION PROCEDURE, SCORING AND CONSOLIDATION OF DATA

V. STATISTICAL TECHNIQUES USED FOR ANALYSIS

## I. DESIGN OF THE STUDY

 The present study has been conducted by employing an experimental design. A design is the blue print of the procedure that enables the researcher to test hypotheses by reaching valid conclusion about relationship between independent and dependent variables (Best & Kahn, 2001).

**a) Design Selected**

 The design selected for the present study was the Quasi Experimental with Pre-test - Post-test non equivalent group design. Due to the inconvenience in random assignment of subjects in the experimental and control groups, intact classroom groups were selected for the study. The design of the study is illustrated as follows.

 O1 x O2

 O3 x O4

Where,

 O1, O3 – pre-tests

 O2 O4 – post-tests

 X – Application of experimental treatment

 C – Application of control treatment

 Two class divisions from same school were treated as experimental and control groups. Experimental group was taught by metacognitive strategies for 15 periods and each periods has duration of 40 minutes. The control group was taught by the existing method of teaching (Constructivist method) for fifteen periods of the same duration.

 Since the design selected for the present study was pre-test, post-test non-equivalent group design, prior to the introduction of the two teaching methods, both groups were administered the same achievement test. Here it is appropriate to apply Analysis of Covariance (ANCOVA) to control statistically any difference in the initial status of the group.

**b) Variables in the Study**

 The experimental study consists of manipulating levels or amount of selected independent variables to examine their influence on dependent variables. The independent variable, dependent variables and control variable for the present study were as follows.

**1) Independent variable**

 The independent variable selected for the study was two methods of teaching- metacognitive learning strategy and existing method of teaching.

**2) Dependent variable**

 Achievement in geography of IX standard pupil was treated as the dependent variable.

**3) Control variable**

 The variable controlled for the present study was the initial status of the students in terms of Achievement in geography as measured by a pre-test.

**c) Selection of the Topic**

The topics for the experiment was selected from the new social studies syllabus prescribed for standard IX pupils of Kerala state. The topic was from the unit two, ‘The Earth Which Supports Man’, which includes the following lessons.

1. Interior of the Earth
2. Moving Plates
3. Earthquakes
4. Tsunami
5. Volcanoes
6. Folding and Faulting
7. Weathering
8. Mountains
9. Plateaus
10. Plains
11. Wind and Erosion
12. Glaciers and Erosion
13. Underground Water and Various Landforms
14. Sea Waves as an Agent of Erosion and Deposition
15. Running Water and Erosion

## II. TOOLS USED FOR THE STUDY

 The tools used for the present study and description of them are presented in this section. Tools used for the present study as follows:

1. Lesson Transcript Based on Metacognitive Learning Strategy
2. Lesson Transcript Based on Existing Method (Constructivist Method) of Teaching
3. Achievement Test in Geography

**a) Lesson Transcript Based on Metacognitive Learning Strategy**

 The metacognitive learning strategy was introduced as a new method of instruction. Based on the meta-cognitive learning strategy the investigator prepared 15 lesson transcripts. The duration of each lesson transcript was expected to be 40-45 minutes. Each lesson was prepared by following format.

## I. Focus

 Introducing the theme of the lesson.

## II. Lesson Objectives

 Discussing the thinking and learning objectives. These are the learning outcomes written in terms of pupil behaviour which the teacher was supposed to realize within the given period of time for a particular lesson.

## III. Input/Stimulus

 This section providing information and stimulus to learning, includes two parts concepts and understandings, and learning materials. In concepts and understandings, discussing the key points which were essential and necessary were selected and given as teaching points. And the learning materials includes, various materials which were given in order to do the activities given in the class.

## IV. Structured Activities

 There are three columns in each lesson plan. First column deals with ‘learning activities’, second deals with ‘metacognitive activities’ and third includes the ‘response’. Learning activities progresses through two stages.

1. Introductory Activity:

 An interesting activity that initiates the students thinking power and thus enters into the content of the lesson.

1. Developmental Activity:

 Activities that make students to think and understand about the content of the lesson.

 Metacognitive activities are divided into 3 phases.

**Phase I- Planning:**

 It includes questions that assist learner to think about the problem that is presented and to make use of previous knowledge to solve this problem as quickly as possible.

**Phase II – Monitoring**

 It includes questions that help the learner to think whether his/her activities related to the content and findings are in the proper way or whether he/she was to try it in any other way.

**Phase III- Evaluation**

 Here some activities are included to activate the thought related to the following. How did I do it? How better is my result? How far I can make me of this knowledge in any other occasions?

## V. Metacognitive Review

 Discussing as a group what they have thought and learnt, reviewing objectives, setting targets, lesson closure.

 Among 15 lesson transcripts which have been prepared using metacognitive learning strategy, only five are attached here for this study. The rest of ten lesson transcripts have been given in Appendix I.

**LESSON TRANSCRIPT BASED ON METACOGNITIVE LEARNING STRATEGY -1**

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Interior of the Earth

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Interior of the Earth |
| Lesson Objectives | : | * To improve the understanding of interior of the earth.
* To understand the different parts of the interior of the earth and identify its features.
* To understand the different movements in the inner part of the earth.
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * The radius of the earth is about 6371 km
* The outermost layer of the earth is the crust.
* Crust, mantle and core are the three parts of the interior of the earth.
* The upper portion of the mantle and the crust together is called the lithosphere.
* The lithosphere consists of seven major plates and about a dozen of minor plates.
* The part that just below the upper mantle is called aesthenosphere.
* Below the aesthenosphere is the lower mantle.
* The conventional currents of aesthenomosphere cause plates to move.
* Lower mantle is followed by core.
* The core has two parts, an outer core and an innercore.
* In the center of the earth, the temperature is almost 110000C and the pressure is very high. Hence the inner core is in a solid state.
 |
| *Learning materials*  | : | * Slide show- The features of the earth surface.
* Globe
* Pictures of mines, earthquakes, etc.
* Model of interior of the earth
* Reading materials
 |

**Structured activities:**

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Teacher shows the slide show of features of the earth surface (Mountains, Rivers, Ocean etc.)
* Teacher wants to connect the pictures of previous slide show with the earth surface.
* And also wants to identify the features of inner part of the earth.
* Students think about the interior of the earth.

Developmental Activity:* Students list out their findings.
* Teacher shows the pictures of mines, earthquakes, volcanic eruption etc. as hints
* Teacher shows the model of interior of the earth.
* Students discuss their findings
* Teacher provides the reading materials related with the features of interior of the earth.
* After observing the model, students realize the features and write their findings.
* Teacher briefly explains the content.
 | Phase I: Planning * Would you think about the interior of the earth?
* Do you know anything about this?
* From where we will get the information about the interior of the earth?

Phase II: Monitoring * Think about whether your answer is right or wrong on the basis of pictures.
* Try to create a clear understanding about the interior of the earth.
* Evaluate your activities are correct.
* How can you arrange the findings clearly?
* Identify the difficult terms. Why did it become difficult?

Phase III: Evaluation * How much did you complete all these activities correctly?
* Examine, whether your findings are believable or not?
 |  |

# Metacognitive Review

* How did we understand about the interior of the earth?
* What kind of reasons have we used?
* How do these process are helpful for the better understanding?
* Is this thinking process useful to you? Is it inspire for the deep understanding?

**LESSON TRANSCRIPT BASED ON METACOGNITIVE LEARNING STRATEGY -2**

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Moving Plates

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Moving Plates  |
| Lesson Objectives | : | * To understand the lithosphere situates as big and small plates and they have various movements, those creates different landforms.
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * The lithosphere consists of seven major plates and about a dozen of minor plates.
* Most of the plates include both of the continental crust and oceanic crust.
* There are three types of plate margins can be recognized on the basis of the relative motions of plates with respect of their adjacent plates.
* Divergent margins are plate margins where two adjacent plates move away from each other.
* Plate margins where two plates meet each other known as convergent margins.
* Shear margins are the plate margins along which the plates slide past each other.
 |
| *Learning materials*  | : | * Globe
* World Map
* Reading Materials
 |

**Structural Activities:**

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Teacher gives the parts of the globe (major plates and minor plates) and asks to join them?
* Note the facts those they understand after joining them.

Developmental Activity:* Asks to recognize all plates and asks to find out correct which is big and small?
* Teacher gives an idea about the divergent margin, convergent margin and shear margin and note it.
* Recognize what are the phenomenas happen after effect of the movements in the margin.
* Check the findings are correct with the help of the text book?
* Note the terms, such as seafloor spreading, tectonic movement, etc.
 | Phase I: Planning * Have you understood before fissures are there in the surface of the earth?
* What was your understanding about this?
* How can you understand the information about this plates are true?

Phase II: Monitoring * Is the term ‘plate’ is fit for this? Can we call it ‘plate’?
* Can you understand the informations are correct about the plate, that we got from the features of that area?
* Can you understand from the previous knowledge what are the phinomenas happened in the margins?
* From where we will get more examples?
* Recognize the new terms.

Phase III: Evaluation * How much clear all the understanding facts?
* Did you have a good plan?
 |  |

# Meta Cognitive Review

* Whether your thoughts are in a proper way about the activities in the classroom?
* Could you find whether the ideas of moving plates?
* How can you use these information in your life?

**LESSON TRANSCRIPT BASED ON METACOGNITIVE LEARNING STRATEGY -3**

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Earthquakes

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Earthquakes  |
| Lesson Objectives | : | * To get an idea about earthquake happens when the energy become free, that called from the interior of the earth and that time waves are created.
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * The point of origin of the earthquakes is known as focus.
* The point just above the focus on the surface of the earth is known as epicenter.
* The energy being released from the focus propagates as waves. These cause tremors on the surface of the earth and cause destructions.
* The instrument used to measure the magnitude of the earthquake is called a seismograph.
* The intensity of the earthquake is measured based on the Richter scale.
 |
| *Learning materials*  | : | * Video of an earthquake
* Chart
* Reading materials
 |

# Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Teacher shows the video of an earthquake and exploded areas. Then she asks what is that and how did it happen.
* Students note down the findings.

Developmental Activity:* Students present the findings
* Teacher presents a chart, that clear the focus and epicenter.
* Students discuss about the speed of the waves that happened after an earth quake.
* Discusses what is richter scale.
* Suggest to collect the details of earthquakes, happened in different times?
 | Phase I: Planning * What did you understand about earthquakes? Is these details are accurate?

Phase II: Monitoring * Which are the best findings from the students? Why?
* What are the points you already know from the chart? What are the remaining points?
* Students check their previous knowledge about the earthquakes first and check the present informations.
* From where we can collect more suitable details about earthquake?

Phase III: Evaluation * How did the previous knowledge help you in this study?
* How much proper were your thoughts?
* How much clear are your findings? Is the evidences are accurate?
 |  |

# Metacognitive Review

* Could you understand properly about earthquake through the thought process in the classroom?
* Could you understand this part of the lesson in a better way?
* Have there any necessity to know about earth quake?

**LESSON TRANSCRIPT BASED ON METACOGNITIVE LEARNING STRATEGY -4**

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Tsunami

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Tsunami  |
| Lesson Objectives | : | * To understand the earthquakes in the sea floor are the reason for Tsunami and to know the precautions against Tsunami
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * Sea waves which can go very high are called Tsunamis
* Tsunami is a Japanese word meaning harbour waves.
* Tremors produced by intense earthquakes that occur in the sea create Tsunamis.
* Tsunami waves travel at about 800 km per hour and rise up to 30 metres high.
 |
| *Learning materials*  | : | * Video of Tsunami
* Reading materials
* Wave movements-an experiment
 |

Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Teacher shows the video of Tsunami
* Students identifies Tsunami, Teacher asked how does it happen?
* Students list out their opinion.

Developmental Activity:* After discussing the opinion of the students teacher shows the wave movements with the help of a bucket filled with water.
* Students identified the different movements in the inner part of the earth.
* Students discuss the precautions against Tsunami, list out their opinions.
* After discussing the precautions teacher wind up the class.
 | Phase I: Planning * Did you understand the reasons of Tsunami?

Phase II: Monitoring * How do your things are correct?
* Did you understand the different movements in the inner part of the earth?
* Can you suggest some remedial measures against the tragedy of the Tsunami?
* How can these are applicable?

Phase III: Evaluation * How much did you understand properly about Tsunami?
* Can you think the new informations are useful to avoid the tragedy of Tsunami?
* From where we get the additional information about this.
 |  |

# Metacognitive Review

* Which are the thoughts and process used in the learning?
* Whether these process are needed in this study?
* Whether these findings/information are useful in your life?

**LESSON TRANSCRIPT BASED ON METACOGNITIVE LEARNING STRATEGY -5**

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Volcanoes

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Volcanoes  |
| Lesson Objectives | : | * To know how volcanoes are caused when magma flows out on to the earth’s surface through fissures that are caused due to the movement of plates, volcanoes can be classified according to the chances of eruption and ‘the fissures through which the magma comes out from the aesthenosphere creates different landforms in the surface and interior of the earth.
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * Volcanoes are caused when molten rock (magma) flows out onto the earth’s surface through fissures that are caused due to the movement of the plates.
* The name ‘volcano’ has its origin from the name of ‘vulcan’, a god of fire in Roman mythology.
* Magma is liquid rock inside a volcano.
* Lava is liquid rock (magma) that flows out of a volcano.
* Over half of the world’s volcanoes arise in a belt around the Pacific Ocean called the Ring of Fire.
* There are around 1510 active volcanoes in the world. We currently know of 80 or more which are under the ocean.
* The fissures, trough which the magma comes out from the aesthenosphere on to the crust of the earth is known as the vent.
* The funnel shaped depression that can be seen on the summit of a volcanoes is known as a crater.
* The molten rock produces various land forms not only on the surface of the earth but also inside the earth such as Sill, Dyke, Lacolith, Botholith etc.
* Based on the chances of eruption the volcanoes are classified into three, these are Active, Extinct and Dormant.
* Volcanoes are helpful for man in many ways.
 |
| *Learning materials*  | : | * Charts - Volcanic eruption
* Video -volcanic eruption
* Outline map of the world
 |

Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * The processes of volcanic eruption is shown in a chart without hints and details. Students note what did they understand.

Developmental Activity:* Video of volcanic eruption is shown and students are asked to make changes in their findings.
* It is shown in another chart about magma chamber, Batholith, sill, Dyke, Lacolith and Vent. Students are asked to mark it on the former chart.
* Different types of volcanoes and their specialties are discussed.
* Important volcanoes are marked on the outline of world map.
* Students are asked to make note and read in the class.
 | Phase I: Planning * Connect the previous knowledge with showing chart.
* Is there any connection with your previous knowledge.

Phase II: Monitoring * Did you understand anything about the volcanic eruption?
* Think your knowledge is correct or not with the help of chart?
* Which are the difficult terms?
* How these hints are helpful to identify these terms?
* Do you know, every volcanoes are not same in nature? Did you think about these?
* Can you understand, which is the most dangerous volcanoes?

Phase III: Evaluation * How does your knowledge become correct related with volcanic eruption?
* Which are the changes come in your previous knowledge due to these learning process?
* From where we get the additional information about this.
 |  |

# Metacognitive Review

* What kind of reasons have you used in this lesson?
* Can you understand this lesson in a better way?
* Whether the learned lesson true? How can you say it is true?

**b) Lesson Transcript Based on Existing Method (Constructivist Method) of Teaching**

 The lesson plans for teaching in the control group were prepared on the basis of newly introduced activity curriculum of Kerala (constructivist method). Each lesson was prepared by the following format.

***1. Issue:***

 Presents the problems that faced by the students related to the topics.

***2. Theme:***

 Introduce the topic.

 ***3. Learning Objectives***:

 This includes the objectives to be attained by the pupils by teaching the particular lesson. It focuses on what will the students do to acquire for the knowledge and skills.

***4. Major Facts and Concepts***

 Point out the major facts and concepts of the lesson.

***5. Pre-requisites***:

 It includes, examining the student knowledge which are relevant for teaching the new topic. Pre-requisites allow the teacher and others replicating the lesson objectives.

***6. Materials/Resources:***

 It consists of all teaching aids which could be used by the teacher while teaching the content.

***7. Products***:

 Any kind of products, which are created at the end of the learning process.

***8. Values and Attitudes:***

 Values and attitudes, which are expected to develop in the students through learning process.

***9. Learning Process:***

 Learning process have three stages, i.e., (a) introductory activity, (b) developmental activity and (c) concluding activity and each stages includes various learning activities to achieve the learning objectives.

***10. Follow up Activities*:**

 Include some activities to prepare the students for enquiring more about the completed lesson.

 A Model Lesson Transcript based on Existing Method (Constructivist Method) of teaching is given as Appendix II.

**c) Achievement Test in Geography**

 This test of Achievement in Geography, used as pre-tests and post-tests, was constructed by the investigator with the help of supervising teacher for the present study on the topics selected for the treatment. Main stages in the preparation of the test were as follows.

**I. Planning of the Test**

 The preparation of any classroom test involves a number of stages. Here first comes the planning stage. Here the decision regarding when to test, what kind of questions to use in the test and how many questions to include in the test etc. are taken.

 With regard to the type of questions, the investigator decided to have including essay types, short answers, very short answers and objective types questions in the test. The duration of the test was fixed as 45 minutes.

**a) Weightage to objectives**

 Objectives are broad goals and are stated in terms of desired change in student behaviour. Items were prepared on the basis of Bloom’s Revised taxonomy of educational objectives (Anderson and Krathwohl, 2001). The weightage given to the categories of objectives under cognitive domain were.

* Remembering
* Understanding
* Applying
* Analysing
* Creating
* Evaluating

The weightage to objectives of the test is given in Table 1

**TABLE 1**

**Weightage to Objectives**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Objectives**  | **Marks**  | **Percentage**  |
| 1. | Remembering  | 6 | 15 |
| 2. | Understanding  | 8 | 20 |
| 3. | Applying  | 6 | 15 |
| 4. | Analysing  | 8 | 20 |
| 5. | Creating  | 4 | 10 |
| 6. | Evaluating  | 8 | 20 |
| **Total**  | **40** | **100%** |

 **b) Weightage to Content:**

 The weightage given to different subunits in the content area are shown in the Table 2.

**TABLE 2**

##### Weightage to Content

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Content**  | **Marks**  | **Percentage**  |
| 1. | The interior of earth, moving plates  | 8 | 20 |
| 2. | Earthquakes, Tsunami, Volcanoes | 12 | 30 |
| 3. | Forces that cause changes on the earth’s surface  | 20 | 50 |
|  | Total  | **40** | **100** |

**c) Weightage to Difficulty Level:**

 The Weightage given to different difficulty level are shown in Table 3.

##### TABLE 3

**Weightage to Difficulty Level**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Difficulty Level**  | **Marks**  | **Percentage**  |
| 1. | Easy questions  | 8 | 20 |
| 2. | Average questions  | 24 | 60 |
| 3. | Difficulty questions  | 8 | 20 |
|  | Total  | **40** | **100** |

**d) Weightage to form of Questions:**

 The Weightage given to different form of questions are shown in the Table 4.

##### TABLE 4

##### Weightage to Form of Questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl. No.** | **Form of questions**  | **No. of Items**  | **Marks**  | **Percentage**  |
| 1. | Very short answer  | 4 | 8 | 20 |
| 2. | Short answer  | 4 | 16 | 40 |
| 3. | Essay type  | 2 | 12 | 30 |
| 4. | Objective type  | 1 | 4 | 10 |
|  | Total  | **11** | **40** | **100** |

**e) Blue Print of Achievement Test in Geography:**

 The investigator presents a detailed question wise distribution of marks over specific topics in the blue print. The blue print for the Achievement Test in Geography incorporating Weightage given to instructional objectives content area and difficulty level are presented in Table 5.

##### TABLE 5

##### Blue Print for the Achievement Test in Geography

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl. No.** | Objectives | **Remembering** | **Understanding** | **Applying** | **Analyzing** | **Creating** | **Evaluating** | **No. of Items** | **Total Marks** |
|  | **Form of question**Content  | **Objective**  | **V.S.A** | **S.A.** | Essay | **Objective**  | **V.S.A** | **S.A.** | Essay | **Objective**  | **V.S.A** | **S.A.** | Essay | **Objective**  | **V.S.A** | **S.A.** | Essay | **Objective**  | **V.S.A** | **S.A.** | Essay | **Objective**  | **V.S.A** | **S.A.** | Essay |
| 1. | The Interior of the Earth, Moving Plates  | 1 (4) |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 (4) |  |  |  |  |  |  |  |  |  | 2 | 8 |
| 2. | Earthquakes, Tsunami, Volcanoes  |  |  |  |  |  |  |  | 1 (6) |  |  |  |  |  |  | 1 (4) |  |  |  |  |  | 1 (2) |  |  |  | 3 | 12 |
| 3. | Forces that cause changes on the Earth surface  |  | 1 (2) |  |  | 1 (2) |  |  |  | 1 (2) | 1 (2) |  |  |  |  |  |  |  |  | 1 (4) |  |  |  |  | 1 (2) | 6 | 20 |
|  | No. of items  | 1 | 1 |  |  | 1 |  |  | 1 |  | 1 | 1 |  |  |  | 2 |  |  |  | 1 |  | 1 |  |  | 1 | 11 |  |
|  | Total marks  | 4 | 2 |  |  | 2 |  |  | 6 |  | 2 | 4 |  |  |  | 8 |  |  |  | 4 |  | 2 |  |  | 6 |  | 40 |
|  | Grand total  | 6 | 8 | 6 | 8 | 4 | 8 |  |

## II. Item Writing

 Based on the Blue print the investigator prepared eleven items, representing each objectives and it was subjected to expert’s criticism. Objective type, short answer type, very short answer type and essay type questions were included in the test. The time duration for the test was 40minutes. The final achievement test is given as Appendix III.

**III. Scoring Key**

 Scoring key was prepared and it was utilized for scoring the answer sheets, which is presented as Appendix IV.

**IV. Reliability and Validity**

 Reliability and validity are the two important constructs in the research.

**Reliability**

The reliability of a measuring instrument is the degree of consistency with which it measures whatever it is measuring. This quality is ascertained in any kind of instrument. According to Crow (1963) by reliability is meant the extent to which or the accuracy with which test measures what it has been constructed to measure. Reliability co-efficient can be calculated with different methods such as test-re-test method, split half method, equivalent of parallel form method and inter score reliability method.

**Reliability of the Present Study**

 A test is said to be reliable when the test scores are stable and trust worthy. The investigator computed the reliability of the test by test-re-test method. By this method, the same test was re-administered after one weeks time. The two sets of scores were then correlated by using Pearson’s Product Moment Co-efficient of Correlation to obtain the reliability of the test. The reliability co-efficient so obtained was 0.826 to N=32. Thus the index suggests that the test is highly reliable.

**Validity**

 A test is said to be valid when it measures what it intends to measure. Validity is an indispensable characteristic of measuring devices. The validity of a test may be defined as the accuracy with which it measures what it is intended to measure or as the degree in which it approaches infallibility in measuring what it purports to measure.

 According to Donald Ary (1972) there are four types of validity-content validity, predictive validity, concurrent validity and construct validity.

**Validity of the Present Test**

 The investigator established the content validity by the proper analysis of the content and objectives and by the preparation of blue print. The investigator ensured face validity by consulting with expert teachers and eliminating unnecessary items according to their suggestions. The investigator established the criterion-related validity of the test by taking the external criteria as school marks of a unit test in social science. The validity co-efficient was found to be 0.63 indicating the test is valid.

**3.3 SAMPLE USED FOR THE STUDY**

 Since it would be impractical to study the experiment on the whole population, the investigator decided to select two groups for the experiment. So by tossing, the investigator selected one class division as control group and another as experimental group. Here the investigator selected two class divisions of standard IX of Islahiya English Medium Higher Secondary School, Malappuram. Details of the sample selected for the study is given below in Table 6.

**TABLE 6**

**Details of Sample Selected for the Study**

|  |  |  |
| --- | --- | --- |
| **Standard** | **Experimental Group**  | **Control Group**  |
| **Boys**  | **Girls**  | **Total**  | **Boys**  | **Girls**  | **Total**  |
| IX | 16 | 16 | 32 | 20 | 12 | 32 |

**3.4 DATA COLLECTION PROCEDURE, SCORING AND CONSOLIDATION OF DATA**

 The details of the data collection procedure, scoring and consolidation of data is briefly explained in this section.

**a) Data Collection Procedure**

 Before conducting experiment, both experimental and control group were given the same pre-test to measure the initial status of the subject in terms of achievement in Geography. After the administration of the pre-test the experimental group was taught through metacognitive strategy and control group was taught through existing method (Constructivist Method) of teaching.

 After the completion of the lesson, both the experimental group and control group were given the same achievement test as pre-test. The score on this test was used for determining the effectiveness of two teaching methods (Metacognitive learning strategy and existing method of teaching).

**b) Scoring and Consolidation of Data**

 All the answer sheets of the pre-test and post-test, which were correct in all respects were scored according to the scoring key. Scores of Pre-test and post-test of control group and experimental group were tabulated separately. The scores obtained for the selected variables were then consolidated for final analysis. The scoring key is presented as Appendix IV.

**3.5 STATISTICAL TECHNIQUES USED FOR ANALYSIS**

 The present study demanded the use of following statistical techniques.

1. **Test of Significance of Difference Between Two Means:**

 For the present study, test of significance of difference between means for large and small independent samples were used to compare the relevant variable between experimental and control groups.

1. **Analysis of Covariance (ANCOVA)**

 To examine the effectiveness of metacognitive learning strategy over the existing method of teaching on the achievement in Geography of standard IX pupil, single factor ANCOVA with one co-variate is used. Analysis of covariance serves the purpose of statistically removing the effects of extraneous variables from the dependent variable. In the present study ANCOVA is employed to remove statistically the effect of confounding variables, the initial status of the subjects measured in terms of a pre-test.

 Analysis of covariances uses the principle of partial correlation with analysis of variance. The effect of the relevant variables are partialed out and the resulting adjusted means of the post-test scores are compared. Analysis of covariance is a method of analysis that enables the researcher to equate the pre-experiential status of the group in terms of relevant known variables (Best and Kahn, 2001). ANCOVA is an important method of analyzing the experiments carried under condition that otherwise would be unacceptable (Ferguson, 1996)

ANALYSIS

 The main purpose of the present study was to find the effectiveness of metacognitive learning strategies over the existing method of teaching on achievement in Geography of standard IX pupils. The collected and tabulated data were analysed using the statistical technique t-test and single factor ANCOVA.

 The statistical analysis of the consolidated data has been based on the following objectives of the study.

1. To compare the mean pre-test scores of experimental and control group.
2. To compare the mean post-test scores of Achievement in Geography for experimental and control group for total sample and sub samples formed on the basis of sex.
3. To compare the mean gain scores of achievement in Geography for experimental and control group for total sample and subsamples formed on the basis of sex.
4. To study the effectiveness of metacognitive learning strategy over the existing method of teaching on the achievement in Geography of Standard IX pupils.

The present study was designed to test the following hypotheses

1. There will be significant difference in the pretest scores of the experimental and control groups.
2. There will be significant difference in the mean scores of the post-test of the experimental and control groups for total sample and subsamples formed on the basis of sex.
3. There will be significant difference in the mean gain scores of the experimental and control groups for total sample and subsamples formed on the basis of sex.
4. Pupils taught through metacognitive learning strategies of teaching Geography of standard IX will significantly differ in achievement in Geography than pupils taught through existing method of teaching.

 Analysis of the data has been done, classified and presented in the following order

I. PRELIMINARY ANALYSIS

II. COMPARISON OF MEANS

III. ANALYSIS OF COVARIANCE

**I. PRELIMINARY ANALYSIS**

 The statistical properties of the variables in the study and the comparison of the mean scores of the relevant variables for the experimental and control group were done and presented in this section.

## Important Statistical Constants

 As part of preliminary analysis important statistical constants like mean, medium, mode, standard deviation, skewness and kurtosis for the pre-test, post-test and gainscores were examined separately for experimental and control groups and is pointed in Table 7 and Table 8 respectively.

##### TABLE 7

**Statistical Constants of**

**Achievement in Geography for Experimental Group**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl. No.** | Variables | **Mean** | **Median** | **Mode** | **S.D** | **Skewness** | **Kurtosis** |
| 1. | Pre-test  | 5.43 | 4.5 | 7.31 | 3.05 | 1.03 | 0.75 |
| 2. | Post-test  | 28.65 | 29 | 27.96 | 4.01 | -0.09 | -0.30 |
| 3. | Gain scores  | 23.21 | 25 | 19.65 | 5.50 | -0.52 | -0.24 |

##### TABLE 8

**Statistical Constants of**

**Achievement in Geography for Control Group**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl. No.** | Variables | **Mean** | **Median** | **Mode** | **S.D** | **Skewness** | **Kurtosis** |
| 1. | Pre-test  | 5.25 | 5 | 5.75 | 1.72 | 0.39 | -0.74 |
| 2. | Post-test  | 20.38 | 20 | 21.12 | 4.17 | 0.30 | -0.63 |
| 3. | Gain scores  | 15.12 | 13.5 | 18.37 | 4.66 | 0.65 | -0.33 |

**II. COMPARISON OF MEANS**

 In this part of the Analysis, comparison of the mean scores of Achievement in Geography for experimental and control groups, in the pre-test, post-test and gain scores for total sample were attempted. Also the mean scores of Boys and Girls for post-test and gain scores were attempted and presented below.

* 1. **Comparison of mean Pre-test scores of Achievement in Geography for Experimental and Control Groups**

The mean scores of experimental and control groups on the pre-test were compared and studied using the test of significance of difference between means of large independent samples. The comparison was done for the sample in each of the experimental and control groups.

 The mean and standard deviation of pre-test scores of both of the group were found out and subjected to the test of significance of difference between means. The data and results of the t-test are presented in the Table 9.

##### TABLE 9

**Test of Significance of the**

**Mean Scores of Pretest between Experimental and Control Groups**

|  |  |  |  |
| --- | --- | --- | --- |
| Experimental Group | Control Group | **t-value** | **Level of significance** |
| **M1** | **1** | **N1** | **M2** | **2** | **N2** |
| 5.43 | 3.05 | 32 | 5.25 | 1.72 | 32 | -0.30 | N.S |

 N.S = not significant at 0.05 level

 It can be seen from Table 9 that the obtained t-value is below the limit set of 0.05 level at significance. So no significant difference is found in the mean pre-test scores of experimental and control groups for the Achievement in Geography.

 It can be inferred from the t-test that the performance of the experimental and control group are similar in case of their pre-experimental status of achievement measured in terms of pretests.

 The graphical representation of pre-test scores of experimental and control groups are presented in Figure 1.

**FIGURE 1**

**Frequency Curve Representing**

**Pre-test Scores of Experimental and Control Groups**

 As per the Figure 1 it is noted that somewhat similar performance of the experimental and control groups in case of their pre-experimental status of Achievement as measured in terms of the pre-test. Results of the t-test confirmed the features in graphical representation of the comparison of pretest scores.

**b) Comparison of the mean post-test scores of Achievement in Geography for Experimental and Control groups**

 The mean performance of experimental and control groups on the post-test scores were studied and compared using the test of significance of difference between means of large independent samples. The comparison was done for the total sample in the experimental and control groups.

 The mean and standard deviation of the post-test of both the groups were found out and subjected to the test of significance of difference between means. The data and results of t-test are presented in Table 10.

##### TABLE 10

**Test of Significance of the Mean Scores**

**of Post-test Between Experimental and Control Groups**

|  |  |  |  |
| --- | --- | --- | --- |
| Experimental Group | Control Group | **t-value** | **Level of significance** |
| **M1** | **1** | **N1** | **M2** | **2** | **N2** |
| 28.65 | 4.01 | 32 | 20.37 | 4.17 | 32 | 08.09 | 0.01 |

 It can be seen from Table 10 that the obtained t-value is above the limit set for 0.01 level of significance. So there exist a significant difference in the mean post-test scores of experimental and control groups.

 It can be inferred from the results of the t-test that, the performance of the experimental and control group is different in the case of their post experimental status of Achievement in Geography measured in terms of a post-test. The graphical representation of post-test scores of Experimental and control groups are presented in Figure 2.

##### FIGURE 2

**Frequency Curve Representing**

**Post-test Scores of Experimental and Control Groups**

 As per the Figure 2 it can be noted that there exist difference in the post-test scores of experimental and control groups. Results of the test confirmed the features in the graphical representation of the comparison of the post-test scores.

**c) Comparison of the Mean Gain Scores of Achievement in Geography for Experimental and Control Groups**

 The mean scores of Experimental and Control groups on the gain scores were studied and compared using the test of significance of difference between means of large independent samples. The comparison was done for the total sample in the experimental and control groups.

 The mean and standard deviation of the gain score of both the groups were found out and subjected to the test of significance of difference between means. The data and results of t-test presented in Table 11.

##### TABLE 11

**Test of Significance of the Mean Scores**

**of Gain Score Between Experimental and Control Groups**

|  |  |  |  |
| --- | --- | --- | --- |
| Experimental Group | Control Group | **t-value** | **Level of significance** |
| **M1** | **1** | **N1** | **M2** | **2** | **N2** |
| 23.21 | 5.50 | 32 | 15.12 | 4.68 | 32 | 6.33 | 0.01 |

 The obtained t value as shown in Table 11 for the mean gain scores is greater than the tabled value required for significance at 0.01 level. This suggests that there is significant difference in the mean gain scores of Experimental and Control groups. So the gain performance of the experimental and control groups are dissimilar.

 High mean gain score for the Experimental group over the Control group for the total sample is noticed. This revealed the superiority of the experimental group over the control group in the case of gain scores.

 The graphical representation of Gain scores of experimental and control groups presented in Figure 3.

##### FIGURE 3

**Frequency Curve Representing**

**Gain Scores of Experimental and Control Groups**

 As per the Figure 3, it can be noted that there exist difference in the gain scores of Experimental and Control groups. Results of the test confirmed the features in the graphical representation of the comparison of the gain scores.

**d) Comparison of Mean Post-test scores of Achievement in Geography for Boys between Experimental and Control groups**

 The mean performance of boys of experimental and control groups in the post-test were studied and compared using the test of significance of difference between means of small independent sample. The data and results of the t-test are presented in Table 12.

**TABLE 12**

##### Test of Significance of the Mean Scores of

##### Post-test Between boys of Experimental and Control Group

|  |  |  |  |
| --- | --- | --- | --- |
| Experimental Group | Control Group | **t-value** | **Level of significance** |
| **M1** | **1** | **N1** | **M2** | **2** | **N2** |
| 26.75 | 4.00 | 16 | 21.80 | 4.36 | 20 | 3.50 | 0.01 |

 The obtained ‘t’ value as shown in Table 12 for the mean post-test scores of Achievement in Geography for boys between experimental and control groups, is greater than the tabled value required for significance at 0.01 level.

 This significant ‘t’ value indicates that the mean post-test scores of boys of the experimental and control groups are not similar. This revealed the superiority of boys of experimental group over the boys of control group in case of post-test scores.

**e) Comparison of Mean Post-test Scores of Achievement in Geography for Girls between Experimental and Control Groups**

 The mean performance of girls of experimental and control groups in the post-test were studied and compared using the test of significance of difference between means of small independent sample. The data and results of the t-test are presented in Table 13.

##### TABLE 13

**Test of Significance of the Mean Scores of**

**Post-test between Girls of Experimental and Control Group**

|  |  |  |  |
| --- | --- | --- | --- |
| Experimental Group | Control Group | **t-value** | **Level of significance** |
| **M1** | **1** | **N1** | **M2** | **2** | **N2** |
| 26.37 | 3.99 | 16 | 12.75 | 3.22 | 12 | 11.52 | 0.01 |

 The obtained ‘t’ value as shown in Table 13 for the mean post-test scores of Achievement in Geography for girls between experimental and control groups, is greater than the tabled value required for significance at 0.01 level. It can be inferred from the table that the mean post-test scores of girls of the experimental and control groups are dissimilar. This indicates that the girls of the experimental group achieved more than the girls of control group.

**f) Comparison of Mean Gain Scores of Boys between Experimental and Control Groups**

 The mean performance of boys of experimental and control groups in the gain scores were studied and compared using the test of significance of difference between means of small independent sample. The data and results of the test are presented in Table 14.

##### TABLE 14

**Test of Significance of the Mean**

**Gain Scores Between Boys of Experimental and Control Groups**

|  |  |  |  |
| --- | --- | --- | --- |
| Experimental Group | Control Group | **t-value** | **Level of significance** |
| **M1** | **1** | **N1** | **M2** | **2** | **N2** |
| 20.06 | 5.03 | 16 | 16.55 | 4.90 | 20 | 2.11 | 0.01 |

 The obtained ‘t’ value as shown in Table 14 for the mean gain scores of boys between experimental and control groups, is greater than the table value required for significance at 0.01 level. This indicates that the mean gain scores of boys of the experimental and control groups are dissimilar. This significant ‘t’ value reveals the superiority of boys of experimental group over the boys of control group in case of gain scores.

**g) Comparison of Mean Gain Scores of Girls between Experimental and Control Groups**

 The mean performance of girls of experimental and control groups in the gain scores were studied and compared using the test of significance of difference between means of small independent sample. The data and results of the test are presented in Table 15.

##### TABLE 15

**Test of Significance of the**

**Mean Gain Scores between Girls of Experimental and Control Groups**

|  |  |  |  |
| --- | --- | --- | --- |
| Experimental Group | Control Group | **t-value** | **Level of significance** |
| **M1** | **1** | **N1** | **M2** | **2** | **N2** |
| 26.37 | 3.99 | 16 | 12.50 | 3.22 | 12 | 9.66 | 0.01 |

 The obtained ‘t’ value as shown in Table 15 for the mean gain scores of girls between experimental and control groups, is greater than the table value required for significance at 0.01 level. This indicates that the mean gain scores of girls of the experimental and control groups are dissimilar. This significant ‘t’ value reveals the superiority of girls of experimental group over the girls of control group in case of gain scores.

## Summary of the Mean Comparison to Total Samples

 The result of the t-test conducted for comparison of the mean pretest, post-test and gain scores for total sample between experimental and control groups were summarized and present in Table 16.

**TABLE 16**

**Summary of t-values for the Pre-test and**

**Gain Scores for Experimental and Control Group (Total Sample)**

|  |  |
| --- | --- |
| Variable  | **t-value**  |
|  Pre-test  | -0.30 |
|  Post-test  | 8.09 |
|  Gain scores  | 6.33 |

 Summary of t-value from Table-16 indicates the t-value obtained for pre-test is not significant. This implies that the experimental and control groups were similar in case of their performance in the pretest.

 The t-value obtained for post-test is found significant. It can be inferred from the result that metacognitive learning strategy differentiates the experimental group and control groups. From the comparison the advantage of the experimental group is evident.

 Table 16 also suggests that the obtained ‘t’ value for the gain scores for the total sample is found to be significant.

**4. ANALYSIS OF COVARIANCE**

 One Factor ANCOVA was used to determine the effect of metacognitive learning strategy on the achievement of Geography of standard IX pupils. The procedures of ANCOVA, data and results are given in this section of analysis. Here it is made a comparison of effectiveness of metacognitive learning strategies on the achievement in geography over the existing method of teaching.

 To determine the effectiveness of metacognitive learning strategies on the achievement in Geography at secondary school level, the pre-test and post-test scores of experimental and control groups were subjected to statistical analysis of covariance. For this single factor ANCOVA, two levels of method of teaching (Metacognitive learning strategies and existing method) as independent variable, is incorporated with one covariate namely the pre-experimental status of the sample measured in terms of a pre-test. Achievement in Geography is considered as the dependent variable.

 Before proceeding to ANCOVA the data used for analysis is subjected to a thorough examination with a view to know whether the data is sufficient to satisfy the major assumptions suggested by Winer (1977), Fergusan (1996), to carry over the ANCOVA procedure. It is examined that the data is seen satisfied with the following assumptions.

1. The dependent variable, which is under measurement, should be normally distributed in the population.
2. The treatment groups should be selected at random from the same population.
3. Within groups, variances must be approximately equal.
4. The contributions of variances in the total sample must be additive.
5. The regression of the final scores (Y) on initial scores (X) should be basically the same in all groups.
6. There should exist a linear relationship between ‘X’ and ‘Y’

 All computations were done by computer by using the software, Statistical Package for Social Sciences (SPSS).

## Homogeneity of Variance

 Within group, variances of the two groups found to be Approximately equal.

## Linear Relationship between the Dependent Variable and Covariate

 To satisfy initially the assumption of instance of linear relationship between the dependent variable and covariate, the nature of relationship is examined using the scatter plot of achievement in Geography against the pre-test scores for experimental group and control group. The scatter plot is presented in Figure 4

##### FIGURE 4

**Scatter Plot of Achievement in**

**Geography Against Pre-test scores by Experimental and Control Groups**

 A visual examination of the scatter plot revealed that the relationship between the dependent variable (Achievement in Geography) and the covariate (pre-test scores) is not depart greatly from linearity.

## Analysis of Variance for Achievement in Geography

 In analysis of variance for the criterion data is attempted, disregarding the covariate to study whether the experimental and control groups create any significant difference in Achievement in Geography. For this purpose the sum of squares, mean square variance along with the corresponding degrees of freedom and the F ratio were calculated. The summary of Analysis of variance of ‘X’ (pre-test) and ‘Y’ (post-test) scores taken separately is given in the Table 17.

##### TABLE 17

**Summary of ANOVA of ‘X’ (Pre-test) ‘Y’ (Post-test)**

**Scores of Pupils in Experimental and Control Groups, Taken Separately**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source of Variance** | **df** | **SSX** | **SSY** | **MSX** | **MSY** |
| Among group mean  | 1 | 0.56 | 1097.26 | 0.56 | 1097.26 |
| Within group  | 62 | 381.87 | 1038.71 | 6.15 | 16.75 |
| Total | **63** | **382.43** | **2135.98** |  |  |

 FX = = 0.09

 FY = = 65.50

 The obtained FX and FY ratios were tested for significance. The table value of F ratio for  is 3.99 at 0.05 level. So the obtained FX is not significant even at 0.05 level. It is clear that X means do not differ significantly. The table value of F ratio for df is 7.06 at 0.01 level. So the obtained FY is highly significant. It can be tentatively concluded that there is significant difference between Y means of the group.

## Analysis of Covariance for Achievement in Geography

 The final Y scores were corrected for differences in initial (X) scores. For that the SSY have been adjusted for any variability in Y contributed by X. the adjusted sum of square for Y and the F ratio was calculated. Summary of ANCOVA is presented in Table 18.

##### TABLE 18

**Summary of ANCOVA of ‘X’ (Pre-test)**

**and ‘Y’ (Post-test) Scores of Pupils in Experimental and Control Groups**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Source of Variance**  | **df** | **SS** | **MS** | **F** |
| Among the group  | 1 | 1108.57 | 1108.57 |  |
| Within the group | 62 | 1012.95 | 16.60 | 66.75 |
| Total  | **63** | **2121.53** |  |  |

 The obtained F ratio was tested for significance. Since the table value of F ratio for df  is 7.06 at 0.01 level of significance, the obtained F ratio is highly significant (F = 66.75). The significant F ratio shows that the means of post-test scores of pupils in the experimental and control groups differ significantly after they have been adjusted for difference in the pre-test scores.

## Comparison of Adjusted Y Means

 The adjusted means of post-test scores (Y means) of pupils in the experimental and control groups were computed and the difference between the adjusted ‘Y’ means was tested for significance (Garret, 1981). The data for adjusted means of post-test scores of pupils in experimental and control groups are presented in Table 19.

##### TABLE 19

**Adjusted Y means for Experimental and Control Groups**

|  |  |  |
| --- | --- | --- |
|  | **Experimental group**  | **Control group**  |
| Adjusted means  | 28.68 | 20.35 |

SED between adjusted Means = 1.40

Obtained difference between means = 8.33

 t-value = 

 = 5.95

 The calculated value of t, 5.95 is significant at 0.01 level. Since the adjusted means of post-test scores of pupils in Experimental group is significantly greater than that of pupils in control group, the Experimental group is superior to the control group in Achievement in Geography. It may therefore be concluded that pupils taught by metacognitive learning strategies have more achievement in Geography than the pupils taught by existing method.

## Discussion

 The analysis of covariance and adjusted means comparison of the data revealed that after controlling of the extraneous variables by statistical technique, differences still exist. The adjusted Y means (post-test scores) are significantly differ after the comparison of adjusted Y means. Hence, it can be inferred that the higher achievement test scores in Experimental group is the result of experimental treatment given to the group namely metacognitive learning strategies.

SUMMARY OF PROCEDURE,

CONCLUSION AND SUGGESTIONS

 This chapter gives an overview of the significant aspects of the stages of conducting the study, the important findings, their educational implications and suggestions for further research.

## I. STUDY IN RETROSPECT

 The various aspects to related to the different stages of the present study like the problem, variables, objectives, hypotheses, and methodology are given in a nutshell.

**a) Restatement of the Problem**

 The problem of the present study was stated as ‘**EFFECTIVENESS OF METACOGNITIVE LEARNING STRATEGY ON THE ACHIEVEMENT IN GEOGRAPHY OF STANDARD IX PUPILS**’

**b) Variables Selected for the Study**

 The independent, dependent and control variables selected for the present study are the following:

* **Independent Variable:**

 The independent variable selected for the study was two methods of teaching-metacognitive learning strategy and the existing method of teaching.

* **Dependent Variable**

 Achievement in Geography of IX standard pupil was treated as the dependent variable.

* **Control Variable**

 The variable controlled for the present study was the initial status of the students in terms of Achievement in Geography as measured by a pre-test.

**c) Objectives of the Study**

 The present investigation was done with the following objectives.

* To compare the mean pre-test scores of experimental and control groups.
* To compare the mean post-test scores of experimental and control group for total sample and subsamples formed on the basis of sex.
* To compare the mean gain scores of experimental and control group for total sample and subsamples formed on the basis of sex.
* To study the effectiveness of metacognitive learning strategy over the existing method of teaching on the achievement in Geography of standard IX pupils.

**d) Hypotheses of the Study**

 The following hypotheses were tested for the study

1. There will be significant difference in the pre-test scores of the experimental and control groups.
2. There will be significant difference in the mean scores of the post-test of the experimental and control groups for total sample and subsamples formed on the basis of sex.
3. There will be significant difference in the mean gain scores of the experimental and control groups for total sample and subsamples formed on the basis of sex.
4. Pupils taught through metacognitive learning strategy will significantly differ in Achievement in Geography than pupils taught through the existing method of teaching.

**e) Methodology**

 The methodology of the present study is briefly discussed in this section.

* **Design of the Study**

 The present study has been conducted by employing the quasi-experimental design. The design used is the present study was the pre-test post-test non-equivalent group design. The notation of the study is as follows.

 O1 x O2

 O3 x O4

Where,

 O1, O3 – pre-tests

 O2 O4 – post-tests

 X – Application of experimental treatment

 C – Application of control treatment

 The experimental group was taught through metacognitive learning strategies and control group was taught through existing method of teaching.

* **Sample of the study**

 The sample of the study consists of 32 pupils in the experimental group and 32 in the control group. The sample for both experimental and control groups were two divisions of standard IX students drawn from the Islahiya E.M.H.S.S., Malappuram.

* **Tools used for the study**
1. Lesson Transcript Based on Metacognitive Learning Strategy
2. Lesson Transcript Based on Existing Method (Constructivist Method) of Teaching
3. Achievement Test in Geography
* **Statistical Techniques Used for the Study**

 The analysis was done using the following statistical techniques.

1. Test of significance of difference between means for large and small independent samples, were used to compare the relevant variables between the experimental and control groups.
2. Single factor ANCOVA- To examine the effectiveness of metacognitive learning strategy over the existing method of teaching on the Achievement in Geography of standard IX pupils, single factor ANCOVA with one covariate is used. Analysis of covariance serves the purpose of statistically removing the effects of extraneous variables from the dependent variable.

## II. MAJOR FINDINGS OF THE STUDY

 The major findings of the study are given briefly in this section. For analysis seven comparisons of means and one ANCOVA were done

* 1. **Comparison of Mean Pre-test Scores of Achievement in Geography for Experimental and Control Groups**

 No significant difference between mean pre-test scores of experimental and control groups were noticed. Both of the groups were found equivalent in terms of pre-test scores. t-value of test of significance for pre-test scores is given in the Table 20.

##### TABLE 20

**t-value of the Test of Significance of Difference**

**between Experimental and Control Groups for Pre-test Scores**

|  |  |  |  |
| --- | --- | --- | --- |
| Sl. No. | **Variable**  | **Sample**  | **t-value**  |
| 1. | Pre-test | Total | -0.30 |

* 1. **Comparison of the Mean Post-test Scores of Achievement in Geography of Experimental and Control Groups for Total Sample, Boys and Girls**

 Significant difference in the mean post-test scores between experimental and control groups for total samples, Boys and Girls were obtained. The obtained t-values are presented in Table 21.

##### TABLE 21

**t-values of the Test of Significance of Difference**

**between Experimental and Control Groups for Post-test Scores**

|  |  |  |  |
| --- | --- | --- | --- |
| Sl. No. | **Variable**  | **Sample**  | **t-value**  |
| 1. | Post-test  | Total | 8.09 |
| 2. | Post-test  | Boys  | 3.50 |
| 3. | Post-test  | Girls  | 11.52 |

* 1. **Comparison of the Mean Gain Scores of Achievement in Geography of Experimental and Control Groups for Total Sample, Boys and Girls**

 The obtained t-value for the gain scores of total sample, Boys and Girls are found to be significant. The t-values of this test are presented in Table 22.

##### TABLE 22

**t-values of the Test of Significance of Difference**

**between Experimental and Control Groups for Gain Scores**

|  |  |  |  |
| --- | --- | --- | --- |
| Sl. No. | **Variable**  | **Sample**  | **t-value**  |
| 1. | Gain scores  | Total | 6.33 |
| 2. | Gain scores  | Boys  | 2.11 |
| 3. | Gain scores  | Girls  | 9.66 |

## Analysis of Covariance for Achievement in Geography

 Single factor ANCOVA was used to study the effectiveness of metacognitive learning strategy over the existing method of teaching. From the covariate analysis it can be inferred that when linear adjustment is made for the effect of variation due to difference in the pre-experimental status of the subjects, there is statistically significant difference between two groups. The ‘F’ value obtained by covariate analysis is presented in the Table 23.

##### TABLE 23

**Summary of ANCOVA for Achievement in Geography**

|  |  |  |  |
| --- | --- | --- | --- |
| Sl. No. | **Dependent Variable**  | **Sample**  | **F-value**  |
| 1. | Achievement in Geography  | Total  | 66.75 |

**Comparison of Adjusted Means:**

 After the significant ‘F’ value is obtained, to examine the effectiveness of metacognitive learning strategy over the existing method of teaching, adjusted means comparison were used. ‘t’ value for adjusted means is presented in the Table 24.

##### TABLE 24

**Summary of Adjusted Mean Comparison**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Experimental Group**  | **Control Group** | **t-value**  |
| Adjusted Means  | 28.68 | 20.35 | 5.95 |

 From the adjusted means comparison, it can be concluded that there exists a significant difference between two methods of teaching- Metacognitive learning strategy and existing method of teaching. By the comparison of adjusted means we can clearly say that metacognitive learning strategy is highly effective than the existing method.

## III. TENABILITY OF HYPOTHESES

 Tenability of the hypotheses was examined in the light of the major findings of the study. The first hypothesis state that,

* **There will be significant difference in the mean pre-test scores of experimental and control groups.**

 It was found that the difference in the mean pre-test scores of experimental and control groups is not significant. Thus the first hypothesis is rejected.

* **The second hypothesis states that, there will be significant difference in the mean scores of the post-test of the experimental and control groups for total sample and subsamples formed on the basis of sex.**

 Significant difference between the experimental and control groups in mean post-test scores for total sample and subsamples based on sex were noticed. Hence the second hypothesis is fully substantiated.

* **The third hypothesis states that, there will be significant difference in the mean gain scores of the experimental and control groups for total sample and subsamples formed on the basis of sex.**

 The difference in the mean gain scores of experimental and control groups for total sample, Boys and Girls were found to be significant. Thus the third hypothesis is accepted completely.

* **The fourth hypothesis states that, pupils taught through metacognitive learning strategy will significantly differ in Achievement in Geography than pupils taught through the existing method of teaching.**

 The ‘F’ value is found to be highly significant between experimental and control groups for total sample. From this we can conclude that the metacognitive learning strategy is more effective than the existing method of teaching Geography of IX standard Pupils. Hence this hypothesis is fully substantiated.

## IV. CONCLUSIONS

Among seven mean comparison, six values were found to be significant. Only the mean comparison between pre-test scores of experimental and control groups was not significant. The values obtained by test of significance of difference between means of experimental and control groups for post-tests and gain scores for total sample and subsample formed on the basis of sex were highly significance. Hence, we can conclude that the pupils taught through the new method of teaching-metacognitive learning strategical method have achieved more than that of the control group.

 The result of analysis of covariance also indicates the high performance of experimental group. The obtained t-value after the adjusted mean comparison was highly significant. From the above statements we can safely conclude that metacognitive learning strategy is an effective method of teaching over existing method of teaching on achievement in Geography.

## V. EDUCATIONAL IMPLICATIONS

 The present study reveals that the using of metacognitive strategies in learning is effective for the proper understanding and meaningful learning of the students. Eventhough the investigation is carried out on a small sample, the finding throw light on the current educational practices in secondary school classes especially in the instruction of Geography.

 The knowledge about metacognitive strategy has provided educationalists with insight about the cognitive processes involved in learning and what differentiates successful students from their less successful peers. It also holds several implications for instructional interventions such as teaching students how to be more aware of their learning processes and products as well as how to regulate those processes for more effective learning. As students become more skilled at using metacognitive strategies, they gain confidence and become more independent as learners. Independence leads to ownership as students realize they can pursue their own intellectual needs and discover a world of information at their fingertips.

 In this rapidly changing world, the challenge of teaching is to help students to develop the skills which will not become absolute. Metacognitive strategies are essential for the twenty-first century. They will enable students to successfully cope with new situations. Teachers and school library media specialists capitalize on their talents as well as access a wealth of resources that will create a metacognitive environment which fosters the development of good thinkers who are successful problem solvers and life long learners.

 In short, this study proves that metacognitive learning strategy equips the teacher to face and solve the problem that encounter in any subjects especially in Geography at secondary school level.

## V. SUGGESTIONS FOR FURTHER RESEARCH

 The present study revealed that the metacognitive learning strategy is superior to the existing method of teaching in terms of Achievement in Geography. That is why this type of study is relevant today. Therefore the investigator suggests the following studies in this area for further research.

1. The present study is confined to small sample in two class divisions only. The study can be extended to large sample including large content.
2. The present study is conducted in Geography. This can be extended to other areas like Physical Science, Natural Science, and Mathematics.
3. This type of study may also be taken up for examining the interaction effects among methods, sex, socio-economic status and the like.
4. Experimental studies may be conducted for primary and higher levels of education also.
5. The effectiveness of metacognitive learning strategy is to be worked out separately among the students of English medium schools and Malayalam medium schools.

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Appendix III

FAROOK TRAINING COLLEGE

ACHIEVEMENT TEST IN GEOGRAPHY

## K.P. MOHAMED ISHAQ AMEER ALI. M

Associate Professor of Education M.Ed. Student

Farook Training College Farook Training College

#### THE EARTH WHICH SUPPORTS MAN

Time: 1½ Hrs

Std. IX Total Scores: 40

1. ‘It has been remarked that Volcanoes are useful to human beings in different ways’. Evaluate this statement (2 scores)
2. Compare the circumstances that leads to the formation of Himalayan mountain and Mariana trench (4 scores)
3. What is folding and faulting? (2 scores)
4. Arrange suitably (4 scores)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Layer** | **Approximate Depth in Kilometres** | **Average density** |
| A | Outer Core  | 40-2900 | 15 |
| B | Crust  | 2900-5150 | 2.90 |
| C | Mantle  | 5150-6371 | 10.70 |
| D | Inner Core  | 0-40 | 4.5 |

1. ‘Earthquakes causes to the Tsunamis’ – Evaluate the statement on the basis of features of the intensity of different earthquakes (6 scores)
2. Prepare a chart on the topic- ‘Different types of weathering’ (4 scores)
3. Mountains has an eminent role in the history of India as well as Kerala. Do you think it is influencing on human life beyond history? How? (4 scores)
4. Some of the similarities and dissimilarities can be seen in the formation of Meanders and Deltas. Explain (2 scores)
5. Identify the different types of Plateaus? Classify the following plateaus on the basis of classification of Plateaus
	* Colorado Plateau
	* Tibetan Plateau
	* East African Plateau (2 scores)
6. ‘The Volcanoes are entirely different on the basis of their features’. Analyse this statement with examples. (4 scores)
7. ‘New landforms are formed due to the action of winds and glaciers’- Explain

 (6 scores)

Appendix-IV

**SCORING KEY – ACHIEVEMENT TEST**

| **Sl. No.** | **Item Serial** | **Answer** | **Score** |
| --- | --- | --- | --- |
| 1. | 1 | * Formation of the areas, that are rich in minerals
 | ½  | 2 |
|  |  | - Black soil that formed as a result of volcanic eruption are using to cotton cultivation  | ½  |
|  |  | - The hotsprings that are found on volcanoes are supposed to have healing properties  | ½ |
|  |  | - Tourism  | ½  |
| 2. | 2 | - Identify the different plate margins  | 1 | 4 |
|  |  | - Different type convergent margins were noticed  | 1 |
|  |  | - Knowledge about the Formation of oceanic trenches and  | 1 |
|  |  | - Formation of fold mountains  | 1 |
| 3. | 3 | - What is Folding?  | 1 | 2 |
|  |  | - What is Faulting?  | 1 |
| 4. | 4(a) | Outer core | 2900 to 5150 | 10.7 | 1 | 4 |
|  |  (b) | Crust  | 0 to 40 | 2.9 | 1 |
|  |  (c) | Mantle  | 40 to 2900 | 4.5 | 1 |
|  |  (d) | Innercore  | 5150 to 6371 | 15 | 1 |
| 5. | 5 | - Justification of statement  | 2 | 6 |
|  |  | - Analyzing the different intensity of earthquakes and its effects  | 4 |
| 6. | 6 | - Weathering (Heading)- Three types of weathering (Physical, Chemical and Biological Weathering)- Structure of Chart  | ½ 3½  | 4 |
| 7. | 7 | - Approval of the statement  | 1 | 4 |
|  |  | - Discussing influence on climate  | 1 |
|  |  | - General purposes (vegetation, terrace farming, sheep rearing etc.) | 1 |
|  |  | - Mineral wealth, tourism, defence, hydro electric power  | 1 |
| 8. | 8 | - Identifying the dissimilarities (Shape, process of formation, etc.) | 1 | 2 |
|  |  | - Identify the similarities (River as agent) | 1 |
| 9. | 9 | - Identifying the different type of plateaus, Intermontane, Piedmont and continental  | ½  | 2 |
|  |  | - Colorado- Piedmont  | ½  |
|  |  | - Tibetan – Intermontane  | ½  |
|  |  | - East African – Continental  | ½  |
| 10. | 10 | - Justification of the statement with examples  | 1 | 4 |
|  |  | - Knowledge about Active volcanoes  | 1 |
|  |  | - Extinct volcanoes and  | 1 |
|  |  | - Dormant volcanoes  | 1 |
| 11. | 11 | - Correct Analysis of the statement with examples  | 2 | 6 |
|  |  | - Wind as an agent * Mushroom rocks
* Barchans
* Loess Plains
 | 2 |
|  |  | - Glaciers as an Agent * Glacial valleys
* Hanging valleys
 | 2 |

Appendix II

LESSON TRANSCRIPT BASED ON CONSTRUCTIVIST METHOD

Name of the teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Interior of the Earth

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Issue  | : | * Ignorance about the earth, its different phenomenas and the importance of protection of earth.
 |
| Theme | : | * Interior of the Earth
 |
| Learning Objectives  | : | * To improve the understanding about the interior of the earth.
* To realize the different parts of the interior of the earth and to identify its features.
 |
| Major Facts and Concepts  | : | * The radius of the earth is about 6371 km
* The outermost layer of the earth is the crust.
* Crust, mantle and core are the three parts of the interior of the earth.
* The upper portion of the mantle and the crust together is called the lithosphere.
* The lithosphere consists of seven major plates and about a dozen of minor plates.
* The part that just below the upper mantle is called aesthenosphere.
* Below the aesthenosphere is the lower mantle.
* The conventional currents of aesthenosphere cause plates to move.
* Lower mantle is followed by core.
* The core has two parts, an outer core and an innercore.
* In the center of the earth, the temperature is almost 110000C and the pressure is very high. Hence the inner core is in a solid state.
 |
| Pre-requisites  | : | * Students identified the features of the earth surface.
 |
| Material/ Resources  | : | * Chart
* Model- interior of the earth
* Pictures-features of the earth surface
* Reading materials
* Audio Travelogue
 |
| Products  | : | * An Essay: ‘Wonders of the Interior of the Earth’
 |
| Values and Attitudes  | : | * To improve the skill of enquiry and observation.
 |

|  |  |
| --- | --- |
| Learning Processes  | Response  |
| Introductory Activity: * Students heard the travelogue with the help of tape recorder.
* Students list out the features of earth surface.
* Teacher wants to identify the features of inner part of the earth from their existing knowledge.

Developmental Activity:Activity I* Teacher introduce a model of the interior of the earth infront of the students.
* Introduce a disorder chart with content.
* Teacher wants to identify the findings of the students with help of chart and model.
* Students shares their findings.

Activity II* Teacher shows the pictures of mines, earthquakes and volcanic eruptions.
* Teacher wants to identify the layers happening this related phenomenon and their reasons.
* Students draw the inference about temperature and pressure the interior of the earth.
* Teacher presents 10 questions related with interior of the earth and wants to write the answer.
* Teacher read the correct answer.
* After examining the scores of students, teacher wants to compare their answer with correct answer.

Concluding Activity * Provides reading materials on interior of the earth.
* Students analyse their findings with the content of reading materials.
* Students shares the correct answers.
* Teacher briefly explain the content.
 |  |

# Follow-up Activity

* Prepare an essay on the topic of ‘Wonders of the Interior of the Earth”

Appendix I

LESSON TRANSCRIPTS BASED ON METACOGNITIVE LEARNING STRATEGY

LESSON TRANSCRIPT-6

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Folding and Faulting

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Folding and Faulting  |
| Lesson Objectives | : | * To know about the different forces that make changes on the earth surface, they can be called an endogenic and exogenic forces and they can create different landforms.
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * The forces that act inside the earth are called endogenic forces.
* The forces that act on the surface of the earth are called exogenic forces.
* Endogenic forces cause compression and tension on the layers of rocks.
* The forces that act on the rock layers of the crust of the earth cause folds to form on them. These are known as folding.
* Folding cause ups and downs and they are called anticlines and synclines, respectively.
* Fault is a planer fracture or discontinuity in a volume of rock, across which there has been significant displacement. Large faults within the Earth’s crust result from the action of tectonic forces.
 |
| *Learning materials*  | : | * Model- folding and faulting
* Pictures
* Slide show
* Reading materials
 |

### Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * With the help of a model presented infront of the learners, they understand that due to some forces earth surface is uplifted or down.

Developmental Activity:* Students are given pictures related to folding and faulting, and they are asked to note down the findings.
* They are presenting their findings
* They are trying to understand term such as folding, faulting, etc.
* Reading materials are given with this and pictures students identify the above terms.
* Findings are presented.
* By the help of a slide show students check whether their findings are true.
 | Phase I: Planning * How far the knowledge is true incase of the earth that every forces make some changes? To know that any previous knowledge will help you?

Phase II: Monitoring * Have you ever understood the real name of any phenomena that are shown in picture?
* Which are the new terms. How far these terms are related to your previous knowledge?
* Do you think that whether your thoughts are correct? Why?

Phase III: Evaluation * How far your thoughts are correct?
* Are you able to understand the term folding, faulting etc. in the true sense.
* How could you improve your thinking next time?
 |  |

# Metacognitive Review

* What are the thinking process that you applied in understanding this lesson?
* Whether the information that you received is useful in your life?

LESSON TRANSCRIPT-7

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Weathering

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Weathering  |
| Lesson Objectives | : | * To know weathering is formed due to the breaking of rocks and they can be classified as mechanical weathering, Chemical Weathering and Biological Weathering
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * Weathering is the breakdown of rocks and minerals at and below the Earth’s surface by the action of physical and chemical processes.
* Weathering is mainly of three types. Mechanical weathering, chemical weathering and biological weathering.
* Changes in temperature and the freezing of the water in the cracks of the rocks cause mechanical weathering.
* As a result of the chemical action, there can be disintegration of the rocks. This is called chemical weathering.
* The roots of the trees penetrate into the cracks of the rocks and small creatures make their homes in these spaces. These also cause the disintegration of rocks. This is called biological weathering.
 |
| *Learning materials*  | : | * Pictures
* Reading materials
 |

Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response |
| Introductory Activity: * The question, how soil is formed, is presented infront of the students.

Developmental Activity:* Opinions are discussed
* Pictures related to three types of weathering are presented.
* By the help of the pictures students form opinion and present them in the class.
* The term weathering and exfoliation are discussed.
* Students are asked to distinguish three types of weathering
* Findings and more examples are presented by the learners
* By the given reading materials, students examine their findings.
 | Phase I: Planning * Have you ever thought that how does soil formed?
* Which are the previous knowledge that will help you in this study.

Phase II: Monitoring * Have you ever seen the pictures and examples that are presented
* Have you ever thought of the importance of these functions?
* Why don’t you distinguish these terms earlier?
* From where you can find more information?
* Which are the difficult terms? Have you ever understood these terms in any other way?

Phase III: Evaluation * How did the previous knowledge help you in this study.
* Whether these information are helpful in future?
* How far your thought are true in this study?
 |  |

# Metacognitive Review

* Whether the thoughts used in the learning process are useful to know properly about the meaning of the concept weathering?
* Whether an interest is created to know more about weathering through these learning process?

LESSON TRANSCRIPT-8

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Mountains

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Mountains  |
| Lesson Objectives | : | * To identify the different type mountains and its influence on human life.
 |
| Input/Stimulus  | : |  |
| Concepts and Understanding  | : | * Those landforms which have a height of 900 metres or more above sea level are called mountains.
* Mountains have been divided into four on the basis of their origin. Fold mountains, block mountains, relict mountains and volcanic mountains.
* Folding of the plates cause fold mountains to form.
* The block mountains are formed as a result of uplift of landforms due to faulting.
* The Aravalli ranges and the Nilgiris in India are the best example for relict mountains.
* The mountains play a vital role in making the earth a hospitable one for all living beings.
 |
| Learning materials  | : | * Pictures
* Hint cards
 |

Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Teacher asked to define term ‘mountain’
* Students discuss their opinions.

Developmental Activity:* Teacher shows the pictures of different mountains
* After distributing the hint cards teacher says mountains are entirely different on the basis of formation and altitude.
* Students identified the difference with the help of cards.
* Students classified on the basis of fold mountain, block mountain, relict mountain and volcanic mountains.
* Teacher wants to identify the additional examples from different sources.
* Students presents their findings and discuss.
* Teacher asked a question, How to influence the mountains in human life?
* After the discussion, students present their opinion.
 | Phase I: Planning * Did you think about the term mountain?
* Which is the suitable source to understand the mountain

Phase II: Monitoring * Do you remember the different types of mountain on the basis of altitude.
* Didn’t you understand fold mountain and volcanic mountains?
* Is your study from correct sources.
* How much your findings are correct?
* Did you think about mountains are influencing in human life?

Phase III: Evaluation * How did you use your previous knowledge?
* How much does your knowledge is correct in this topic?
* Is there any changes in your previous knowledge?
 |  |

# Metacognitive Review

* What are the thinking process that you applied in understanding this lesson?
* How can you use these information in your life?
* Could you understand this lesson in a better way?

LESSON TRANSCRIPT-9

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Plateaus

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Plateaus  |
| Lesson Objectives | : | * To identify the features of plateaus and to understand the different types of plateaus.
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * Comparatively flat areas, but higher than the plains and water bodies surround it are called plateaus.
* Steep slopes and flat tops are the characteristic features of plateaus.
* There are three types of plateaus- Intermontane, piedmont and continental plateaus.
* Plateaus that are completely surrounded or partially surrounded by mountains are called intermontane plateaus.
* Plateaus that are found at the foot of a range of mountains are called piedmont plateaus.
* When compared to the surrounding plains, some plateaus are found to be higher. These are continental plateaus.
* Tibetan Plateau is the best example for intermontane plateau.
* East African plateau is a continental plateau
 |
| *Learning materials*  | : | * Pictures
* Slide show
* Outline map of the world
 |

**Structured Activities:**

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Teacher shows picture of a plateau, and asks to recognize and point out the specialties of it from other areas of land.

Developmental Activity:* Students understand the features of plateaus through discussions and slideshow.
* Pupil understands about the various types of plateaus from reading tips.
* Teacher asks to find out the examples and prepare short descriptions.
* Pupil points the plateaus those were found by the students-in the world out line map.
 | Phase I: Planning * Had you understood before what is plateau?
* Is your previous ideas related to the present ideas of plateaus?
* How much the pictures and facts in the discussion related to each other?

Phase II: Monitoring * From where we understand more details about this?
* Plateaus are various types. How can we understand this facts through examples?
* From where we collect more details about this?

Phase III: Evaluation * How much did you use your previous knowledge in these learning process.
* What is the reason to think that your findings are correct?
 |  |

# Metacognitive Review

* Whether your thoughts are in a proper way about the activities in the classroom?
* Could you find whether the ideas of plateaus.
* How can you use these information in your future life?

LESSON TRANSCRIPT-10

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Plains

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Plains |
| Lesson Objectives | : | * To know about the features of plains, the process of the formation of these and different types of plains.
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * Places that are not so rugged and are not much higher than sea level are called plains.
* Based on their formation, plains are three types-structural plains, erosional plains and depositional plains.
* Due to endogenic forces, an area can be raised or lowered. These actions cause plains to be formed. They are called structural plains.
* Some areas on the earth’s surface which originally were rugged are leveled due to friction or planation. The plains that are formed thus are called erosional plains.
* Some external agents carry rock materials from the hills to depressions on the surface of the earth. In course of time these deposits lead to the formation of plains. These are depositional plains.
* Indo-Gangetic plain is one of the biggest alluvial plains in the world.
 |
| *Learning materials*  | : | * Hint cards
* Map of India
* Outline map of India
 |

Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Students are asked to define plains. Definitions are presented

Developmental Activity:* Students note down and discuss the features of plains.
* The noted points of discussion are examined.
* Students create different types of plains in the classroom with sands.
* Students asked to note different types of plains
* As a hint term such as uplift, subsidence, erosion, deposition are familiarized to the students.
* Findings of different groups are presented in the classroom.
* From the given reading materials, students examine their findings.
* They are asked to find out the most important plain in India.
* Some hints on cards and map of India are given to the learners.
* Major plains are marked in the outline map of India.
* Findings are summarized through discussions.
 | Phase I: Planning * Have you ever thought of plains?
* Do you think whether your definition is correct? Why?

Phase II: Monitoring * Whether the information you received, in discussion are similar to your previous knowledge?
* Have you ever thought that the phenomenon of the formation of plain home any such duty behind that?
* What are the new terms? How did you understand it before?
* How far the new findings are correct? How will you justify this new knowledge?
* Have you ever thought of the importance of Gangetic plain?

Phase III: Evaluation * Can you understand now, how new plains are created?
* Have you understood that plains are necessary in human life?
* How far you benefited with previous knowledge in this study?
 |  |

# Metacognitive Review

* Whether the previous knowledge related to the plains are changed through this learning process?
* Which are the thoughts through which this study is completed?
* How can we utilize these information in our life?

LESSON TRANSCRIPT-11

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Wind and Erosion

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Wind and Erosion |
| Lesson Objectives | : | * To recognize the wind reasons to create various type of landforms.
* To identify the various type of landforms after effect the activities of wind.
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * Wind is one major agent of erosion.
* Wind erosion is more in dry areas.
* Mushroom topography, Deflation basin, barchans, Loess plains are some major land forms, which creates by wind.
 |
| *Learning materials*  | : | * Picture of a mushroom rock
* Chart
 |

Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Teacher shows the picture of a mushroom rock in the class, then asks how can created this?
* Pupils presents their opinions.

Developmental Activity:* Pupil scratch a sandpaper on the wall and teacher explains the same process is the reason of creating mushroom rock.
* Pupils create new ideas and present it.
* Teacher shows the picture of sand dunes and barchans. Then gives a clue to understand all the process are happening after effect of the works of same powers.
* Pupils discuss their findings.
* Teacher presents a chart of wind’s erosional and depositional process.
* Pupils analyse their opinions.
 | Phase I: Planning * Have you understood the landforms in the picture before?
* Can you relate this idea with your previous knowledge?

Phase II: Monitoring * Does your thoughts are correct? Why?
* Have you thought about the creation of the landforms in the picture before?
* Which previous knowledge help you to relate this creation of landforms.
* Does your thoughts are correct? Why?

Phase III: Evaluation * How much do your thoughts are working?
* Have any changes make in your thoughts? How can we do it?
 |  |

# Metacognitive Review

* What are the new information you got after completing this lesson?
* What are the thinking process you adopt to understand this?
* Can you understand this lesson in a better way?

LESSON TRANSCRIPT-12

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Glaciers and Erosion

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Glaciers and Erosion |
| Lesson Objectives | : | * To recognize the creation of landforms after effect of the work of glaciers
* To identify the various type of landforms that created after effect of the Glaciers
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * On high mountains and cold regions, snowfall is common. The snow that collects like this, in course of time and when it reaches a certain thickness, starts moving very slowly to lower regions. these moving masses of ice are called glaciers.
* Glacial valleys, hanging valleys, cliffs etc. are some major landforms which creates by wind.
* The ‘V’ shaped valleys sometimes get modified to ‘V’ shaped as a result of erosion by glaciers. These are called glacial valleys.
 |
| *Learning materials*  | : | * Pictures
* Reading Materials
* Video Animation
* Chart
 |

## Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Teacher shows the picture of landforms, that created by glaciers without any clues infront of the students.
* Suggest to find out the important landforms and point out it.

Developmental Activity:* Discuss the findings of the students.
* Presents cirque, cliffs, arates, U shape valleys, Hanging valleys and waterfalls in a chart as clues.
* Suggest to recognize all these in the first picture.
* Pupils correct their findings.
* Teacher shows the first picture again.
* Teacher asks to find out that how it could be created, then group the students.
* Gives the reading materials.
* Pupils check whether their findings are correct or not.
 | Phase I: Planning * Have any relation to this picture with your previous knowledge?
* Have you thought about these landforms before/

Phase II: Monitoring * Does your thoughts are proper?
* Which are the new terms?
* Did you understand about these terms before?
* Which previous knowledge you use to do this work properly?
* Do you have any previous knowledge to understand the creation of these landforms.

Phase III: Evaluation * How much your thoughts are correct?
* Is this a new knowledge about the works of Glaciers?
* Are these true findings?
 |  |

# Metacognitive Review

* How much new thoughts you use for these studies?
* Your previous knowledge and related thoughts are correct? Does it happen any changes?

LESSON TRANSCRIPT-13

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Underground Water and Various Landforms

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Underground Water and Various Landforms |
| Lesson Objectives | : | * To create an idea about the creation of landforms after effect of the work of underground water,
* To recognize them.
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * Underground water produces the erosional and depositional landforms in those areas made of soft rocks like limestone.
* Caverns, karren, stalactites, stalagmites etc. are some major landforms, which creates by the functions of underground water.
* The water percolates through the cracks and dissolves the limestone on the side of the cracks. when this continues for a very long time, caves are formed.
* Formations that are upside down are stalactites and the formations that grow from the bottom of the cave upwards are stalagmites.
* Borra caves are limestone caves situated in Anantagiri hills in Vishakhapatanam district.
 |
| *Learning materials*  | : | * Picture
* Flash cards
* Chart
* Video Animation
 |

Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Teacher show the picture of landforms that created by the after effects of underground water with out any clues.
* Pupil points and presents recognized ideas.

Developmental Activity:* Show the caves, Karren, stalactites and stalagmites through flashcards, and tells to recognize from the picture.
* Discusses the findings of the students.
* Teacher present the chart and that explore the clues pointed before.
* Pupils recognize different landforms.
* Teacher asks to find out how did it form?
* Pupils presents their opinion?
* Show these works through video animation.
* Pupils analyse the findings.

  | Phase I: Planning * Have you seen this picture before? Do you think about this before?
* Do you have anything related with this in your previous knowledge?
* Do you think your previous knowledge is correct?

Phase II: Monitoring * Which are the terms new?
* Which terms are difficult? Why did it become difficult?
* How can you think to recognize it?
* Does your findings are correct?
* Have any changes make in your thinking process?

Phase III: Evaluation * Does your knowledge change about the works of underground water through new findings?
* Does this findings are correct? Why?
 |  |

# Metacognitive Review

* Which are the thinking process do you adopt for completing this lesson?
* Could you understand this part of the lesson in a better way?

LESSON TRANSCRIPT-14

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Sea Waves as an Agent of Erosion and Deposition

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : | Sea Waves as an Agent of Erosion and Deposition  |
| Lesson Objectives | : | * To recognize that sea waves reason to create landforms, and which are they
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * Strong waves cause changes on the shores through the erosional and depositional processes. this leads to the formation of different landforms.
* Sea cliffs, sea caves, arches, stacks etc are some major landforms, which creates by function of sea waves.
* Due to the force of the waves cracks occur to the rocks which are situated near to the shore. This causes steep slopes to form on the shores. they are called sea cliffs.
* Due to the erosion by the waves, weak rocks by the side of the sea are carved out and sea caves are formed.
* Due to the weathering and erosion caused by the waves, sea caves which are close to each other are joined and arches are formed.
 |
| *Learning materials*  | : | * Video
* Pictures
* Reading Materials
 |

Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Teacher show the video of sea waves that blows in to the rocks.
* Teacher asks whether any changes occur in the seashore after effect of this action?
* Discuss the opinions.

Developmental Activity:* Shows the picture of sea cliffs, sea caves, arches, and stacks.
* Suggest to find out the process with the help of the video.
* Present the findings in the class.
* Analyse any landforms are creating after effect the work of seawaves.
* Pupils present the new findings.
* Teacher gives the reading materials and asks to check whether findings are correct or not?

  | Phase I: Planning * Have you thought at any time about the changes in the shore after effect of the waves?
* What are the memories about the coastal areas in your studies?

Phase II: Monitoring * Does these landforms are the same in your thoughts?
* Does any previous knowledge helps to recognize these forming process?
* Do you think correctly?
* Does we make any changes in it?

Phase III: Evaluation * Does the experience of visiting coastal areas strengthen your thoughts?
* Can you believe the new thoughts are correct?
* How did you complete your works properly?
 |  |

# Metacognitive Review

* Which are the previous knowledge that help you most in this study?
* The thoughts are correct that used in this lesson?
* Had a need to study this lesson? Does the curiosity create to study more about this?

LESSON TRANSCRIPT-15

Name of the Teacher : Ameer Ali M. Standard : IX

Subject : Social Science Duration : 40 mts.

Unit : The Earth Which Supports Man Strength : 32

Topic : Running water and erosion

Name of the School : Islahiya E.M.H.S.S., Malappuram

|  |  |  |
| --- | --- | --- |
| Focus | : |  Running water and erosion  |
| Lesson Objectives | : | * To understand the different landforms are created after effect of running water and
* To recognize those land forms
 |
| Input/Stimulus  | : |  |
| *Concepts and Understanding*  | : | * The act of removing the rock debris derived by the weathering process of external agencies is called erosion.
* Factors like running water, wind, glaciers, seawaves all aid in erosion process.
* Rivers are the major agents of erosion which help in the formation of different landforms on the earth.
* ‘V’ shaped valleys, waterfalls, flood plains and meanders are the major landforms, which creates by running water.
* The Grand Canyon of USA was formed by the erosive action of Colorado river.
* The jog falls of Karnataka is the biggest in India.
* At times a curve of meander gets isolated into an individual body of water. These are called oxbow lakes.
 |
| *Learning materials*  | : | * Pictures
* Reading Materials
* Video Animation
 |

## Structured Activities

|  |  |  |
| --- | --- | --- |
| Learning activities  | Metacognitive activities  | Response  |
| Introductory Activity: * Teacher asks whether rivers and running water create any changes in the surface of the earth.
* Discuss the opinions of the students.

Developmental Activity:* Teacher shows the pictures of ‘V’ shaped valley, waterfalls, flood plains and oxbow lake infront of the students.
* Teacher tells them to recognize how this things are created.
* Pupils presents their opinions in the class.
* Teacher gives some reading materials to understand whether their findings are correct or not.
* Pupils analyse on their findings.
* Teacher presents one animation video of running water and the creation of its new landforms.
 | Phase I: Planning * Did you thing the running water makes any changes in the earth surface?
* Then how will be it happen?
* How can we recognize it?

Phase II: Monitoring * Did you think at any time whether the process that created by the landforms in the picture?
* Which are the previous knowledge help you for these studies?
* How much your findings are correct? Why?
* What might be the reason of difficulties to identify the correct ideas?

Phase III: Evaluation * Can you understand this part of the lesson properly?
* What are the new ideas you understood from this lesson.
 |  |

# Metacognitive Review

* What are the thoughts you use to understand this lesson?
* Did you understand any new ideas from this lesson? Does it valuable in your life?
* What are the changes happened in your previous knowledge after this studies?