**INTRODUCTION**

Education is a process of development from infancy to maturity. “The educated differ from the uneducated as much as the living differs from the dead”. Education is an ever evolving concept. So many changes have taken place in its structure and form through the ages. In the report of the Education Commission, (1964-66) stated that, “The destiny of India is now being shaped in her classrooms”. Education is essential for everyone. It is the level of education that helps people earn respect and recognition. The importance of education is undeniable for every single person. It goes without saying that education has a positive effect on human life. All people need to study. Only with the advent of education can people gain knowledge and enlarge their view over the world. People may become more useful and civilized if better educated.

Secondly, education plays such a rudimentary role in our society that we cannot even imagine a life without education. It is a determined element for the civilization of the human society. Every child should be given equal opportunities to lean and study because the development of a country depends vastly on the standard of education. Although the educational systems of different countries are not similar, they have to share a common goal which is to provide its citizens a suitable and proper learning. In conclusion, education is absolutely beneficial for society on the whole. It is a lifelong process to each person that needs to be reinforced throughout life.

Learning is a process by which a relatively lasting change in potential behavior occurs as a result of practice or experience. To learn is to acquire knowledge or skill. Learning also may involve a change in attitude or behavior. The ability to learn is one of the most outstanding human characteristics. Learning is change in behaviour as a result of experience. “Feed a man fish and you have equipped him for the day, teach him to fish and you have equipped him for the life”. This is something which emphasizes the importance of learning that we all have to remember. Let us ask ourselves if we can transform our schools to become centres where true learning for life take place and not just remain centres of information. For the students to live effectively in this and the coming age, they have to master the process of learning. As one masters the process of learning he/she experiences the enjoyment that comes from self-discovery, the Eureka experience and from clear understanding of a subject matter.

A teacher who enjoys learning can benefit his students in two ways. First, his enjoyment of learning becomes apparent to his students. Hence he/she sets up a model for the pleasure that comes from learning. Second, he/she is more inclined to understand and practice his teaching role as a guide and counselor for his students in their own learning. As an educated person, a teacher finds delight in teaching others. He or she approaches a teaching or an information situation not with a feeling of superiority but with a drive to share and to participate in the growth of others. He/she recognizes his or her main role in the teaching-learning environment as being a learning facilitator, a counselor and a good communicator. As a facilitator the teacher assumes a host of responsibilities to provide a rich, exciting and enjoyable learning environment.

Traditional teaching training programmes emphasize communication through the written and spoken word. While such training is extremely essential, it is not sufficient for effective teacher student communication. The existing method of instruction is child centered. Teacher is a facilitator in the class room. To be effective, an instructional program has to be designed and engineered with precision. An instructional environment has to be an interactive environment, a flexible learning environment, rich in resources can provide exciting and appropriate learning experiences to all students involved. A systematic approach in which a variety of resources in different formats are integrated can provide a flexible learning environment to suit the need and learning levels of every student. To put it in a few words, to teach is to communicate, to communicate is to interact, to interact is to learn.

**NEED AND SIGNIFICANCE OF THE STUDY**

Education in its general sense is a form of learning in which the knowledge, skills and habits of a group of people are transferred from one generation to the next through teaching, training or research. Some scholars argue that, experiencing a different way of education can often be considered to be the most important, enriching elements of a learning experience. Education is being imparted through the study of various subjects. Among the various subjects included in the school curriculum, science has greater importance. Science can be defined as the study of nature and its properties. Science is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe. Science also refers to a body of knowledge itself, of the type that can be rationally explained and reliably applied. The scope of science is expanding as wide as the world itself and as lengthy as the history of man.

* Science refers to a system of acquiring knowledge. This system uses an observation and experimentation to describe and explain natural phenomena.
* Science also refers to the organized body of knowledge people have gained using any system.
* Science often describes any systematic field of study or knowledge.
* The purpose of science is to produce useful models of reality. Fields of science are commonly classified along two major lines. Natural Sciences, the study of the natural world, and Social Sciences, the systematic study of human behavior and society. The areas coming under natural science is Biology, Chemistry, Physics, Earth Science, etc.

**The Place of Physics in Science**

Physics is the branch of science concerned with the properties of matter and energy and the relationship between them. It is based on mathematics and traditionally includes mechanics, optics, electricity and magnetism, acoustics and heat. Modern physics based on quantum theory includes atomic, nuclear, particle and solid state study. It can also embrace applied field such as geophysics and meteorology.

Physics is an essential part of the educational system of an advanced society.

* Physics generates fundamental knowledge needed for the future technological advances that will continue to drive the economic engine of the world.
* Physics is an exciting intellectual adventure that inspires young people and expands the frontiers of our knowledge about nature.
* Physics contributes to the technological infrastructure and provides trained personnel needed to take advantage of scientific advances and discoveries.
* Physics is an important element in the education of chemists, engineers and computer scientists as well as practitioners of the other physical and bio-medical sciences.
* Physics extends and enhances our understanding of other discipline such as the earth, agricultural, chemical, biological and environmental sciences.
* Physics improves our quality of life by providing the basic understanding necessary for developing new instrumentation and techniques for different fields of our day- to -day life.

In conclusion, we can state that physics is branch of science that deals with nature and natural phenomena. It is a science based on experimental, observative and qualitative measurement. Originally it was devoted to the study of behaviour of physical, known living objects. As time passed on we learnt that even living materials in its tiniest form seen to be subjected to the laws governing known living things. Today, physics is known to be important in all branches of science.

**Major problems of Physics teaching**

Teaching and learning introductory physics are both challenging tasks, while traditional methods have led to frequently disappointing results. Conventional physics instruction tends to be ineffective in helping students to develop a real understanding of physics. How, then, should the nature of physics instruction be changed?

We should be willing to consider new forms and new approaches for the time honoured lecture and discussion session. Whatever gains we can make in improving student understanding and appreciation of physics cannot help but improve the public perception of physics as a useful, interesting and above all comprehensible human activity.

It has been realized that the conventional system cannot make universalization of education a success due to its inadequacy in various aspects. Thus a new and more effective strategy of teaching physics should be developed.

David Ausubel, a North American educational psychologist viewed learning as an active process, not simply responding to your environment. Learners seek to make sense of their surroundings by integrating new knowledge with that which they have already learned.

The key concept for Ausubel is the cognitive structure. Learning for Ausubel is bringing something new into our cognitive structure and attaching it to our existing knowledge that is located there.

John H. Flavell is an American developmental psychologist specializing in children’s cognitive development. He has conducted extensive research into metacognition and the child’s theory of mind. He suggests metacognitive strategies as a better way to achieve meaningful learning.

He used the term Metamemory in regard to an individual’s ability to manage and monitor the input, storage, search and retrieval of the contents of his own memory. He implied with his statements that metacognition is intentional, conscious, foresighted, purposeful and directed at accomplishing a goal or outcome.

Metacognitive activity usually precedes and follows cognitive activity. They are closely inter-related and mutually dependent. Meta cognitive knowledge can lead the individual to engage in or abandon a particular cognitive process based on its relationship to his interests, abilities and goals.

Metacognitive strategies are designed to monitor cognitive progress. Metacognitive strategies are ordered processes used to control one’s own cognitive activities. It is an effective tool to increase the achievement of students and as an evaluation tool. Review shows that in India not many researches are conducted on metacognition and its strategies. Hence the researcher investigates on the effectiveness of metacognitive learning strategies on the achievement in physics.

**STATEMENT OF THE PROBLEM**

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

**DEFINITION OF THE KEY TERMS**

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

1. **Effectiveness**

Effectiveness is defined as the adequacy to accomplish a purpose on the capacity to produce the intended result (Webster, 1996).

For the present study effectiveness is defined as the improvement in academic achievement as an effect of a particular treatment.

1. **Metacognitive learning strategies**

Metacognitive learning strategies are systematic cognitive techniques to assist students in recognizing, planning, implementing and monitoring solutions to problems.

For the present study, metacognitive learning strategies means all the techniques used in the class room to teach a particular topic based on the metacognitive learning strategies which activate the cognitive domain of the students.

The basic metacognitive strategies are:

* Connecting new information to former knowledge.
* Selecting thinking strategies deliberately.
* Planning, monitoring and evaluation thinking process deliberately.
1. **Achievement in Physics**

In the present study, the term Achievement in Physics means the level of performance of an individual in the unit ‘Motion and Wave Motion’ of standard IX physics syllabus.

**VARIABLES SELECTED FOR THE STUDY**

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

1. **Independent variable**

The independent variable selected for the study were two methods of teaching. A method of teaching using metacognitive learning strategies and constructivist method of teaching which is the existing method.

1. **Dependent Variable**

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

1. **Control Variable**

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

**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 Physics for experimental and control groups for total sample and the subsamples based on gender.
3. To compare the mean gain scores of experimental and control groups for total sample and the subsamples based on gender
4. To study the effectiveness of metacognitive learning strategies over the existing method of teaching on the achievement in Physics of standard IX pupils.

**HYPOTHESES OF THE STUDY**

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

* There exists significant difference in the pre-test scores of the experimental and control groups.
* There exists significant difference in the mean scores of the post-test of the experimental and control groups for total sample and subsamples based on gender.
* There exists significant difference in the mean gain scores of the experimental and control groups for total sample and subsamples based on gender.
* There exists significant difference in the Achievement of Physics between the experimental and control groups.

**METHODOLOGY**

The present study is an experimental one and the design applied here is pre-test post-test equivalent group design. Two class divisions from the same school were taken for the experiment. The classes selected for the study were selected on a double blind priority basis. Out of the two study groups, one was assigned to be control group and other – the experimental group on a random basis.

The methodology of the present study is according to the following procedure.

**Design of the study**

The design used in the present study was the pre-test post-test none-equivalent group design which is the quasi experimental design.

O1 C O2

O3 X O4

Where

O1 O3 – pre-test

O2 O4 – Post-test

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.

**Sample for the study**

The sample of the study consists of 54 pupils in the experimental group and 49 in the control group. The sample for both experimental and control groups were two divisions of standard IX students drawn from the Govt. Ganapth Vocational Higher Secondary School, Feroke, Calicut.

**Tools used for the study**

The tool selection is an important aspect of any research work. The following tools were used to collect the data for the present study.

Lesson Transcript Based on Metacognitive Learning Strategies.

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

Achievement test in Physics.

**Statistical Techniques Used for Analysis**

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.

**SCOPE AND LIMITATIONS OF THE STUDY**

The main purpose of the present study was to check the relative effectiveness of metacognitive learning strategy in teaching a particular topic in Physics of standard IX pupils over the existing method of teaching. The investigator prepared lesson transcripts based on both metacognitive learning strategy and constructivist method of teaching. Also the investigator prepared achievement test in Physics for the same topic. These were the tools used for collecting the data. The topic selected for the experiment was ‘motion’ and ‘wave motion’ from the standard IX Physics syllabus. The investigator used the achievement test in Physics for checking the previous knowledge of the students before teaching the topics. The same achievement test was used to check the level of performance of the students after the treatment.

The investigator expects that the results from the present study may help educationists to re-structure and implement new strategies for teaching different topics in Physics.

Even though precautions were taken to make the study as objective, valid and accurate as possible, some limitations were crept into the study. They are listed below.

1. The sample of the study was restricted to two divisions of standard IX students in GGVHSS, Feroke, Calicut.
2. The study was concentrated on the constructivist method of teaching only for the control group. It didn’t take into account critical pedagogy and issue based teaching as part of it.
3. The topic selected for the study was a small unit and the study was confined to the subject Physics only.
4. The time period in which the experiment has been conducted was very short. This lack of time forced the investigator to limit the study to one independent variable only, namely teaching method.

**ORGANIZATION OF THE REPORT**

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** This chapter 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** This chapter discusses in detail 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 with conclusions are presented in this chapter. All the analysis done for the present study are tabulated in this chapter.

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

**REVIEW OF RELATED LITERATURE**

The success of any research work depends upon the familiarity and understanding of the investigator with the studies and literature related to one’s topic. In review of literature, the researcher attempts to determine what others have learned about similar works and to gather information relevant to the research problem at hand. Since effective research is based upon past knowledge, the review of related literature helps to eliminate the duplication of what has been done and provides useful hypothesis and helpful suggestions for significant investigation.

Review of literature is a valuable guide in defining the problem, recognizing its significance, suggesting and promising data gathering services, appropriate study design and sources of data. This also helps to sharpen and define understanding of existing knowledge in the problem area and provides a back ground for the research project. “The knowledge of related literature brings the researcher up-to-date on the work which others have done and thus to state the objectives clearly and precisely” (Koul, 1997)

A survey of related literature helps the research worker to find out what is already known, what others have attempted to find out, what methods of attack have been promising and what problems remain to be solved. Thus, through review of related literature the researcher can avoid unintentional duplication of well established findings. Above all, it contributes to the general scholarship of the investigator. Best and Kahn (1992) suggests, “Citing studies that show substantial agreement and those that seems to prevent conflicting conclusion helps to sharpen and define understanding of existing knowledge in the problem area, provides background for the research project and makes the reader aware of the status of the issue”.

In the context of present study, the investigator tried to review the theoretical aspects which have close relation with the study. The researcher also reviewed different other studies connected with the present problem under investigation.

The literature reviewed in the present study has been explained through the following headings.

**THEORETICAL FRAME WORK OF VARIABLES**

**STUDIES RELATED WITH METACOGNITION AND META COGNITIVE STRATEGIES**

**THEORETICAL FRAME WORK OF VARIABLES**

Metacognition is knowledge and awareness about cognitive processes on our thoughts about thinking. John Flavell was considered the father of metacognition, who started the research activity in this field. Afterwards many researches were done in this area. Research on metacognition in children has been thriving for more than two decades. In fact the first major research in metacognition was focused on children rather than on college students. Young children have extremely limited metacognition; they seldom monitor their memory, language, problem solving or decision making.

A number of strategies aiming to enhance children’s metacognitive abilities have been suggested. Teachers need to help children develop metacognitive awareness and identify the factors which enhance the metacognitive development. Metacognitive thinking is a key element in the transfer of learning. The child’s development of metacognitive skills is defined as meta learning.

Theoretical overview has been classified into the following headings.

**The concept of metacognition**

**Metacognitive knowledge and metacognitive regulation**

**Vygotsky as precursor to metacognitive theory**

**The conceptual evolution of metacognition**

**Metacognitive learning strategies**

**Development of metacognitive strategies**

**Strategies for developing metacognitive behaviours**

**Activities that support the development of metacognitive skills**

**Importance of creating metacognitive environment**

**The concept of metacognition**

Metacognition refers to the ability to monitor, control and organize mental activity (i.e. Cognition). Effective learning is not just a matter of innate intelligence. Learning, depends in part on the effective use of basic cognitive processes such as memory and attention, the activation of relevant background knowledge and the deployment of cognitive strategies to achieve particular goals. To ensure that the basic processes are used effectively, that the activated knowledge is indeed relevant, and that appropriate strategies are being deployed learners also need to have awareness and control of their cognitive processes. This higher level cognition was given the label metacognition by American developmental psychologist John Flavell (1976). Metacognition refers to learner’s awareness of their own knowledge and their ability to understand, control and manipulate their own cognitive processes. Quite simply metacognition has been characterized as “thinking about thinking” (Geoghiades 2004). “Thinking about learning” (Jackson 2004) and “What we know about what we know” (Walpern 1998). Baker (1989) defined it as “The knowledge and control a child has over his or her own thinking and learning activities”.

Any process in which students examine the methods that they are using to retrieve, develop or expand information is deemed to be metacognitive in nature. Children vary in their abilities to solve problems and to learn from experience. These individual differences are related to differences of intelligence, differences in experience and to differences in the use of metacognition. Metacognition is a multifaceted concept, it comprises knowledge, processes and strategies that apprise monitor or control cognition. The great majority of theorists however would agree in drawing destruction between two basic aspects of metacognition.

**Metacognitive knowledge and metacognitive regulation**

Metacognitive knowledge refers to the information individuals have about their own cognition and about learning strategies and tasks factors that impact own it (Wells 2000). Metacognitive regulation refers to a broad spectrum of executive functions such as monitoring, planning, checking, attention and detection of errors in performance (Wells 2000).

The emergence of cognitive theories of psycho pathology (e.g. Beck 1976) has led to growing interest in the characteristics of cognition and its regulation. The self-regulatory executive function (S-REF: Wells and Mathews, 1994) theory was the first to conceptualize multiple metacognitive factors as control components of information processing that effect the development and persistence of psychological disorders. Early mention of metacognition, means thinking about thinking .since then, metacognition has received continuous attention as key a factor in problem solving.

Mayer (1998) proposes that having metacognitive knowledge is one of three essential ingredients of problem solving (together with skill and will). Meanwhile metacognitive ability is included by Sternberg (1999) as one of five key contributors to intelligence. Sternberg’s incremental view of intelligence would suggest that metacognitive ability is an expertise that can be taught and learned. Viewing metacognitive ability as component of intelligence concurs with the writing of Resinick (1987), suggest that important general metacognitive skill apply across different situations.

Some people will discover metacognitive strategies by themselves (perhaps through trial and error) but others will not (West Wood 1997). After drawing together the results of a number studies, Pressley and Ghatella (1990) concluded that metacognitive monitoring is pure in early childhood, and still far from ideal in adults. Winne (1997) cautioned that expecting people to develop strategies such as metacognition through a process of trial and error is inefficient. Rather, educators of children and adults should give people the chance to understand, practice and use metacognition.

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

1. Metacognitive knowledge (also called metacognitive awareness) refers to what individual 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 ongoing cognitive endeovours.

**Vygotsky as precursor to metacognitive theory**

Russian psychologist Lev SenyovichVygotsky (1896 – 1934) involved in the area of conceptual development. His primary focus was on determining the source of intellectual development. According to Vygotsky a learner’s cognitive development is derived from a combined contact with higher level abstract subject matter imposed by higher level social interaction.

He observed that children naturally make sense of any tasks with the use of speech as a tool, first verbalizing a situation to make sense of it and then internalizing this speech as part of self-regulated thought. An individual continues to use her/his private inner language to think, according to him. People often talk to themselves to reinforce then what could be labeled as the Vygotskian metacognitive theory and it closely resembles the cognitive psychology of executive control. His most prominent work in North America is his zone of proximal development, which he wrote only a few pages about in all of his writings. He believed that learning is not development: however, he also believed that properly organized learning result in mental development and sets into motion in a variety of developmental processes that would not occur without the process of learning. And school learning according to Vygotsky introduces something new into a child’s development.

Vygotsky’s zone of proximal development is an important concept that elaborates the dimensions of school learning. It explores the idea that what children can achieve with the assistance of others (Social Interaction) may be more indicative of their mental development than what they can do alone. He believes that the ongoing tension between the relationship of learning and development cannot be resolved without the zone of proximal development.

He proposes that an essential feature of learning is that it creates the zone of proximal development; that is learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in co-operation with his peers. Once these processes are internalized, they become part of the child’s independent developmental achievement.

**Vygotsky’s example of the ZPD**

Vygotsky provides an example of the zone of proximal development by illustrating how two children of the same age chronologically and mentally solve a given problem at their developmental level. Vygotsky’s example suggests that the two children should arrive at the same solutions to the problem, but when the children are given the opportunity to solve the problem with assistance (Social interaction and the child’s active participation in the problem); it shows that one child can solve the problem at a twelve-year-old level, and one at a nine year old level. He describes actual development as the level of development of a child’s mental functions already established because of certain completed developmental cycles. Actual development defines functions that have already natured and are the products of development.

**The Conceptual Evolution of Metacognition**

Metacognition is one of the latest buzz words in educational psychology. It refers to higher order thinking, which involves active control over the cognitive processes engaged in learning. The term didn’t appear in the literature until the latter part of the eighteenth century.

Metacognition is a broadly defined concept incorporating any knowledge or cognitive process that refers to monitor or control any aspect of cognition. It is now seen as a central contributor to main aspects of cognition including memory, attention, communication, problem solving and intelligence with important applications to areas like education, aging, neuro-psychology and eye witness testimony.

The notion of a learner as a personal creator and constructor of knowledge was suggested by US Philosopher and educator John Dewey in 1859. Dewey (1902) expressed that “Learning is an active process”. It involves reaching out of once mind. It involves organic assimilation from within. The inductive vision of learning through observation is the prime component of Dewey and was exhibited in his book, ‘how we think.’ He was one of the first educators to take a scientific look at thinking from a metacognitive view point. He proposed two distinct metacognitive faces of reflective thoughts.

1. A conscious recognition of doubt where desired knowledge is obscured in some way causing a state of perplexity.
2. The active thinking process required relieving this difficulty as “An act of searching, hunting, inquiring to find material that will resolve the doubt, settles and dispose of the perplexity (Dewas, 1900).

John Dewey recognized and described the cognitive processes of self-monitoring and self-regulation and provided an early conceptual design of metacognition.

During the same period another Colombia university psychologist, educator and lexicographer Thorndike conducted early cognitive research, (in Bugelski, 1964). While a student at Harvard University, his original goal was to become English teacher. He was also showing sensitivity to the cognitive processes involved in connecting words for comprehension purposes. He described reflection and self-evaluation as prime component for thinking and reading. He stated “The mind is assailed as it were by every word in the paragraph. It must select, repress, soften, emphasize, correlate and organize, all under the influence of the right mental setup or purpose of demand”. These early concepts of metacognition are considered a basic, yet evolving definition of metacognition.

Most references directed to the nascent studies of metacognition, single out from the work Jean Piaget. According to Piaget the young is directing cognition, but he is not yet conscious of the evolving thought processes, which he/she displaces. Some of Piaget’s later research with older children described an evolving ability on the part of these learners to verbalize the actual step by step processes utilized to complete assigned tasks. Piaget termed this awareness and narrative ability as “Consciousness of cognizance”, which we called metacognition for this function.

During the period of Piaget or early research, another provocative cognitive researcher, the Russian psycholinguist Lev Senyovich Vygotsky involved in the area of conceptual development. His primary focus was on determining the source of intellectual development. According to Vygotsky, a learner’s cognitive development is derived from a combined contact with higher level abstract subject matter imposed by higher level social interaction. He professed that the introduction of advanced information presented by an individual displaying higher order thinking skills will facilitate the development of advanced abstract cognitive processes within the learner.

During 1950 and 1960 the behaviourist paradigm had matured in method from the stimulus response frame work to an information processing model and also interest in aspects of memory development and also interested in aspects of control began to take foot by memory development explored by Brown and Hart (1965 & 1966). The actual process of monitoring one’s memory could be discerned and analyzed by researchers. The subjects of their experiments attempted to retrieve information that they have previously learned and felt they knew. Cognitive psychologists began to reconsider the significance of the thinking process. US researchers such as John Flavell and Henry Wellman (1977), John Borkowski (1979) realized that the learners could demonstrate previously undisclosed and unexplored control processes of learning and thinking. Both cognitive researchers and computer programmers emphasized an information processing model of learning and they applied the term ‘executive process’ when they described strategic control of thinking process. Uric Neiser (1967) was one of the first psychologists who attempted to illustrate the concept of an executive thinking ability. Executive process is a control mechanism used to organize cognition, to harness and orchestrate the various cognitive skills, such as memory, the recognition of icons and verbal cues, etc. This is a metacognitive process

John Flavell a cognitive researcher, professor of psychology, proponent of the Piagetian theory explored cognitive systems, particularly in relation to memory. He introduced the term ‘meta-memory’ and he has been considered responsible for coining the term ‘metacognition’. Meta-memory, a component of metacognition, the first to the control or memory functions which is mind’s ability to purposefully store and retrieve information. He was the first to recognize the specific strategies for who remembering; categorizing and recalling needed information, which can be consciously directed by learners. He offered a model of metacognition with four components;

1. Metacognitive knowledge – Refers to the personal perspectives of one’s own learning ability as well as others.
2. Metacognitive experience – Is the conscious consideration of intellectual experiences that accompany any success or failures in learning.
3. Metacognitive Goals (tasks) – Are the actual objectives of a cognitive endeavor, such as reading and comprehension of a passage, etc.
4. Metacognitive Actions (strategies) – Refer to the utilization of specific techniques that may assist in understanding.

**Metacognitive learning strategies**

“A metacognitive strategy is a systematic cognitive technique to assist student 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 deliberately.

Metacognitive learning strategies are general learning strategies. Reflection upon your own thinking and learning is metacognitive thinking. Once students begin to think about their own learning they can, then begin to notice how they learn, how others learn, and how they might adjust and how they learn to learn more efficiently. We list four general metacognitive strategies:

* Organize/Plan your own learning
* Manage your own learning
* Monitor your own learning
* Evaluate your own learning.

The metacognitive strategies follow the sequential order of the process a learner generally goes through in accomplishing any task. What do I do before I start? (Organize/Plan) What do I do while I am working on the task? (Manage) How do I make sure I am doing the tasks correctly? (Monitor) What do I do after I have finished the task? (Evaluate) It is important to remember, however, that learners are not as linear as our models suggest. In reality, we go back and forth: planning, then monitoring, then planning again, managing, organizing, etc.

|  |
| --- |
| **METACOGNITIVE STRATEGIES** |
| **Strategy** | **Description** |
| Organize/ Plan | Calendar | * Plan the tasks or content sequence.
* Set goals.
* Plan how to accomplish the task.
 |
| Manage Your Own Learning | Pace Yourself | * Determine how you learn best.
* Arrange conditions that help your learn.
* Seek opportunities for practice.
* Focus your attention on the tasks
 |
| Monitor | Check | * Check your progress on the task
* Check your comprehension as you use the language. Do you understand?
* Check your production as you use the language. Are you making sense?
 |
| Evaluate | I did it! | After completing the task:* Assess how well you have accomplished the learning task.
* Assess how well you have applied the strategies.
* Decide how effective the strategies were in helping you accomplish the task
 |

|  |
| --- |
| **TASK BASED STRATEGIES: USE WHAT YOU KNOW** |
| **Strategy** | **Description** |
| Use background knowledge | I Know | * Think about and use what you already know to help you do the task
* Make associations
 |
| Make Inferences | Use Clues | * Use context and what you know to figure our meaning
* Read and listen between the lines
 |
| Make predictions | Crystal ball | * Anticipate information to come.
* Make logical guesses about what will happen
 |
| Personalize | Me | * Relate new concepts to your own life, that is, to your experiences, knowledge, beliefs and feelings
 |

Metacognition literally means knowing about knowing. It is an appreciation of what one already knows together with a correct comprehension of the learning tasks. Metacognition helps learners monitor and control their learning process on an ongoing basis and adjust their strategies to maximize achievement. The metacognitive strategies are teaching strategies which can motivate students and give them the opportunity to learn, understand and recognize the information received in class and in their everyday life. They will make the students to be more and more independent in facing new situations. Teachers should allow the students to seek understanding by exploring and investigating on their own with teachers as facilitators.

So many metacognitive strategies are used in learning. They are listed as below.

* Meaningful learning: This is a process which connects new information to knowledge already existing in the long term memory.
* Elaboration: This is a process which uses previous knowledge to interpret and expand on the new materials.
* Organization: Organize materials early.
* Group discussions: Discussing in groups.
* Individual Activities: Giving activities individually
* Self-Evaluation: Each student evaluating himself/herself
* Self-Questioning: Asking questions themselves.

**Development of Metacognitive Strategies**

Metacognitive strategies involve executive regulation processes directing regulation of the course of thinking. They involve decisions that help.

* To allocate to the current task
* To determine the order of steps to be taken to complete the task
* To set the intensity or the speed at which one should work the task

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

Step I. Teach students that the ability to learn is different in different students: The students’ capacity to learn is a personal skill that can be developed 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 achievements.

Step II. 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 didn’t receive the training. They planned how they would spend their time in the learning tasks, spend most their time in goal oriented searching and periodically reminded themselves of their current goal. (Azevedo and Cromely 2004)

Step III. Give students opportunity to practice self-monitoring and adapting; Most of our students are over confident. Their expectations are not realistic. Opportunity to practice self-testing and self-monitoring can help them set realistic goals and improve their performance.

**Strategies for Developing Metacognitive Behaviors**

Some strategies are given below. It can be used by the teachers in their classrooms to help students developing metacognitive abilities.

**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.

**Talking about thinking**

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

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

**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 filed they are studying. Such exposure to the problem-solving strategies of legendary thinkers can be inspirational and informative for students.

**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.

**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 note of their awareness of ambiguities and inconsistencies, and comment on how they have dealt with difficulties. This journal is a diary of processes.

**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 lean to think and ask questions for themselves as they proceed through a learning activity.

**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.

**Self-evaluation**

Guided self-evaluation experiences can be introduced through individual conferences and checklists focussing 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.

**Activities that support the development of metacognitive skills**

Unknown task exercise: the purpose is to help students to experience the impact of metacognitive strategy to look at the overview or the big picture before you are getting the details.

Reading probes (quizzes or questions): the purpose is to help students’ overview the material before they come to class.

Student-generated questions from the overview or reading that they did.

Post-lecture student questions: the students attend the lecture and at the end write down a question on a card. Then it can be handed in to the instructor who will post a few of the questions on the overhead or in PowerPoint to be answered at the beginning of the next class. Students can exchange cards with another student and try to answer the other student’s question before the next class. This fosters a sense of community among the students in the class, and helps students develop increased self-efficacy and confidence in their ability to answer their own questions.

**Importance of creating metacognitive environment**

A metacognitive skill helps to facilitate any type of cognitive learning but is especially useful in the subjects based on logic, critical thinking, reasoning and requiring problem solving skills. E.g. Mathematics. The basic concept of metacognition is thinking about one’s own cognitive thought. It could be interpreted as cognition about cognition which simply means knowledge of thinking and regulation of one’s learning process. In its simplest form, it could be termed as thinking about thinking. The concept of metacognition equates with active involvement of learners in what they are learning. It includes, awareness and knowledge of the subject domain and its nature, learners ability to regulate his/her own actions in application of that knowledge, awareness of an individual of his/her own knowledge, strengths and weakness and belief about him/herself as a learner.

Tomorrow’s coordinator needs to have metacognitive skills: The competency to know how to access, select, review and integrate the content into personal knowledge which is essential foundation on which all else will be built, be able to guide one’s own learning using external resources the ability for self-management sense of problem resolving and able team working using personal resources and technology, proficient to facilitate learner to learner interaction enabling the learner to explore multiple resources individually or as team member.

Metacognitive thinking is a key element in the transfer of learning. The child’s development of metacognitive skills is defined as Meta learning. Meta cognitive teaching strategies can help mediate the metacognitive skills of children and stimulate children’s metacognitive thinking.

**STUDIES RELATED WITH METACOGNITION AND META COGNITIVE STRATEGIES**

From the review of related literature in the area, it was understood that, there has not been many studies related to the topic. To teach successfully, one must plan successfully; and, successful planning means knowing how to facilitate a positive learning experience for all students. Review of related literature is a valuable guide in defining the problem, collecting information, conducting the study and reaching on valuable conclusions. Literature review related with metacognition and metacognitive strategies are the following:

The origin of the term metacognition has often been attributed to John Flavell, who has largely explored metacognition in the context of cognitive development. He 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 “Circulation About the Nature and Development of Metacognition” (1987). In general, metacognition refers to people’s “Cognition about cognitive phenomena”.

Elaine & Sheila (1990) in their study ‘developing metacognition’ proves that metacognitive strategies can be used to increase learning skills and the independent use of these metacognitive strategies can be gradually developed in people. The students should connect new information to old information and deliberately select thinking strategies, plan, monitor and evaluate these thinking processes.

Robert Fisher (1998) prepared an article ‘thinking about thinking’ – developing metacognition in children. This article explains what metacognition is and why it is important and why teachers need to help children develop metacognitive awareness. Metacognitive thinking is a key element in the transfer of learning. The article helps on raising achievement in thinking and learning through developing the metacognition of children as learners in schools.

Michael (1999) conducted a study and opinioned metacognition represents a strategy of acquiring knowledge namely the ability to understand the methods for learning and assimilating information. He put forward several strategies for this purpose. The students should be capable of adequately selecting, employing, monitoring and evaluating their use of these strategies.

Sheila’s (1999) prepared an article metacognitive learning strategies for students with learning disabilities, describes research on metacognition and the strong possibilities and opportunities to influence our understanding of learning strategies for students with learning disabilities. This article helps teachers to develop metacognitive learning strategies for students with learning disabilities.

Ramp and Guffey (1999) in their article ‘a new implementation model for learning’ gives a very good review on metacognition regarding the problems and promise that metacognition presents to educators. The definition of metacognition with several examples and models are explained here. The two methods of teaching and training metacognition techniques are also explained. It also suggests an alternative theory to support training in metacognition for high school students which is the composite theory of intellectual development.

Lokanatha Reddy and Shantakumari (2004) had the following objectives of developing diagnostic tools to identify the LLD of second language learners (English) at higher secondary level and to develop metacognitive awareness questionnaire (MCAQ) and to find out the difference between LLD students and normal students in their metacognitive awareness, in their study. The study underlined the need for language intervention programs with metacognitive strategic orientation.

Haneet Gandhi and Varma (2004) in their article entitled ‘Elucidating mathematical problem solving through metacognition’ illustrate that when children learn more about themselves their strategies and their tasks, they become better aware of themselves. An awareness and knowledge of one’s own thought processes and cognitive strictures facilitate the development of logical approach, critical thinking and precise decision making skills in the learner and contribute to the making of an efficient mathematical problem solver. And the conclusion was that they learn to reflect on their learning by regulating and executing control over their own thought processes.

Savithri (2006) conducted a research entitled ‘Impact of metacognitive strategy in enhancing perceptual skills among high school students on learning geometry’. The study reveals the effectiveness of metacognitive strategies in learning Geometry.

Jahitha Beegam and Mohan (2007) in their article entitled ‘the conceptual evolution of metacognition’ bring out the evolution of the concept ‘metacognition’ from 1800 onwards. Metacognition is one of the latest buzz words in educational psychology. It refers to higher order thinking, which involves active control over the cognitive processes engaged in learning. The term didn’t appear in the literature until the latter part of the 18th century. This paper attempts to bring out an overview, how various components have conceptualized metacognition variously.

Ramganesh (2008) conducted a study on ‘effect of metacognitive strategies on enhancing teaching competency in mathematics among prospective teachers’, makes an attempt to determine the effectiveness of metacognitive strategy on enhancing the teaching competency among B.Ed. students. The finding was that teacher trainees could strengthen their teaching competency through metacognitive control.

Noushad (2008) prepared an article, “Cognition about cognition: The Theory of Metacognition” gives a theoretical review of the term “Metacognition”. It was introduced by John Flavell in the early 1970’s based on the term ‘meta memory’ previously conceived by the same scholar (Flavell 1971). Metacognition is usually related to the 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.

Lokanada Reddy, Santhakumari and Purnima (2009) prepared an article entitled ‘Cognitive and metacognitive orientation for quality improvement in teacher education with special reference to children with special needs. Existing research in cognitive and metacognitive training has focused on the development and refinement of specific strategies such as self-monitoring for application with in specific academic skills.

Claudia Roebers, Corinne Schmid and Roderer (2009) conducted a study entitled metacognitive monitoring and control processes involved in primary school children’s test performance. The present study examined metacognitive monitoring and control processes in elementary school children’s test taking behavior and explored the impacts of these metacognitive skills for the accuracy and the quantity of test performance. A total of 133 participants from third and fifth grade was the sample for the study. The study offers evidence for the impact of metacognitive processes in students’ learning outcomes and documents strategic behavior during test taking as well as developmental progression in the involved skills.

Ramganesh and Raja Soundara Pandian (2009) prepared an article ‘Efficacy of metacognition and reading comprehension in higher education’. In this article they explained about the two dimensions of metacognitive ability i.e. knowledge of cognition and regulation of cognition with examples. Metacognitive knowledge or awareness is knowledge about ourselves, the tasks one faces and the strategies he/she employs. Metacognition is relatively new label for a body of theory and research that addresses learners knowledge and use of their own cognitive resources. The finding was that better readers are better strategy users.

The study by Ameer Ali (2010) attempted to see the effect of metacognitive learning strategies on the achievement in Geography of Std. 1X pupils. The sample used was 64 students from the Islahiya E.M.H.S.S., Malappuram and the finding was that metacognitive learning strategy is an effective method of teaching over existing method of teaching on achievement in Geography.

Vishak Kumar (2010) studied on the effectiveness of metacognitive strategies on classroom participation and student achievement in higher secondary school physics classrooms. The sample was two classes of higher secondary students of DBHSS Thiruvalla, Kerala. The study used a two group pre-test post-test design. The study consisted of two different treatments: a control group and a metacognitive questions group. The finding was that the teachers should allowed the students to seek understanding by exploring and investigating on their own with teachers as facilitators.

Ramadevi and Vishakh Kumar (2010) conducted a study on ‘Relation between metacognitive awareness and achievement in physics at higher secondary level’. In this study they used a sample of three hundred students studying in standard XI from seven schools from Pathanamthitta, Alappuza and Kottayam district. The study revealed that there exists a high positive correlation between metacognitive awareness and achievement in physics. Also they found that male students were superior to female students in their metacognitive awareness.

Saskia Krebs and Claudia Roebers (2010) conducted a study entitled ‘Children’s strategic regulation, metacognitive monitoring and control processes during test taking’. A total of 107 participants 8-9 and 11-12 years old students were the sample for the study. The study offers evidence for the impact of metacognitive skills in children’s learning outcome and document strategic behavior during test taking as well as developmental progression in the involved skills. Further, findings underline the importance of metacognitive processes in test situations.

John Dunlloksy and Janet Metcalfe’s (2010) ‘metacognition – A textbook for cognitive, educational, life span and applied psychology’ is a very good source on the concept and cops of metacognition. It includes the opinions of great educators and psychologists. Studies also revealed that metacognitive strategy can be used as an effective tool to increase the achievement of students and as an evaluation tool.

Shareeja Ali (2010) prepared an article ‘Metacognition – Concept and its development’. This article explores what metacognition is, why it is important and how it is developed in children. It argues that teachers need to help children develop metacognitive awareness and identify the factors which enhance metacognitive development. Metacognitive thinking is a key element in the transfer of learning. Metacognitive teaching strategies can help mediate the metacognitive skills of children and stimulate children’s metacognitive thinking.

Noushad and Usha (2011) prepared an article on the ‘influence of metacognition on successful intelligence of secondary school students. This paper is an attempt to investigate the influence of metacognition on successful intelligence of secondary school students. The study concluded that enhancing metacognitive abilities of secondary school students will improve successful intelligence of secondary school students.

Parameswari (2011) investigated the Effect of metacognitive orientation to B.Ed Physical Science trainees on teaching competency and self-esteem. In the light of research findings it is felt that the present study might contribute to the enhancement of competency in teaching and to the self-esteem level of the trainees. So this strategy is urgently needed in our country for creating efficient teachers. So many in-service programs are arranged by the academic staff college to give training in this skill.

Devaki and Mary Lilly Pushpam (2011) conducted a study entitled ‘metacognitive ability and academic achievement in Chemistry among standard XI students. This study aimed at the assessment of metacognitive ability of Standard XI students and its association with academic achievement in Chemistry. A sample of 244 students belonging to science group was selected for the study. The tool used was metacognitive inventory constructed and standardized by Schraw and Dennison and the finding was that there is significant difference in the metacognitive ability of boys and girls. Girls possess higher metacognitive ability than boys.

Romesh Varma and NivedithaVarma (2011) prepared an article, ‘Cognitive and metacognitive skills of a coordinator’. In this article they explained that open distant education systems are designed to minimize isolation, maximizing academic activities, strengthening learning support services, enhancing interactivity, enriching communication in between the content, the learner, coordinator at four levels, viz academic, personal, supplemental and peer group and they concluded that in nut shell, with the explosion of knowledge and technology one can experience a sea change in the level of aspirations of the learner.

Rasool Mohiuddin and Usha Parvathi (2011) on their study ‘Metacognition of prospective teachers in Thoothukudi Dist., explains the different dimensions of metacognitive strategies. Metacognition is learning of learning which refers to higher order thinking which involves active control over the cognitive processes engaged in learning. 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. It was inferred from the study that metacognitive learning strategies are very important in our day to day life.

Annaraja and Sheeja Titus (2012) in their study ‘Metacognitive awareness secondary teacher education students’ explains how metacognitive awareness helps the teacher trainees to perform many cognitive tasks more effectively and may improve the cognitive skills of students. The investigators who feel that metacognitive awareness help the teacher trainees to perform many cognitive tasks more effectively, find that the new generation teachers suffer from many problems in their classroom practices. This situation calls for a change in teacher training classrooms. Metacognitive awareness helps the teacher trainees selecting, revising and evaluating to improve the cognitive skills of students.

Minikutty and Seema Gopinath (2012) conducted a study entitled ‘Influence of metacognitive awareness on attitude towards teaching student teachers at secondary level’. The present study examined the relationship between metacognitive awareness and teaching attitude of student teachers at secondary level. Teachers’ metacognitive awareness inventory and teaching attitude inventory was used as tools. Normative survey method is used for the study on a sample of sixty secondary school student teachers.

Arul Sekar and Anna Raja (2013) conducted a survey study entitled ‘Correlation of metacognition and teaching competency of mathematics teacher trainees of colleges of education’. 250 mathematics teacher trainees were taken for this investigation, and the correlation analysis result reveals that the teaching competency is a direct correlate of Knowledge cognition, Regulation cognition and metacognition of Mathematics teacher trainees in their metacognition.

Noufal (2013) attempted to see the effectiveness of metacognitive strategy on English language anxiety of the secondary school students. The study also highlights the importance of learning strategy for creating a rich language environment in English classrooms. The study also emphasis the importance of a threat free language rich environment in the classroom which enables the learner to acquire language through its frequent use. The finding was that the metacognitive learning strategy is an effective strategy for reducing the English language anxiety of secondary school students.

Jahitha Beegam and Sivakumar (2013) conducted a study entitled ‘metacognitive awareness among engineering and law college students’. The study was conducted on 269 students from two professional colleges using Punita Govil’s metacognitive awareness inventory (MAI) and there is no significant difference in the metacognitive knowledge between male and female students. This study found out that there is no significant difference in the overall level of metacognition between engineering and law college students.

Praksh Chandra Jena (2013) conducted a study entitled usage of metacognitive strategy by teacher trainees: An explorative study, for identifying the different levels of metacognitive strategy use of primary school teacher trainees. The investigator has taken three hundred primary school teacher trainees from three districts of Jammu and Kashmir. For collection of data, metacognitive inventory (MCI) by Punita Govil was used and the finding was that male teacher trainees were better than female teacher trainees in the use of knowledge of cognition strategies.

Brady, M., Seli, H. and Rosenthal, J. (2013) conducted a study on “Clickers” and metacognition. A quasi experimental comparative study about metacognitive self-regulation and use of electronic feedback devices. The purpose of the study was to establish whether electronic response system (clickers) influence student metacognition in large lecture settings. This quasi experimental study was performed with students from three sections of the same undergraduate educational psychology course taught by the same instructor. The results from the study indicate that metacognitive processes are influenced more by paddles than by clickers.

Spada, M.A. Nickeevi, A. Moneta, G. and Wells, A. (2013) in their study ‘metacognition as a mediator of the relationship between emotion and smoking dependence’, which investigated the role of metacognition as a mediator of the relationship between emotion and smoking dependence. A sample or 104 smokers completed the following questionnaire and finding was that smoking dependence was also positively and significantly correlated with both anxiety and depression.

**CONCLUSION**

 The above review of related literature gives a wide perspective of the problem under investigation. Reviewing the studies, the investigator found out large number of studies related to metacognitive learning strategies. Most of the studies were done in a variety of subjects and almost all of the studies explained the importance of metacognitive learning strategies for teaching different subjects. Elaine and Sheela (1990), Michael (1999), Savithri (2006), Parameswari (2011), Vishak kumar & Ramadevi (2010), Claudia Robers and Roderrer (2010) and Ameerali (2010) tried to study the effectiveness of metacognitive learning strategies on different subjects. Lokanatha Reddy and Santhakumari (2004) tried in developing diagnostic tools to identify the LLD of English Language learners. The investigator found out that the studies which checks the effect of metacognitive learning strategies in Physics are very rare. So the investigator was curious to know whether metacognitive learning strategies will help learning the subject Physics. So the investigator assumes that the present study is a highly relevant one.

**METHODOLOGY**

Methodology of a study is the key of its validity. The success of the research work depends largely upon the suitability of the methods, tools and techniques followed by the researcher in collecting and processing data. A suitable method helps the researcher to carry out work in a scientific and valid manner.

The present study entitled “EFFECTIVENESS OF METACOGNITIVE LEARNING STRATEGIES ON THE ACHIEVEMENT IN PHYSICS OF STANDARD IX PUPILS” attempts to find out the effect of metacognitive learning strategy over the existing method of teaching.

The methodology adopted for the study is described under the following major headings.

**OBJECTIVES OF THE STUDY**

**HYPOTHESES OF THE STUDY**

**DESIGN OF THE STUDY**

**TOOLS USED FOR THE STUDY**

**SAMPLE USED FOR THE STUDY**

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

**STATISTICAL TECHNIQUES USED FOR ANALYSIS**

**OBJECTIVES OF THE STUDY**

The following objectives were considered for the present study.

* To compare the mean pre-test scores of experimental and control groups.
* To compare the means post-test scores of experimental and control groups for total sample and the subsamples based on gender.
* To compare the means gain scores of experimental and control groups for total sample and the subsamples based on gender.
* To study the effectiveness of metacognitive learning strategies over the existing method of teaching on the achievement in Physics of standard IX pupils.

**HYPOTHESES OF THE STUDY**

The following hypotheses were tested for the study.

* There exists significant difference in the pre-test scores of the experimental and control groups.
* There exists significant difference in the mean scores of the post-test of the experimental and control groups for total sample and subsamples based on gender.
* There exists significant difference in the mean gain scores of the experimental and control groups for total sample and subsamples based on gender.
* There exists significant difference in the Achievement of Physics between the experimental and control groups.

**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).

**Design Selected**

The design selected for the present study was the Quasi Experimental with pre-test – Post-test nonequivalent 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 C 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 period 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 introduction of the two teaching methods, both groups were administered the same achievement test.

**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 variable and control variable for the present study are as follows.

**Independent Variables**

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

**Dependent Variable**

Achievement in Physics 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 physics as measured by a pre-test.

**Selection of the Topic**

The topics for the experiment were selected from the new syllabus of Physics prescribed for standard IX pupils of Kerala state. The topic was from the unit four and five, ‘Motion’ and ‘Wave Motion’. This includes the following topics.

Introduction to Graph, Position time graph, Velocity time graph

Equations of motion, Uniform acceleration, Momentum, Rate of change of momentum, Newton’s second law of motion, Newton’s third law of motion, Law of conservation of momentum, Simple Pendulum, Period, frequency and the relation between them, Wave motion, Transverse wave, Longitudinal wave.

**TOOLS USED FOR THE STUDY**

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

Lesson Transcript Based on Metacognitive Learning Strategies

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

Achievement Test in Physics

**Lesson Transcript Based on Metacognitive Learning Strategy**

The metacognitive learning strategy was introduced as a new method of instruction. Based on the metacognitive 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 using the following format.

**Content Overview**

Introducing the theme of the lesson and all the important topics which will be explained in the class.

**Content Analysis**

Here the term, facts and concepts are discussed. All the relevant ideas related to the terms, facts and concepts will be discussed.

**Curricular Objectives**

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

**Learning Strategies**

Here, the strategies used for teaching the particular topic using the metacognitive learning strategies will be mentioned.

**Subject Reality**

Here, the previous knowledge of the students regarding the particular topic will be mentioned.

**Learning Resources**

Here, the learning materials used will be mentioned

**Learning Activity (Structured Activities)**

**Stage I – Metacognitive Knowledge**

Checking the previous knowledge of the students by using some questions.

**Stage II – Metacognitive Monitoring and Regulation**

**Planning or organizing**

Here, the teacher introduces the lesson in an interesting way. The teacher may use charts, models, blackboard etc. Here also some questions will be given which will promote the thinking process of the students which connects the previous knowledge of the students with the new information imparted by the teacher.

There will be a consolidation session which gives a complete idea of the class.

**Monitoring**

Here, after giving a brief explanation, the teacher asks the students to find out various methods or activities related to the content to learn the topic more easily. Also the students will be asked whether their activities related to contents and finding are the proper way or he/she may try it in another way. Here also there will be a consolidation session which gives a complete idea of the class.

**Evaluation or Reflection**

Here some activities and questions will be included which will activate the thoughts related to the thinking

How did I do it?

How better is my result?

How far I can make use of the knowledge I got in my future life?

**Metacognitive Review**

This part of the lesson plan includes some questions which promote the thinking processes of the students and they will start thinking about their own position in the learning processes.

Examples.

Can you understand this lesson in a better way?

How can you use these information in your life?

Whether your thoughts about the activities in the class room are in a proper way?

How could you utilize your previous knowledge to learn this lesson in a better way?

How much new thoughts did you use to learn this new topic?

Discussing as a group what they have learnt, and giving a metacognitive review, the teacher concludes the lesson. There are 15 lesson transcripts which have been prepared using metacognitive learning strategy which are given as appendix I.

**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 plan was prepared by using the following format.

**Content Analysis**

Here the terms, facts and concepts coming under the topic will be discussed. All the relevant ideas related to the terms, facts and concepts will be discussed.

**Learning Objectives**

The objectives to be attained by the people by learning the particular lesson will be mentioned in this section. It mentions the learning outcomes which the teacher expects from the students by teaching the particular topic.

**Process Skills**

The skills used by the students will be discussed here. All the ideas and activities done by the students will be also discussed.

**Pre requisites**

The information the students should acquire for understanding the topic.

**Resources / Learning Materials**

Here, the learning materials used will be mentioned

**Product / Value**

The values which the teacher expects to impart to the students by teaching the particular topic will be discussed here.

**Process**

The introductory part of the lesson will be given in an interesting way by including some interesting questions which will bring the students to the new topic which the teacher is going to teach. Here some activities will be included in this section. Some thought provoking questions related to each and every activity will be also included. Consolidation will be done for each activity.

**Follow up Activities**

Some questions will be given for the students so that they will internalize the topic they learned and they will start applying it in their future life.

A model lesson transcript based on existing method (Constructivist Method) of teaching is given as Appendix II

**Achievement Test in Physics**

This test of achievement in Physics, used as pre-test and post-test 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:

**Planning of the Test**

The preparation of any classroom test involves a number of states. 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 test etc. are taken. With regard to the type of questions, the investigator decided to have objective type questions only. The duration of the test was fixed as 45 minutes.

 **Weightage to Objectives**

Objectives are broad goals and are stated in terms of desired change in student behavior. 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.

Knowledge

Understanding

Application

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

**Table I: Weightage to Objectives**

|  |  |  |  |
| --- | --- | --- | --- |
| SI. No. | Objectives | Marks | Percentage |
| 1 | Knowledge | 7 | 15 |
| 2 | Understanding | 16 | 36 |
| 3 | Application | 22 | 49 |
| TOTAL | 45 | 100 |

**Weightage to Content**

The weightage given to different sub-units in the content area are shown in Table 2.

**Table 2: Weightage to Content**

|  |  |  |  |
| --- | --- | --- | --- |
| SI. No. | Content | Marks | Percentage |
| 1 | Motion:-Position Time Graph, Velocity Time Graph, Equations of Motion, Acceleration | 11 | 24 |
| 2 | Momentum, Rate of Change of Momentum, Newton’s Second Law of Motion, Newton’s Third Law of Motion, Law of Conservation of Momentum | 12 | 28 |
| 3 | Wave Motion:-Simple Pendulum, Oscillation, Equilibrium Position, Amplitude, Period, Frequency | 11 | 24 |
| 4 | Transverse Wave, Longitudinal Wave, Wave Length | 11 | 24 |
| TOTAL | 45 | 100 |

**Weightage to Difficulty Level**

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

**Table 3: Weightage to Difficulty Level**

|  |  |  |  |
| --- | --- | --- | --- |
| SI. No. | Difficulty Level | Marks | Percentage |
| 1 | Easy Questions | 10 | 22 |
| 2 | Average Questions | 25 | 56 |
| 3 | Difficulty Questions | 10 | 22 |
| TOTAL | 45 | 100 |

**Weightage to Form of Questions**

Here the investigator included only object type questions as shown in Table 4.

**Table 4: Weightage to Form of Questions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SI. No. | Form of Questions | No. of Items | Marks | Percentage |
| 1 | Objective Type | 45 | 45 | 100 |
| TOTAL | 45 | 100 |

**Blue Print of Achievement Test in Physics**

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 Physics 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 Physics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SI. No. | Content | Knowledge | Understanding | Application | Total |
| 1 | Motion:-Position Time Graph, Velocity Time Graph, Equations of Motion, Acceleration | 2 | 4 | 5 | 11 |
| 2 | Momentum, Rate of Change of Momentum, Newton’s Second Law of Motion, Newton’s Third Law of Motion, Law of Conservation of Momentum | 1 | 5 | 6 | 12 |
| 3 | Wave Motion:-Simple Pendulum, Oscillation, Equilibrium Position, Amplitude, Period, Frequency | 1 | 4 | 6 | 11 |
| 4 | Transverse Wave, Longitudinal Wave, Wave Length | 3 | 3 | 5 | 11 |
| Total Marks | 7 | 16 | 22 | 45 |

**Item Writing**

Based on the Blue print the investigator prepared 45 objective type questions and it was subjected to expert’s criticism. The time duration for the test was 45 minutes. The achievement test is given as Appendix III.

**Scoring Key**

Scoring key was prepared by the investigator for scoring answer sheets. One mark was given for each correct answer.

**Reliability and Validity**

Reliability and validity are essential to the effectiveness of any data gathering procedure. These terms are defined here in the most general way.

**Reliability**

Reliability is the degree of consistency that the instrument or procedure demonstrates: whatever it is measuring, it does so consistently. Validity is that quality of a data gathering instrument or procedure that enables it to measure what it is supposed to measure. Reliability is a necessary but not sufficient condition for validity. That is, a test must be reliable for it to be valid, but a test can be reliable and still not be valid.

**Reliability of the present Test**

A test is said to be reliable when the test scores are stable and trust worthy. The investigator calculated the reliability of the test by test-re-test method. By this method, the same test was re-administered after one week 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 0.83 to N = 32. Thus the index suggests that the test is highly reliable.

**Validity**

“Validity refers to the degree to which evidence and theory support the interpretation of test scores entailed by proposed uses of tests” (Joint Committee on Standard for Educational and Psychological Testing, 1999, P.9). That is. Validity has to do with both the attributes of the test and the uses to which it is put. When test are used for more than one purpose, there needs to be evidence of validity for each of these uses. Considering the number and variety of tests and their uses, the type of validity evidence needed will vary quite a bit.

**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 prints. 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 mark of a unit test in Physics. The validity co-efficient was found to be 0.63 indicating the test is valid.

**SAMPLE USED FOR THE STUDY**

The investigator considered two groups for the experiment. One class division as control group and another as experimental group. Here the investigator selected two class divisions of std. IX of GGVHSS, Feroke, Calicut. Details of the sample selected for the study is given below in table 6.

**Table 6: Details of the Sample Selected for the Study**

|  |  |  |
| --- | --- | --- |
| Standard | Experimental Group | Control Group |
| Boys | Girls | Total | Boys | Girls | Total |
| IX | 24 | 30 | 54 | 29 | 20 | 49 |

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

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

**Data Collection Procedure**

Before conducting the 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 Physics. 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)

**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.

**STATISTICAL TECHNIQUE USED FOR ANALYSIS**

The present study demanded the use of following statistical technique. 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.

**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 Physics of standard IX pupils. The collected and tabulated data were analyzed using the statistical technique t-test.

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

* To compare the mean pre-test scores of experimental and control group
* To compare the mean post-test scores of achievement in Physics for experimental and control group for total sample and the subsamples based on gender.
* To compare the mean gains scores of achievement in Physics for experimental and control group for total sample and the subsamples based on gender.
* To study the effectiveness of metacognitive learning strategies over the existing method of teaching on the achievement in Physics of standard IX pupils.

The present study was designed to test the following hypotheses.

* There exists significant difference in the pre-test scores of the experimental and control groups.
* There exists significant difference in the mean scores of the post-test of the experimental and control group for total sample and the subsamples based on gender.
* There exists significant difference in the mean gain scores of the experimental and control groups for total sample and the subsamples based on gender.
* There exists significant difference in the Achievement of Physics between the experimental and control groups.

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

**PRELIMINARY ANALYSIS**

**COMPARISON OF MEANS**

**PRELIMINARY ANALYSIS**

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

**Important Statistical Constant**

As part of preliminary analysis important statistical constants like mean, median, mode, standard deviation, Skewness and Kurtosis for the pre-test, post-test and gain scores 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 Physics for Experimental Group**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Variables | Mean | Median | Mode | S.D | Skewness | Kurtosis |
| 1 | Pre-test | 14.18 | 14.00 | 15.00 | 3.16 | 0.210 | 0.006 |
| 2 | Post-test | 33.11 | 33.50 | 44.00 | 8.94 | -0.366 | -0.988 |
| 3 | Gain Scores | 18.92 | 19.50 | 27.00 | 8.54 | -0.038 | -1.075 |

**Table 8: Statistical Constants of Achievement in Physics for Control Group**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl No. | Variables | Mean | Median | Mode | S.D | Skewness | Kurtosis |
| 1 | Pre-test | 14.16 | 15.00 | 15.00 | 5.07 | 0.50 | 2.831 |
| 2 | Post-test | 23.65 | 24.00 | 24.00 | 9.82 | -0.046 | -0.921 |
| 3 | Gain Scores | 9.48 | 10.00 | 4.00 | 8.33 | 0.094 | -0.944 |

**COMPARISON OF MEANS**

In this part of the analysis, comparison of the mean scores of achievement in Physics for experimental and control groups, in the pre-test, post-test and gain scores for total sample were attempted. The mean scores of boys and girls for post-test and gain scores were also attempted and presented below.

**Comparison of mean pre-test scores of Achievement in Physics 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 sample. 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 Pre-test Between Experimental and Control Groups**

|  |  |  |  |
| --- | --- | --- | --- |
| Experimental Group | Control Group | t-value | Level of Significance |
| 1 | σ1 | N1 | 2 | σ2 | N2 |
| 14.18 | 3.16 | 54 | 14.16 | 5.07 | 49 | 0.027 | N.S |

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 found in the mean pre-test scores of experimental and control groups for the achievement in Physics. It can be inferred from the t-test that the performance of the experimental and control groups are similar in case of their pre-experimental status of achievements measured in terms of pre-tests.

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

**Figure 1: Bar Graph 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.

**Comparison of the Mean Post-test scores of Achievement in Physics 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 sample. 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 |
| 1 | σ1 | N1 | 2 | σ2 | N2 |
| 33.11 | 8.94 | 54.00 | 23.65 | 9.82 | 49.00 | 5.115 | 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 result 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 Physics measured in terms of a post-test. The graphical representation of post-test scores of experimental and control groups are given in figure 2.

**Figure 2: Bar Graph Representing Post-test scores of Experimental and Control Groups**

As per the figure 2 it can be noted that there exists significant 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.

**Comparison of the Mean Gain Scores of Achievement in Physics 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 sample. 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 |
| 1 | σ1 | N1 | 2 | σ2 | N2 |
| 18.92 | 8.54 | 54.00 | 9.48 | 8.33 | 49.00 | 5.66 | 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 not similar. High mean gain scores for the experimental group over the control group for the total sample is noticed. This revealed that 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 is presented in figure 3.

**Figure 3: Bar Graph Representing Gain scores of Experimental and Control Groups**

From figure 3 it can be noted that there exists significant 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.

**Comparison of the Mean Post-test scores of Achievement in Physics 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 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 Groups**

|  |  |  |  |
| --- | --- | --- | --- |
| Experimental Group | Control Group | t-value | Level of Significance |
| 1 | σ1 | N1 | 2 | σ2 | N2 |
| 33.08 | 10.26 | 24 | 21.79 | 9.48 | 29 | 4.15 | 0.01 |

The obtained t-value as shown in table 12 for the mean post-test scores of achievement in Physics for boys between experimental and control groups is greater than the tabled value required for significance at 0.01 level.

This significant t-value indicate 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.

**Comparison of the Mean Post-test Scores of Achievement in Physics for Girls Between Experimental and Control Groups**

The mean performance of girls of experimental and control group 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 Groups**

|  |  |  |  |
| --- | --- | --- | --- |
| Experimental Group | Control Group | t-value | Level of Significance |
| 1 | σ1 | N1 | 2 | σ2 | N2 |
| 33.13 | 7.92 | 30 | 26.35 | 9.91 | 20 | 2.68 | 0.01 |

The obtained t-value as shown in Table 13 for the mean post-test scores of achievement in Physics 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 indicate that the girls of the experimental group achieved more than the girls of control group.

**Comparison of the 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 |
| 1 | σ1 | N1 | 2 | σ2 | N2 |
| 19.95 | 9.50 | 24 | 8.69 | 8.67 | 29 | 4.508 | 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 tabled 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 that the superiority of boys of experimental group over the boys of control group in case of gain scores.

**Comparison of the 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 |
| 1 | σ1 | N1 | 2 | σ2 | N2 |
| 18.10 | 7.76 | 30 | 10.65 | 7.88 | 20 | 3.306 | 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 for Total Sample**

The result of the t-test conducted for comparison of the mean pre-test, post-test and gain scores for total sample between experimental and control groups where summarized and presented in table 16

**Table 16: Summary of t-values for the Pre-test and Gain Scores for Experimental and Control Groups (Total Sample)**

|  |  |
| --- | --- |
| Variable | t-value |
| Pre-test | 0.027 |
| Post-test | 5.115 |
| Gain scores | 5.664 |

 Summary of t-value from Table 16 indicates that 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 pre-test. The t-value obtained for post-test is found significant. It can be inferred from the result that metacognitive learning strategies differentiate the experimental group and control group. From the comparison the advantage of the experimental group is evident.

Table 16 also suggests that the obtained t-value for the gain scores of the total sample is found to be significant.

**Linear Relationship between Experimental and Control group**

By considering means of pre-test, post-test and gain scores of experimental and control groups a line graph is drawn which is given in figure 4. From the figure it is clear that pre-test scores of both experimental and control groups were similar, but when we consider post-test and gain score values the experimental group runs superior to the control group.

**Figure 4: Frequency Curve Representing Achievement in Physics for Pre-test, Post-test and Gain scores of Experimental and Control Groups**

**SUMMARY, CONCLUSIONS AND SUGGESTIONS**

This chapter gives an overview of the significant aspects of the stages of conducting the study, variables, objectives, hypotheses, methodology and major findings of the study, their educational implications and suggestions for further research, etc.

**STUDY IN RETROSPECT**

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

**Restatement of the Problem**

The problem of the present study was stated as ‘EFFECTIVENESS OF METACOGNITIVE LEARNING STRATEGIES ON THE ACHIEVEMENT IN PHYSICS OF STANDARD IX PUPILS’.

**Variables Selected for the Study**

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

**Independent Variables**

The independent variable selected for the study was two methods of teaching – A method of teaching using metacognitive learning strategies and the existing method of teaching.

**Dependent Variable**

Achievement in Physics of standard IX pupils 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 Physics as measured by a pre-test.

**Objectives of the Study**

The following objectives were considered for the present study.

* To compare the mean pre-test scores of experimental and control groups.
* To compare the means post-test scores of experimental and control groups for total sample and the subsamples based on gender.
* To compare the means gain scores of experimental and control groups for total sample and the subsamples based on gender.
* To study the effectiveness of metacognitive learning strategies over the existing method of teaching on the achievement in Physics of standard IX pupils.

**Hypotheses of the Study**

The following hypotheses were tested for the study.

1. There exists significant difference in the pre-test scores of the experimental and control groups.
2. There exists significant difference in the mean scores of the post-test of the experimental and control groups for total sample and subsamples based on gender.
3. There exists significant difference in the mean gain scores of the experimental and control groups for total sample and subsamples based on gender.
4. There exists significant difference in the Achievement of Physics between the experimental and control groups.

**Methodology**

The methodology of the study is briefly explained in this section.

**Design of the Study**

The design selected for the present study was the Quasi Experimental with pre-test – Post-test nonequivalent 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 C 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 54 students in the experimental group and 49 students in the control groups. The sample for both experimental and control groups were two divisions of standard IX pupils drawn from the G.G.V.H.S.S Feroke, Calicut.

**Tools used for the study**

Lesson transcript based on metacognitive learning strategies.

Lesson transcript based on existing method (Constructivist method) of teaching.

Achievement test in Physics

**Statistical Technique used for the Study**

The analysis was done using the test of significance of difference between means for large and small independent sample to compare the relevant variables between the experimental and control groups.

**MAJOR FINDINGS OF THE STUDY**

The major findings of the study are the following.

1. There is no significant difference between the mean pre-test scores of experimental and control groups. Both of the groups were found equivalent in terms of pre-test scores. t-value of the test of significance for pre-test scores is 0.027.
2. There exists significant difference at 0.01 level, between the mean post-test scores of experimental and control groups. The obtained t-value for the test is 5.115. Which indicates that the performance of the experimental and control groups is different in the case of their post-experimental status of achievement in Physics.
3. There exists significant difference in the mean gain scores of experimental and control groups. The obtained t-value for the test is 5.66 which indicates that the gain performance of the experimental and control groups are dis-similar at 0.01 level.
4. Metacognitive learning strategies are effective for teaching the subject Physics for secondary school students.

**TENABILITY OF HYPOTHESES**

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

**There exists 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 exists significant difference in the mean scores of the post-test of the experimental and control groups for total sample and subsamples based on gender.**

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

**The third hypothesis states that there exists significant difference in the mean gain scores of the experimental and control groups for total sample and subsample based on gender.**

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

**The fourth hypothesis states that there exists significant difference in the Achievement of Physics between the experimental and control groups.**

Out of the seven t-tests done, six were found to be significant, which shows the superiority of the experimental group over the control group. The t-test done for the pre-test scores shows that there is no significant difference between the experimental and control groups before the treatment was applied. From these all, we can conclude that the improvement of the experimental group over the control group was due to the treatment given which is the method of teaching using metacognitive learning strategies. So we can conclude that metacognitive learning strategy is more effective than the existing method of teaching Physics of standard IX pupils. Hence this hypothesis is fully substantiated.

**CONCLUSIONS**

It generally concludes that metacognitive learning strategies have helped the students to improve their performance in studies to a great extent. From the study, it is clear that both boys and girls have improved in their studies with better increment in the case of boys. In the case of both low achievers and high achievers metacognitive learning strategies have raised their level of achievement with considerable improvement in the case of high achievers.

After teaching through metacognitive learning strategies, the students have effective utilization of time; it made learning easier and at the same time interesting and also has helped the students to develop a positive attitude towards their studies by boosting their motivation. We reach on all these conclusions by considering the statistical analysis which we have done.

The statistical analysis considered was seven test of significance of means. Out of these seven mean comparisons, six values were found to be significant. Only the mean comparison between pre-test scores of experimental and control groups were 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 the total sample and the subsamples based on gender were highly significant. Hence we can conclude that the pupils taught through the new method of teaching using metacognitive learning strategies have achieved more than that of the control group taught by the existing constructivist method of teaching.

From the above statement we can safely conclude that the method of teaching using metacognitive learning strategies is an effective method of teaching over existing method of teaching on achievement in Physics.

**EDUCATIONAL IMPLICATIONS**

The present study reveals the importance of metacognitive learning strategies which are effective for the proper understanding and meaningful learning of the students. Even though the investigation is carried out on a small sample, the findings throw light on the current educational practice – especially in the teaching-learning process of Physics.

The existing Physics curriculum may be modified to inculcate metacognitive learning strategies in it. Teachers may be trained to practice this method. These strategies are useful in curriculum planning and organization.

The experimenter put forward some educational implications of the present study on the basis of the major findings and conclusions of the study

1. The development of metacognitive learning strategies will remain important in advancing students’ academic, personal and professional success.
2. By providing proper assistance and guidance, low achievers and average achievers can improve their academic performance.
3. In teaching-learning process, if teachers take the responsibility of equipping students with the important metacognitive learning strategies, students would become independent learners to a great extent.
4. By acquiring metacognitive learning strategies, the children have a deeper understanding of their own learning so that they can learn effectively.
5. Students can identify the ways of improving their own performance and to take responsibility for their own learning and achieving goals.

The conclusions arrived in the course of present study clearly established the effect of metacognitive learning strategies in the improvement of academic achievements in Physics for standard IX students. These findings have considerable implications for the students, teachers, parents, administrator, counselors and for the society at large.

Healthy academic improvements of students are related to academic success, career choice and healthy habits. The findings of the study suggest the importance of these new metacognitive learning strategies for improving the academic achievement.

**SUGGESTIONS FOR FURTHER RESEARCH**

The present study revealed that the method of teaching using metacognitive learning strategies is superior to the existing method of teaching in terms of achievement in Physics. Demands are there to improve the strategies of Physics teaching. Review of related studies and findings of the study lead the investigator to suggest the following new areas for further research.

1. A comparative study of the effect of metacognitive learning strategies on Lower and Higher Grade students can be done.
2. A comparative study of the effect of metacognitive learning strategies on English Medium and Malayalam Medium students can be done.
3. The same study can be conducted among students of professional colleges.
4. The same study can be replicated at college level students.
5. The same study can be conducted on Higher Secondary students under CBSE and Vocational Higher Secondary School and can be compared.
6. The same study can be conducted on a large sample for a longer period of time.
7. In the present study the only dependent variable is achievement in Physics. Other important aspects like interest, attitude, creativity, etc. can be included in the study.
8. The study can be extended to study the effectiveness of metacognitive learning strategies on academic achievement between urban and rural or educationally backward and forward.
9. Replication of the study using different experimental designs can be done.
10. The study can be extended to other academic subjects also.

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**Appendix I**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

|  |
| --- |
| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Ne\w |
| Topic | {Km^v ]cn-N-b-s¸-SÂ |
| Duration | 40minutes |

**Content Overview:-**

{Km-^p-IÄ k-¦oÀ-®am-b ]-e hn-j-b-§fpw Ir-Xy-am-bn hn-i-Ie-\w sN-¿m³ {Km-^p-IÄ D-]-tbm-Kn-¡-s¸-Sp¶p. {In-¡-äv I-fn-bnÂ d¬kpw Hm-hdpw kq-Nn-¸n-¡p-¶ {Km-^v Ip-«n-IÄ I-­n-«p-­v.

|  |
| --- |
| **Content analysis** |
| Terms | {Km^v ]cn-N-b-s¸-SÂ  |
| Fact | {Km^nÂ hne-§s\ hc-¨n«pÅ hc-bmWv X A£w.{Km^nÂ Ip¯s\ hc-¨n-«pÅ hc-bmWv Y A£w. |
| Concept | X A£w, Y A£w, tXmXv {Km-^n-Â Xn-c-Ýo-\-am-bn h-c-¡p-¶ tcJ-sb {Km-^nsâ  X A-£w F-¶pw ew-\_-am-bn h-c-¡p-¶ tcJ-sb {Km-^n- Â Y A-£w F¶pw ]d-bp-¶p. |

**Curricular objectives :**

* Ip-«n-IÄ hn-hn-[ X-cw {Km-^p-I-sf¸-än A-dn-hv k-¼m-Zn-¡p¶p.
* Ip-«nIÄ Hmtcm {Km-^p-I-fp-sSbpw {]-tXy-I-X-I-sf-¡p-dn-¨v a-\-Ên-em-¡p¶p.
* Ip-«n-IÄ hnhn-[ X-cw {Km-^p-IÄ X-½nÂ Xm-c-Xayw sN-¿p¶p.

**Learning Strategies:-**

Group discussion Group activities

Individual activities using black board

self evaluation self Questioning, Self Monitoring

**subject Reality:-**

Ip-«n-IÄ hn-hn-[X-cw {Km-^p-IÄ Im-Wp-Ibpw \n-co-£n-¡p-Ibpw sN-bv-Xn-«p-­v.

Learning Process:-þ {Km-^v t]¸À, s]³-knÂ, kv-sI-bnÂ

|  |  |
| --- | --- |
| **Learning activity:-** | Response |
| **Stage:-1** |
| **Metacognitive knowledge:-** |
| Ip-«n-I-tfm-Sv A-h-cp-sS ap-¶-dn-hv ]cn-tim-[n-¡m-\m-bn Nne tNm-Zy-§Ä tNm-Zn-¡p¶p.1. {Km-^p-IÄ F-¶mÂ F-´mWv?
2. {Km-^p-IÄ D-]-tbm-Kn-¡p-¶ G-sX-¦nepw k-µÀ-`-§Ä \n-§Ä-¡-dnbmtam?
3. {Km-^p-IÄ D-]-tbm-Kn-¡p-¶-Xp-sIm-­p-Å {]-tbm-P-\-§Ä F-s´Ãmw?
 | Ip«n-IÄ DÂkm-l-]qÀÆw D¯-c-§Ä ]d-ªp. |
| Ip-«n-IÄ A-h-cp-sS ]T-\-{]-{In-b-bn-se t\-«-§fpw t]m-cm-bv-a-Ifpw Xn-cn-¨-dn-ªp. |
| Hmtcm Zn-h-khpw \-ap-¡v Npäpw \-S-¡p-¶ hn-hn-[X-cw Im-cy-§-sf-¡p-dn-¨p-Å A-f-hp-IÄ {Km-^nÂ F§s\ Nn-{X-o-I-cn-¡p-w F-¶v Ip-«n-I-tfm-Sv NÀ-¨ sN-¿m³ B-h-iy-s¸-Sp¶p. |
| **Stage II** |
| **Metacognitive monitoring and regulation** |
| 1. **Planning Or Organising**
 |
| So-¨À hn-h-n-[ X-cw {Km-^p-I-sf¸-än ¢m-ÊnÂ NÀ-¨ kw-L-Sn-¸n-¡p¶p. {In-¡-än-se kv-tImÀ Im-Wn-¡p-¶ {Km^v, H-cp Im-dn-sâ Ne-\w kw-\_-Ôn-¨ k-a-bØm-\ {Km-^v F-¶n-h-sb-¡p-dn-¨v hn-i-Zo-I-cn-¡p¶p. Xm-sg ]-d-bp-¶ Im-cy-§Ä Ip-«n-I-tfm-Sv \nÀ-t±-in-¡p¶p.* {Km-^p-I-fp-sS {]m-[m\yw Xn-cn-¨-dn-bp-hm³ B-h-iy-s¸-Sp¶p.
* hn-hn-[ X-cw {Km-^p-IÄ X-½n-ep-Å hy-Xym-k-§Ä I-s­-¯p-hm³ Ip-«n-I-tfm-Sv B-h-iy-s¸-Sp¶p.
 |
| **Consolidation:-** | Ip«n-IÄ DÕm-l-t¯msS Hmhdpw d¬kpw {Km^v t]¸-d-nÂ tcJ-s¸-Sp¯n |
| {Km-^pI-sf k-a-bØm-\ {Km^v, k-a-b {]th-K {Km-^v F-¶n§-s\ X-cw- Xn-cn-¨n-cn-¡p¶p. |
| 1. **Monitoring**
 |
| So-¨À {Km-^p-I-sf¸-än H-cp e-Lp-hn-hc-Ww \Â-Ip¶p. ]n-¶o-Sv {In¡-äv I-fn-bnÂ kv-tImÀ tc-J-s¸-Sp-¯p-¶-sX-§-s\sb-¶v hn-h-cn-¨ ti-jw Ip-«n-I-tfm-Sv kz-´w I-¿n-ep-Å {Km-^nÂ {In-¡-änse Hm-hdpw d¬kpw tc-J-s¸-Sp-¯m³ B-h-iy-s¸-Sp¶p.* {Km-^v \n-co-£n-¡m³ Ip-«n-I-tfm-Sv B-h-iy-s¸-Sp¶p.
* CXp-t]m-ep-Å a-äv Pohn-X k-µÀ-`-§-Ä-¡-\p-Iq-eam-b {Km-^p-IÄ h-c-¡m³ Ip-«n-I-tfm-Sm-h-iy-s¸-Sp¶p.
 |
| **Consolidation:-** |
| \nXy-Po-hn-X-hp-ambn \_Ô-s¸« ]e hnj-b-§-sfbpw kw\_-Ôn¨ Af-hp-IÄ F§ns\ {Km^nÂ Nn{Xo-I-cn-¡m-sa¶v Ip«n-IÄ a\-Ên-em-¡p-¶p. |
| **C) Evaluation or reflection** |
| X A£w, Y A£w, aq-e-\_n-µp Xp-S-§n-b-h-sbÃmw Ip-«n-IÄ-¡v kp-]-cn-Nn-X-amWv  |
| **Metacognitive Review** |
| 1. Cu ]mTw ]Tn-¡p-¶-Xn-eq-sS \n-§Ä-¡v e-`n-¨ ]pXn-b A-dn-hp-IÄ F-s´Ãmw?
2. \n-§Ä F-s´Ãmw X-c-¯n-ep-Å Nn-´-IÄ D-]-tbm-Kn-¨mWv Cu ]mTw ]Tn-¨Xv?
3. Cu ]mT-¯nÂ ]Tn-¨ Im-cy-§Ä \n-§-fp-sS {]m-tbmKn-I Po-hn-X-¯nÂ D]-tbm-K-s¸-Sp-¯m³ \n-§Ä D-t±-in-¡p-¶pt­m?
 |

**2**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

|  |
| --- |
| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Ne\w |
| Topic | ka-b-þ-Øm\ {Km^v. |
| Duration | 40 minutes |

**Content Over View:-**

 ka-th-K-¯nÂ k©-cn-¡p¶ Hcp ImÀ hyXykvX ka-b-§-fnÂ F¯n-t¨À¶ Øm\-§fpw ka-b-§fpw AS-bm-f-s¸-Sp-¯p-bn-cn-¡p-¶Xv Ip«n-IÄ ImWp-¶p. \½psS \nXy-Po-hn-X-¯nÂ ka-b-þ-Øm\ {Km^nsâ {]m[m\yw Ip«n-IÄ a\-Ên-em-¡p-¶p.

|  |
| --- |
| **Content analysis** |
| Terms | kabþØm\ {--Km^-v |
| Facts | 1. ka-b-¯n-s\m¯v Øm\-¯n\v amä-ap-­m-Ip-t¼m-gmWv hkvXp Nen¡p¶p F¶p ]d-bp-¶-Xv.
2. Ipdª ka-b-¯nÂ IqSp-XÂ Øm\m-´cw D­m-bmÂ Ah thK-X-tb-dn-b-h-bm-sW¶v ]d-bmw.
 |
| Concept | ka-b-¯n-s\m¯v hkvXp-hn-\p-­mb Øm\-am-äs¯ Ipdn-¡p¶ {Km^mWv ka-b-þ-Øm\ {Km^v. |

**Curriculum objectives:-**

* IqSp-XÂ {Km^p-I-fp-ambn ]cn-N-b-s¸-Sm³
* ka-b-Øm\ {Km^v hc-¡m-\pÅ tijn ssIh-cn-¡p-¶-Xn\v
* ka-b-Øm\ {Km^v A]-{K-Yn-¡m-\pÅ tijn ssIh-cn-¡p-¶-Xn\v

**LEARNING STRATEGIES**

Group discussion, Individual activities, Note taking, Using black board, Self questioning, self monitoring

**Subject Reality:-**

 ka-b-þØm\ {Km^nsâ hnhn[ D]-tbm-K-§-sf-¡p-dn¨v Ip«n t\_m[-hm-\m-Wv, {Km^nsâ {]mtbm-KnI Xe-§-sf-¡p-dn-¨pÅ Adnhv Ip«-IÄ¡p-­v.

**Learning resources**:---þ {Km^v t]¸À, s]³knÂ, kvsIbnÂ

|  |  |
| --- | --- |
| **Learning activity:-**  | **Response** |
| **Stage: 1** |
| **Metacognitive knowledge** |
| Ip«n-I-tfmSv Ah-cpsS ap¶-dnhv ]cn-tim-[n-¡p-¶-Xn-\mbn Nne tNmZy-§Ä tNmZn-¡p-¶p. 1. {Km^p-IÄ sIm-­pÅ D]-tbm-K-§Ä Fs´Ãmw?
2. \n§Ä GsXÃmw Xc-¯n-epÅ {Km^p-IÄ I­n-«p­v?
 | Ip«n-IÄ Nn´n-¡p-Ibpw D¯-c-§Ä ]d-bp-Ibpw sNbvXp. Nne D¯-c-§Ä icn-bm-bn-cp-¶p.Ip«n-IÄ D¯-c-§Ä ]dªp |
| Ip«n-IÄ Ah-cpsS ap¶-dn-hn-s\-¡p-dn¨v t\_m[-hm-·m-cm-bn. |
| Hcp Imdnsâ hnhn[ ka-b-§-fn-ep-Å- Øm\§Ä e`n-¨mÂ AXv F§ns\ Hcp {Km^nÂ Nn{Xo-I-cn¡pw F¶v Nn´n-¡p-hm³ Ip«n-I-tfmSv Bh-iy-s¸-Sp-¶p. |
| **Stage II** |
| **Metacognitive monitoring and regulation** |
| 1. **Planning or organizing**
 |
| hnhn[ {Km^p-IÄ F§s\ {Km^v t]¸-dnÂ Nn{Xo-I-cn-¡msa¶-Xn-s\-¡p-dn¨v So¨À ¢mÊnÂ NÀ¨ kwL-Sn-¸n-¡p-¶p.Hcp Imdnsâ Ne\w kw\_-Ôn¨ ka-b-þ-Øm\ {Km^v F§s\ hc-¡m-sa-¶-Xn-s\-¡p-dn¨v hni-Zo-I-cn-¡p-¶p.* {Km^p-IÄ sIm-­pÅ D]-tbm-K-§Ä Xncn-¨-dn-bm³ Ip«n-I-tfmSv Bh-iy-s¸-Sp-¶p
* ka-b-þ-Øm\ {Km^v D]-tbm-Kn¨v GsX-¦nepw Hcp \nÝnX ka-b-¯nÂ ImÀ F¯n-t¨À¶ Zqcw F{X-bm-sW¶v F§s\ I­p-]n-Sn-¡m-sa¶v Ip«n-I-tfmSv tNmZn-¡p-¶p
 |
| 1. **Monitoring**
 |  Ip«n-IÄ {i²-tbmsS kab Øm\ {Km^v hc-¡p-¶p. |
|  {Km^v t]¸-dnÂ Hcp Imdnsâ Øm\hpw ka-bhpw F§s\ Nn{Xo-I-cn-¡m-sa-¶-Xn-s\-¡p-dn¨v So¨À Hcp eLp-hn-h-cWw \ÂIp-¶p. ka-th-K-¯nÂ k©-cn-¡p¶ Hcp ImÀ hyXykvX ka-b-§-fnÂ F¯n-t¨À¶ Øm\-§fpw ka-b-§fpw »m¡v t\_mÀUnÂ AS-bm-f-s¸-Sp-¯nb tijw Ip«n-I-tfmSv kz´w I¿n-epÅ {Km^nÂ Imdnsâ kabþØm\ {Km^v hc-¡m³ Bh-iy-s¸-Sp-¶p kam\ coXn-bn-epÅ asämcp kabþØm\ {Km^v hc-¡m³ Ip«n-I-tfmSv Bh-iy-s¸-Sp-¶p |
| **Consolidation.** |
| Ip«n-IÄ kzbw ka-b-þØm\ {Km^v hc-¡m³ ]cn-io-en-¡p-¶p.X§Ä hc¨ {Km^nÂ \n¶pw NneXv I­p-]n-Sn-¡m³ So¨À Bh-iy-s¸-Sp-¶p.* kabw ]qPyw Bbn-cn-¡p-t¼mÄ Imdnsâ Øm\w Fhn-sS-bmWv?
* kabw 2 sk¡âv Bbn-cn-¡p-t¼mÄ Imdnsâ Øm\w Fhn-sS-bm-Wv?
 |
| 1. **Evaluation or reflection**
 |
| Ip«n-IÄ kabþØm\ {Km^v A]-{K-Yn-¡m\pw AXnÂ \n¶pw Bh-iy-apÅ hnh-c-§Ä Is­-¯p-hm\pw ]Tn-¡p-¶p |
| **Metacognitive Review** |
| 1. \n§Ä Fs´Ãmw Xc-¯n-epÅ Nn´-IÄ D]-tbm-Kn-¨mWv Cu ]mTw ]Tn-¨Xv?
2. Cu ]mT-¯nÂ \n§Ä ]Tn¨-sX-Ãmw hkvXp-\n-jvT-amtWm? hyà-am-¡p-I.
 |

**3**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

|  |
| --- |
| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Ne\w |
| Topic | ka-b-þ-{]thK {Km^v. |
| Duration | 40minutes |

**Content overview:-**

 \½psS \nXy-Po-hn-X-¯nÂ kab {]thK {Km^n\v [mcmfw {]mtbm-KnI D]-tbm-K-§-fp-­v. Hcp {]tXyI ka-b¯v Hcp hkvXp-hnsâ {]thKw \nÀ®-bn-¡m\pw Ft¸m-sg-s¡m-bmWv Hcp hkvXp-hn\v Hcp {]tXyI {]thKw D­m-bn-cp-¶Xv F¶v \nÝ-bn-¡m\pw kab {]thK {Km^n\v Ign-bp-¶p.

|  |
| --- |
| **Content analysis** |
| Terms | kabþ{]thK {Km^v |
| Fact | 1. ka-b-¯n-s\m¯v Øm\-¯n\v amä-ap-­m-Ipt¼mgmWv hkvXp Nen- ¡p¶p F¶v ]d-bp-¶-Xv
2. Øm\m-´-c-¯nsâ \nc-¡mWv {]thKw.
 |
| Concept | ka-b-¯n-s\m¯v hkvXp-hn-ep-­m-Ip¶ {]th-K-am-äs¯ Ipdn-¡p¶ {Km^mWv kab {]thK {Km^v. |

**Curricular objectives :-**

1. {Km^p-I-sf¸än IqSp-XÂ Ad-nbp-¶-Xn\v.

2. ka-b-þ-{]-thK {Km^v hc-¡m-\pÅ tijn ssIh-cn-¡p-¶-Xn\v.

3. ka-b-þ-{]-thK {Km^v A]-{K-Yn-¡m-\pÅ tijn ssIh-cn-¡p-¶-Xn\v.

**Learning strategies:-** Charts**,** Self evaluation,Group discussion**,** Self questioning, self monitoring**,** Black board

**Subject reality:-**

Ip«n-IÄ¡v {Km^v F´m-sW-¶pÅ [mc-Wbpw {Km^nsâ {]mtbm-KnI Xe-§-sf-¡p-d-n-¨pÅ Adnhpw {Km^v hc-¡m-\pÅ Ignhpw D­v.

**Learning Resources**:- Chart, graph, pencil, scale etc

|  |  |
| --- | --- |
| **Learning activity:-** | Response |
| **Stage :1** |
| **Metacognitive knowledge** |
|  Ip«n-I-tfmSv Ah-cpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn Nne tNmZy-§Ä tNmZn-¡p-¶p. ka-b-þ-{]-thK {Km^nÂ X A£-¯nepw Y A£-¯nepw GsXÃmw Af-hp-I-fm-bn-cn¡pw FSp-t¡-­Xv F¶Xv \n§Ä¡-dn-bmtam? |  |
|  Ip«n-IÄ Ah-cpsS ap¶-dnhns\-¡p-dn¨v t\_m[-hm-·m-cmbn. Ah-cpsS ]T\ {]{In-b-bnse t\«-§fpw t]mcm-bva-Ifpw AhÀ Xncn-¨-dn-ªp. Hcp Imdnsâ hnhn[ ka-b-§-fn-epÅ {]th-K-§Ä e`n-¨mÂ AXv F§s\ Hcp {Km^nÂ Nn{Xo-I-cn¡pw F¶v Nn´n-¡p-hm³ Ip«n-I-tfmSv Bh-iy-s¸-Sp-¶p. | Ip«n-IÄ XmÂ]cy ]qÀÆw ¢mkv {i²n-¡p-¶p. |
| **Stage II** |
| **Metacognitive monitoring and regulation** |
| 1. **Planning Or Organizing**
 |
| ka-bhpw {]th-Khpw \_Ôn-¸n¨v F§s\ {Km^v hc-¡m-sa¶Xns\-¡p-d-n¨v So¨À ¢mknÂ NÀ¨ kwL-Sn-¸n-¡p-¶p.* Hcp hml-\-¯nsâ Ne\w kw\_-Ôn¨ kab {]thK {Km^v F§s\ hc-¡m-sa-¶-Xn-s\-¡p-dn¨v hni-Zo-I-cn-¡p-¶p.
* {Km^p-IÄ sIm-­pÅ D]-tbm-K-§Ä Xncn-¨-dn-bp-hm³ Ip«n-I-tfmSv Bh-iy-s¸-Sp-¶p.

 kabþ{]thK {Km^v D]-tbm-Kn¨v Hcp {]tXyI ka-b¯v Hcp hkvXphnsâ {]thKw \nÀ®-bn-¡p-¶-sX-§s\sb¶v Ip«-I-tfmSv tNmZn-¡p-Ibpw A¡mcyw hni-Zo-I-cn-¡p-Ibpw sN¿p-¶p. Ft¸m-sgms¡bmWv Hcp hkvXp-hn\v Hcp {]tXyI {]thKw D­m-bn-cp-¶Xv F¶v F§ns\ I­p-]n-Sn¡pw F¶Xv Ip«n-I-fpsS klm-b-t¯mSv IqSn So¨À hni-Zo-I-cn-¡p-¶p. |
| **Consolidation:-þ** | Ip«n-IÄ kab {]thK {Km^v hc-¡p¶p |
|  kab {]thK {Km^n-s\-¡p-dn-¨pÅ Hcp [mcW Ip«n-IÄ¡p-­m-Ip-¶p. |
| 1. **Monitoring:-**
 |
|  {Km^v t]¸-dnÂ Hcp Imdnsâ {]th-Khpw ka-bhpw F§s\ Nn{Xo-I-cn-¡m-sa-¶-Xn-s\-¡p-dn¨v So¨À hni-Zo-I-cn-¡p-¶p. Hcp Imdnsâ hyXykvX ka-b-§-fn-epÅ {]th-K-§Ä e`n-¨mÂ AXv F§s\ {Km^nÂ Nn{Xo-I-cn-¡m-sa¶v So¨À »m¡v t\_mÀUnÂ hc¨v ImWn-¡p-¶p. Ip«n-IÄ kz´w I¿n-epÅ {Km^nÂ Imdnsâ kab {]thK {Km^v hc-¡p-¶p. kam\ coXn-bn-epÅ asämcp ka-b- {]-thK {Km^v hc-¡m³ Ip«n-I-tfmSv Bh-iy-s¸-Sp-¶p. |
| **Consolidation** |
|  Ip«n-IÄ kab {]thK {Km^v hc-¡m³ ]cn-io-en-¡p-¶p.X§Ä hc¨ {Km^nÂ \n¶pw NneXv I­p-]n-Sn-¡m³ Bh-iy-s¸-Sp-¶p.* F«m-as¯ sk¡ânÂ hml-\-¯nsâ {]thKw F{X-bm-bn-cn¡pw?
* Ft¸m-sgm-s¡-bmWv hml-\-¯n\v 12 m/s {]thKw D­m-bn-cp-¶Xv?
 |
| 1. **Evaluation or reflection**
 |
|  Ip«n-IÄ kab {]thK {Km^v A]-{K-Yn-¡m\pw AXnÂ \n¶pw Bh-iy-apÅ hnh-c-§Ä Is­-¯m\pw ]Tn-¡p-¶p. |
| **Metacognitive Review** |  |
| 1. ¢mÊnÂ {Km^v hc¨ coXn \n§Ä¡v kzoIm-cy-amtWm?
2. IqSp-XÂ sa¨-s¸« atä-sX-¦nepw coXn \n§Ä¡v \nÀt±-in-¡m³ Ign-bptam?
 |

**4**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

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| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Ne\w |
| Topic | Ne\ ka-hm-Iy-§Ä |
| Duration | 40 minutes |

**Content overview:-**

\nÝ-em-h-Ø-bnÂ \n¶pw Xmtgm«v ]Xn-¨p-sIm-­n-cn-¡p¶ hkvXp-¡Ä¡v {]thKw D­m-Ipw.

IqSp-XÂ Db-c-¯nÂ \n¶v ]Xn-¡p¶ hkvXp-¡Ä¡v Xd-tbm-S-Sp-¡p-t¼mÄ {]thKw IqSp-X-em-bn-cn-¡pw.

|  |
| --- |
| **Content analysis** |
| Terms | ka-Xz-cWw, BZy-{]-th-Kw, A´y-{]-thKw, ew\_Iw. |
| Fact | Hcp kab {]thK {Km^nÂ Øm\m-´-cw, {Km^v DÄs¸-Sp¶ NXpÀ`q-P-¯nsâ hnkvXoÀ®-am-Wv. |
| Concept | Xmtgm«v ]Xn-¨p-sIm-­n-cn¡p¶ hkvXp-¡Ä¡v {]thKw D­m-bn-cn-¡pw. |

**Curricular objectives:-**

 S=ut+ ½ at­2, V2=U2+2as F¶o ka-hm-Iy-§Ä cq]o-I-cn-¡p-¶-Xn-\pw, Ah D]-tbm-Kn¨v {]iv\ \nÀ[m-cWw sN¿p-¶-Xn-\p-apÅ Ignhv D­m-¡p-¶-Xn-\pw.

**Learning strategies:-**

Charts, graph activities, black board usage.

**Subject Reality**:- Hcp kab {]thK {Km^nÂ, Øm\m´cw {Km^v DÄs¸-Sp¶ NXpÀ`p-P-¯nsâ hnkvXoÀ®-amWv.

**Learning resources:-** Chart, scale, pencil etc.

|  |  |
| --- | --- |
| **Learning activity:-** | **Response** |
| **State:1** |
| **Metacognitive knowledge** |
| Ip«n-I-tfmSv Ah-cpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn Nne tNmZy-§Ä tNmZn-¡p-¶p:1. Hcp kab {]thK {Km^nÂ, Øm\m-´cw F§ns\ I­p-]n-Sn¡mw?
2. Hcp ew\_-I-¯nsâ hnkvXoÀ®w ImWm-\pÅ kq{X-hmIyw F´v?
 |  |
| Ip«n-IÄ Ah-cpsS ]T\ {]{In-b-bnse t\«-§fpw t]mcm-bva-Ifpw Xncn-¨-dn-ªp. |
| \nXy-Po-hn-X¯nÂ Ne\ ka-hm-Iy-§-fpsS Bh-iy-IX F´m-sW¶v Nn´n-¡m³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p |
| Ne\ ka-hm-Iy-§Ä sIm-­pÅ D]-tbm-K-§Ä I­p-]n-Sn¨vkb³kv Ub-dn-bnÂ Ipdn-¨n-Sm³ Ip«n-I-tfmSv Bh-iy-s¸-Sp¶p. |
| **Stage II** |
| **Metacognitive monitoring and regulation** | Ip«n-IÄ Ne\ ka-hm-Iy-§Ä \nÀ[m-cWw sN¿m³ ]cn-io-en-¡p-¶p.Ip«n-IÄ {i²m]qÀÆw {Km^v \nco-£n-¡p¶p.{Kq¸p-IÄ NÀ¨ sNbvXv D¯-c-sa-gpXn. |
| 1. **Planning or organizing**
 |
|  ka- {]-th-K-¯nÂ k©-cn-¡p¶ Hcp hkvXp-hnsâ ka-b-{]-thK {Km^nsâ {]tXy-I-X-Ifpw D]-tbm-K-§fpw \½Ä a\-Ên-em¡n Ign-ªp. C\n ka-Xz-c-W-¯nÂ k©-cn-¡p¶ Hcp hkvXp-hnsâ ka-b-þ-{]-thK {Km^v hni-I-e\w sNbvXv \ap¡v hf-sc-tbsd D]-Im-c-{]-Z-amb Ne\ ka-hm-Iy-§Ä \nÀ[m-cWw sN¿m³ {ian-¨p-t\m-¡mw. {Km^v hni-I-e\w sN¿p-¶-Xn-\mbn Ip«n-IÄ {Kq¸p-I-fmbn Xncn-bp-¶p. ka-Xz-c-W-¯nÂ k©-cn-¡p¶ Hcp hkvXp-hnsâ ka-b-{]thK {Km^v NmÀ«nÂ hc¨v {]ZÀin-¸n-¡p-¶p.Xmsg sIm-Sp-¯n-cn-¡p¶ tNmZy-§Ä¡v D¯-c-§Ä Is­-¯m³ Bh-iy-s¸-Sp-¶p.1. B apXÂ C hsc-bpÅ Øm\m-´cw IW-¡m-¡m³ GXp NXpÀ`p-P-¯nsâ hnkvXoÀW-amWv IW-¡m-t¡-­Xv?
2. AXnsâ hnkvXoÀ®w F{X-bmWv?
 |
| **Consolidation** | c­v {Kq¸p-I-sfmgnsI asäÃm {Kq¸pI-fp-sSbpw D¯cw icn-bm-bn-cp¶p. |
| {Kq¸v eoUÀamÀ D¯-c-§Ä hmbn-¡p-¶p. So¨À t{ImUo-I-cn-¡p-¶p. ABCD F¶ NXpÀ`p-P-¯nsâ hnkvXoÀ®w IW-¡m-¡n-bmÂ AXv ½ BC(AB+CD) F¶v e`n-¡p-¶p. AXnÂ AB= u (BZy-{]-th-Kw), CD=V (A´y-{]-thKw BC=t (ka-bw) F¶o hne-IÄ Btcm-]n¨v {Kq¸p-I-tfmSv \nÀ[m-cWw sN¿m³ ]d-bp-¶p. In«nb D¯cw {Kq¸v eoUÀ hmbn-¡p-¶pØm\-´cw (S) = NXpÀ`p-P-¯nsâ hnkvXoÀ®w S = ut+ ½ at2 Hcp hkvXp k©-cn¨ kabw Adn-bn-sÃ-¦nepw n,a,s F¶nh Adn-ªmÂ hkvXp-hnsâ A´y-{]-thKw Is­-¯p-hm³ km[n-¡ptam? F¶v Ip«n-I-tfmSv tNmZn-¡p-¶p. \ap-¡-dnbmw, XzcWw (a) . V=u+at V2=u2+2uat+a2t2XpSÀ¶pÅ \nÀ[m-cWw {Kq¸p-I-tfmSv sN¿m³ ]d-bp-¶p. D¯-c-§Ä {Kq¸v eoUÀamÀ hmbn-¡p-¶p. V2=u2+2as |
| 1. **Monitoring**
 |
|  So¨À Ne\ ka-hm-Iy-§-sf-¸än hni-Zo-I-cn-¡p-Ibpw ka-hm-Iy-§-fpsS \nÀ[m-cWw t\_mÀUnÂ sNbvXv ImWn-¡p-Ibpw sN¿p-¶p. S = ut+ ½ at2 V2 = u2+2as |
| **Consolidation** |  |
| Ip«n-IÄ Ne\ ka-hm-Iy-§Ä \nÀ[m-cWw sN¿m³ ]Tn-¨p.Xmsg-sImSp¯n-cn-¡p¶ tNmZy-§Ä¡v D¯-c-§Ä Is­-¯p-hm-\m-h-iy-s¸-Sp-¶p.1. Ne\ ka-hm-Iy-§Ä \½psS \nXy-Po-hn-X-¯nÂ F{X-t¯mfw D]-Im-c-{]-Z-amWv?
2. Ne\ ka-hmIyw D]-tbm-Kn¨v Hcp {]iv\w \nÀ[m-cWw sN¿m³ \ap¡v km[n-¡ptam?
 |
| 1. **Evaluation or reflection**
 |
| Xmsg-]-d-bp¶ tNmZy-§Ä¡v D¯-c-§Ä Is­-¯p-hm³ A²y-c-I³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.1. FÃm {]iv\-§fpw \nÀ[m-cWw sN¿m³ Hcp ka-hmIyw D]-tbm-Kn¡mtam?
2. GXp ka-hmIyw Ft¸mÄ D]-tbm-Kn-¡-W-sa¶v \n§Ä¡n-t¸mÄ hyà-amb Hcp [mc-W-bpt­m?
 |
| **Metacognitive Review** |
| 1. Hcp {]iv\w \nÀ[m-cWw sN¿m-\m-h-iy-s¸-«mÂ \n§Ä¡v km[n-¡ptam?
2. ka-hm-Iy-§Ä \½psS Pohn-X-hp-ambn F{X-t¯mfw \_Ô-s¸-«n-cn-¡p¶p?
 |

**5**

**LESSON PLAN-BASED ON METACOGNITIVE LEARNING STRATEGIES**

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| --- |
| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Ne\w |
| Topic | Ne\ ka-hm-Iy-§Ä D]-tbm-Kn-¨pÅ {]iv\ \nÀ[m-cWw |
| Duration | 40minutes |

**Content overview:-**

1. V2=u2+2as
2. S=ut + ½ at2 F¶o Ne\ ka-hm-Iy-§Ä D]-tbm-Kn¨v {]iv\-§Ä \nÀ[m-cWw sN¿p-I.

|  |
| --- |
| **Content analysis** |
| Terms | `qKp-cp-Xzm-IÀjWw aqe-apÅ Xzc-Ww (g), v,u, s, t, a |
| Fact | hyXykvX Db-c-§-fnÂ \n¶pw Xmtg-¡n-Sp¶ hkvXp-¡Ä¡v Xd-bn-se-¯p-t¼mÄ hyXykvX {]th-K-am-bn-cn¡pw D­m-bn-cn-¡p-¶-Xv. |
| Concept | \nÝ-em-h-Ø-bnÂ \n¶pw Xmtgm«v ]Xn-¨p-sIm-­n-cn-¡p¶ hkvX-¡Ä¡v {]thKw D­m-Ipw.  |

**Curriculum objectives :**- S= ut+ at2, V2=u2+2as F¶o ka-hm-Iy-§Ä D]-tbm-Kn¨v {]iv\ \nÀ[m-cWw sN¿p-¶-Xn-\pÅ Ign-hp-­m-Ip-¶-Xn\v

**Learning strategies**:- Individual activities, Calculations, Group discussion

Black board usage

**Subject Reality:-**

Ip«n-IÄ¡v Ne\ ka-hm-Iy-§Ä Adn-bmw. Ahsb \nÀ[m-cWw sNbvX coXnbpw Adn-bmw.

**Learning Resources**:- Black board

|  |  |
| --- | --- |
| **Learning activity** | **Response** |
| **Stage:1** |
| **Metacognitive knowledge** |
| Ip«nI-tfmSv Ah-cpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn Nne tNmZy-§Ä tNmZn-¡p-¶p.1. Ne\ ka-hm-Iy-§-Ä GsXÃmw?2. Ne\ ka-hm-Iy-§Ä D]-tbm-Kn¨v Hcp {]iv\w \nÀ[m-cWw sN¿m³ \n§Ä¡v Ign-bptam?3. u, v, a, st, t F¶o ]Z-§Ä sIm­v Dt±-in-¡p-¶-sX´v? | Ip«n-IÄ Ne\ ka-hm-Iy-§Ä ]d-bp-¶p. |
| Ip«nIÄ Ah-cpsS ]T\ {]{In-b-sb-¸än IqSp-XÂ t\_m[-hm-·m-cmbn. |
| \½psS \nXy-Po-hn-X¯nÂ \mw ]e-Xcw {]iv\-§sf A`n-ap-Jo-I-cn-¡m-dp­v. Ah-bnÂ `uXnI imkv{X-{]-iv\-§sf \nÀ[m-cWw sN¿m³ \mw ]Tn¨ Ne\ ka-hm-Iy-§-Ä D]-tbm-Kn-¨mÂ aXn-sb¶v So¨À Ip«n-Isf t\_m[-hm-·m-cm-¡p-¶p.  |
| **Stage:II** | {Kq¸p-IÄ {]iv\w \nÀ[m-cWw sNbvXp.kb³kv Ub-dn-bnÂ Ipdn-¡p-¶p. |
| **Metacognitive monitoring and Regulation** |
| 1. **Planning or Organizing**
 |
| V2=u2 +2as F¶ ka-hmIyw D]-tbm-Kn¨v \ap¡v Hcp {]iv\w \nÀ[m-cWw sN¿mw F¶v So¨À Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.Hcp t\_mÄ 5 aoäÀ Db-c-¯nÂ \n¶pw asäm¶v 20 aoäÀ Db-c-¯nÂ \n¶pw Xmtgm«v C«mÂ Hmtcm¶pw F{X {]th-K-t¯m-sS-bmWv Xd-bnÂ ap«p-¶-Xv? Xd-bn-se-¯p-t¼mÄ GXv t\_mfn-\mWv {]thKw IqSp-XÂ?V2=u2 + 2asV2= 0+2 X 10 X 5=100V= = 10m/sV2= 0 +2X10X20=400V= = 20m/s Xd-bn-se-¯p-t¼mÄ 20 aoäÀ Db-c-¯nÂ \n¶pw ]Xn¨ hkvXp-hn-\m-bn-cn¡pw {]thKw IqSp-XÂ. |
| **Consolidation** |
| \nÝ-em-h-Ø-bnÂ \n¶pw Xmtgm«v ]Xn-¨p-sIm-­n-cn-¡p¶ hkvXp-¡Ä¡v {]thKw D­mIpw. IqSp-XÂ Db-c-¯nÂ \n¶v ]Xn-¡p¶ hkvXp-¡Ä¡v Xd-tbm-S-Sp-¡p-t¼m-Ä {]thKw IqSp-X-em-bn-cn¡pw |
| 1. **Monitoring:-**
 |
| Hcp s{Sbn³ \nÝ-em-h-Ø-bnÂ \n¶pw ]pd-s¸«v 30 sk¡âv Ign-ª-t¸mÄ AXnsâ {]thKw 30m/s BIp-¶p. s{Sbn-\nsâ XzcWw F{X-bm-bn-cn-¡pw? Cu kabw sIm­v s{Sbn³ k©-cn¨ Zqcw F{X-bm-bn-cn¡pw? |
| **Consolidation:-** | Ip«n-IÄ {]iv\-¯n\v D¯cw Is­-¯m³ {ian-¡p-¶p. |
| u=o t= 30s v= 30m/s a=? s=? |
| V= u + ata= = = = 1m/sS=ut +½ at2= o + ½ X 1 X 302 = = 450ms{Sbn\nsâ XzcWw = 1m/s2s{Sbn³ k©-cn¨ Zqcw = 450m |
| 1. **Evaluation or Reflection**
 |
| Xmsg ]d-bp¶ tNmZy-§Ä¡v D¯-c-§Ä Is­-¯phm³ A[ym-]-IÀ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.\nÀ[m-cWw sN¿m-hp¶ {]iv\-§Ä Is­¯n, Ahsb \nÀ[m-cWw sNbvXv kb³kv Ub-dn-bnÂ Ipdn-¡p-I.Hcp {]iv\w e`n-¨mÂ AXv kz´-ambn \nÀ[m-cWw sN¿m³ \n§Ä¡v Ign-bptam?\n§-fpsS ap¶-dnhv Cu ]mTw ]Tn-¡m³ \n§Ä F§ns\ D]-tbm-Kn¨p? |
| **Metacognitive Review** |
| 1. \n§Ä ]Tn¨ Imcy-§Ä Imcy-Im-cW klnXw hni-Zo-I-cn-¡m³ \n§Ä¡v Ign-bptam?2. Cu ]mT -`m-K-s¯-¡p-dn¨v IqSp-XÂ Nn´n-¡m³ \n§Ä t{]cn-X-cmtbm? |

**6**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

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| --- |
| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Ne\w |
| Topic | B¡w |
| Duration | 40 minutes |

**Content overview:-**

Nen-¨p-sIm-­n-cn-¡p¶ hkvXp-¡-fpsS khn-tij KpW-amWv B¡w. Nen-¨p-sIm-­n-cn-¡p¶ hkvXp-¡Ä¡v aäv hkvXp-¡-fnÂ BLmXw FÂ]n-¡m-\pÅ Ign-hmWv B¡w.

|  |
| --- |
| **Content analysis** |
| Terms | B¡w, amkv, {]thKw. |
| Fact | amknsâbpw {]th-K-¯n-sâbp KpW-^-e-amWv B¡w.  |
| Concept | amkv IqSp-¶-Xn-\-\p-k-cn¨pw {]thKw IqSp-¶-Xn-\-\p-k-cn¨pw B¡w IqSp-¶p.  |

**Curricular Objective:-** B¡w, B¡-hy-Xymkw F¶o Bi-b-§-sf-¡p-dn¨v [mcWv ssIh-cn-¡p-¶-Xn\v.

**Learning strategies:-**þ Group discussion, black board usage, self evaluation, self monitoring.

**Subject Reality**:-

Ip«n-IÄ¡v amkv, {]th-Kw F¶o Bi-b-§Ä hyà-ambn Adn-bmw. \nXy-Po-hn-X-¯nÂ hnhn[ Bh-iy-§Ä¡mbn \_ew {]tbm-Kn-t¡­n hcp-¶-Xmbn Ip«n-IÄ¡-dn-bmw.

**Learning Recourses :-þ** t{S, \\ª aWÂ, ¹mÌn-Iv t\_mÄ, Ccp¼v t\_mÄ apX-em-bh.

|  |  |
| --- | --- |
| **Learning Activity:-** | **Response** |
| **Stage :1** |
| **Metacognitive Knowledge** |
| Ip-«n-I-tfmSv Ah-cpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn Nne tNmZy-§-Ä tNmZn-¡p-¶p. 1. amkv, {]th-Kw F¶n-h-sb-¡p-dn¨v \n§Äs¡-s´Ãmw Adn-bmw, Ch c­n-s\bpw kqNn-¸n-¡p¶Xn\p-]-tbm-Kn-¡p¶ A£-c-§-Ä Gh?2. Nen-¨p-sIm-­n-cn-¡p¶ hkvXp-¡-fpsS GsX-¦nepw khn-tij KpW-§-sf-¸än \n§Ä¡-dn-bmtam?3. Nen-¨p-sIm-­n-cn-¡p¶ hkvXp-¡Äs¡Ãmw Fs´-¦nepw khn-tij KpW-ap-Å-Xmbn \n§Ä¡v tXm¶n-bn-«pt­m? | Bth-i-]qÀÆw Ip«n-IÄ NÀ¨-bnÂ ]s¦-Sp-¯p. |
| Ip«n-IÄ Ah-cpsS ]T\ {]{In-b-sb-¸än IqSp-XÂ t\_m[-hm-·m-cmbn. |
| Nen-¨p-sIm-­n-cn-¡p¶ hkvXp-¡-fpsS khn-tij KpW-§-sf-¸än {Kq¸nÂ NÀ¨ sNbvXv kb³kv Ub-dn-bnÂ Ipdn-¡m³ Bh-iy-s¸-Sp-¶p. BLm-Xs¯ kzm[o-\n-¡p¶ LS-I-§Ä Gh F¶pw NÀ¨ sN¿m-\m-h-iy-s¸-Sp-¶p. |
| **Stage: II** | D­v ssI Xmsg¡v hen-s¨¶v Ip«n-IÄ adp-]Sn ]dªp.IqSp-XÂ Zqcw NmSm³ F¶v Ip«n-IÄ D¯cw ]dªp.{Kq¸p-IÄ {i²m-]qÀÆw ]co-£Ww sNbvXp.Ip«n-IÄ FÃm tNmZy§Ä¡pw {Kq¸m-bn-cp¶v D¯-c-sa-gp-Xn.Ip«n-IÄ {i²m-]qÀÆw {]iv\w \nÀ[m-cWw sNbvXp |
| **Metacognitive monitoring and Regulation** |
| 1. **Planning or Organizing**
 |
| So¨À Ip«n-IfpsS {i² {In¡-än-te¡v £Wn-¡p-¶p. \n§Ä {In¡äv ImWm-dntÃ? hfsc Db-c-¯nÂ \n¶pw thK-¯nÂ hcp¶ t\_mÄ bmsXmcp A]-I-Shpw ]ämsX Ifn-¡mÀ ]nSn-¡p-¶p-­-tÃm? AsX-§-s\-bmsW¶v \n§Ä¡-dn-bmtam?AXp-t]mse temwKv P¼v NmSp-¶-hÀ HmSn h¶v NmSp-¶-sX-´p-sIms­¶v \n§Ä Nn´n-¨n-«pt­m? CXn-s\-¡p-dn¨v NÀ¨ sN¿m\pw ]co-£Ww \S-¯n hin-I-e\w sN¿m\pw Ip«n-IÄ {Kq¸p-I-fmbn Xncn-bp-¶p. hoXn-bpÅ Hcp t{SbnÂ AÂ]w I\-¯nÂ \\ª aWÂ FSp-¯-tijw hyXykvX amkpÅ c­v t\_mfp-IÄ hnhn[ Db-c-§fnÂ \n¶v aW-en-te-¡n-Sm³ ]d-bp-¶p. ]co-£Ww \nco-£n¨ tijw GXm\pw tNmZy-§Ä \nc-¯p-¶p.1. amkv IqSn-b-t¸m-gmtWm Ipd-ª-t¸mgmtWm Ipgn-bpsS Bgw hÀ²n-¨Xv?2. {]thKw IqSn-b-t¸m-gmtWm Ipd-ª-t¸m-gmtWm Ipgn-bpsS Bgw hÀ²n-¨Xv? |
| **Consolidation :-þ** |
| {Kq¸v eoUÀamÀ D¯-c-§Ä hmbn-¡p-¶p. Ah-cpsS \nK-a-\-§Ä hnenbn-cp-¯nb tijw B¡w, amkn-s\bpw {]th-K-s¯bpw B{i-bn-¨n-cn-¡p-¶p F¶v So¨À t{ImUo-I-cn-¡p¶p.  |
| 1. **Monitoring**
 |
| 0.005kg amkpÅ Hcp shSn-bp­ tXm¡nÂ \n¶v ]pd-s¸-Sp-t¼m-gpÅ {]thKw 150m/s thK-t¯m-sSbpw Fdn-bp-¶p. AtX amkpÅ asämcp shSn-bp­ 10m/s thK-t¯m-sSbpw Fdn-bp-¶p. GXp kµÀ`-¯n-em-bn-cn¡pw B¡w IqSp-XÂ? {]iv\w \nÀ[m-cWw sNbvXv icn-bmb \nK-a-\-¯nÂ F¯n-t¨-cpI.GXm\pw tNmZy-§Ä¡v D¯-c-§Ä Is­-¯m³ So¨À Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.1. shSn-bp­ tXm¡nÂ \n¶v ]pd-s¸-Sp-t¼m-gpÅ B¡w F{X-bm-bn-cn-¡pw?2. shSn-bp­ Fdn-bp-t¼m-gpÅ B¡tam? |
| **Consolidation** |  |
| {Kq¸v eoUÀamÀ D¯-c-§Ä hmbn-¡p-¶p. So¨À t{ImUo-I-cn-¡p-¶p.1. P=mv=0.005 X 150 = 0.75kgm/s2. p=mv = 0.005 X 10 = 0.05kgm/s{]thKw IqSp-t¼mÄ shSn-bp-­-bpsS B¡hpw IqSp-¶p. B¡w IqSn-b-Xn-\m-emWv tXm¡nÂ \n¶pw ]pd-s¸« shSn-bp­¡v IqSp-XÂ BLmXw D­m-¡m³ Ign-ªXv.B¡w IqSnb hkvXp-¡Ä¡v IqSp-XÂ BLmXw D­m-¡m³ Ign-bpw.  |
| 1. **Evalution or Reflection**
 |
| 1. B¡w IqSp-¶-Xn-\-\p-k-cn¨v BLmXw IqSp¶p F¶-Xn\v IqSp-XÂ DZm-l-c-W-§Ä \nXy-Po-hn-X-¯nÂ \n¶pw Is­-¯pI?2. \½psS \nXy-Po-hn-X-¯nÂ B¡-s¯-¡p-dn-¨pÅ Adnhv F{X-t¯mfw D]-Im-c-{]-Z-am-Wv?3. ]mT-¯nsâ Cu `mKw a\-Ên-em-¡m³ \n§-fpsS ap¶-dnhv F{X-t¯mfw {]tbm-P-\-s¸-«p.  |
| **Metacognitive Review** |  |
| 1. Cu ]mT-`mKw a\-Ên-em-¡m³ \n§Ä Fs´Ãmw Nn´-IÄ D]-tbm-Kn¨p?2. Cu ]T-\-¯n\v tijw \n§-fpsS ap¶-dn-hnÂ Fs´-¦nepw amä-§Ä kw`-hnt¨m?3. Cu ]mTw ]Tn-¨-t¸mÄ Fs´-¦nepw ]pXnb Bi-b-§Ä In«ntbm? \n§-fpsS `mhn Pohn-X-¯nÂ AXv sIm­v Fs´-¦nepw {]tbm-P-\-apt­m? |

**7**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

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| --- |
| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Ne\w |
| Topic | B¡hyXn-bm-\-¯nsâ \nc¡v |
| Duration | 40minutes |

**Content overview:-**

B¡ hyXn-bm-\-¯nsâ \nc¡v IqSp-XÂ BLm-Xhpw IqSp-¶p. B¡w IqSnb hkvXp-¡Ä¡v BLm-X-ap-­m-¡m³ Ign-bpw.

|  |
| --- |
| **Content analysis** |
| Terms | B¡-hy-Xn-bm-\-¯nsâ \nc¡v. |
| Fact | Hcp hkvXp-hnsâ B¡w AXnsâ amkn-s\bpw {]th-K-s¯bpw B{i-bn-¨n-cn-¡p¶p. |
| Concept | Nen-¨p-sIm-­n-cn-¡p¶ hkvXp-¡Ä¡v aäv hkvXp-¡-fnÂ BLmXw GÂ]n-¡m-\pÅ Ign-hmWv B¡w. B¡-hy-Xn-bm-\-¯nsâ \nc¡v Ipd-ªmÂ BLm-Xhpw Ipd-bp-¶p. |

**Curricular Objectives:-**

* B¡w, B¡hyXym-kw, B¡-hy-Xn-bm-\-¯nsâ \nc¡v F¶o Bib-§-sf-¡pdn¨v [mcW ssIh-cn-¡p-¶-Xn-\v.
* B¡-hy-Xn-bm-\-¯nsâ \nc¡v Ipd¨v F§ns\ BLmXw Ipd-¡m-sa¶v [mc-W-bp-­m-¡p-¶-Xn-\v.

**Learning Strategies:-**

Using prompts, group discussion, note taking, self evaluation, planning and self regulation

**Subject reality:-** \nXy-Po-hn-X-¯nÂ hnhn[ B h-Iy-§Ä¡mbn \_ew {]tbm-Kn-t¡­n hcp-¶-Xmbn Ip«n-IÄ¡-dn-bmw.

**Learning Resources**:- cricket ball

|  |  |
| --- | --- |
| **Learning Activity** | **Response** |
| **Stage: 1** |
| **Metacognitive Knowledge** |
| Ip«n-I-tfmSv Ah-cpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn Nne tNmZy-§Ä tNmZn-¡p-¶p.1. B¡w IqSnb hkvXp-¡Ä D­m-¡p¶ BLmXw IqSp-X-emtWm AtXm Ipd-hmtWm F¶v Nn´n¡q2. amkv IqSnb hkvXp-¡Ä D­m-¡p¶ BLmXw IqSp-¶-sX-´v sIm­v? |  |
| Ip«n-IÄ IqSp-XÂ {i²-tbmsS Ah-cpsS ]T\ {]{In-b-sb-¸än Nn´n-¡m³ XpS§n. |
| hfsc Db-c-¯nÂ \n¶pw thK-¯nÂ hcp¶ t\_mÄ bmsXmcp A]-I-Shpw ]ämsX Ifn-¡mÀ ]nSn-¡p-¶-sX-§n-s\-sb¶v Nn´n-¡p-hm\pw kb³kv Ub-dn-bnÂ Ipdn-¡p-hm\pw Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.temwKv P¼v NmSp-¶-hÀ HmSn-h¶v NmSp¶sX´p-sIm­msW¶v Nn´n-¡p-hm³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.CXn-s\-¡p-dn¨v NÀ¨ sN¿m\pw ]co-£Ww \S¯n hni-I-e\w sN¿m\pw Ip«n-IÄ {Kq¸p-I-fmbn Xncn-bp-¶p.  |
| **Stage II** | {]iv\-¯n\v D¯cw Is­-¯m³ Ip«n-IÄ {i-an-¡p¶p |
| **Metacognitive monitoring and regulation** |
| 1. **Planning or Organising**
 |
| {In¡-änÂ Iym¨v FSp-¡p-t¼mÄ t\_mfn-t\m-sSm¸w ssI Aev]w ]nd-tIm«v \o¡p-¶-Xp-sIm-­pÅ {]tbm-P\sas´¶v Ip«n-I-tfmSv tNmZn-¡p-¶p.0.6 Intem amkpÅ Hcp {In¡äv t\_mÄ 20m/s {]th-K-¯nÂ hcp-¶p. {In¡äv t\_mfnsâ B¡w F{X-bm-bn-cn¡pw?Ifn-¡m-c³ t\_mfns\ \nÝ-e-am-¡p-t¼mÄ {]thKw ]qPy-ambn. F¦nÂ B¡w F{X?Ifn-¡m-c³ 3 sk¡âv kabw Ign-ªmWv t\_mfns\ \nÝ-e-am-¡n-b-sX-¦nÂ B¡-hy-Xn-bm-\-¯nsâ \nc¡v F{X?B¡-hy-Xym-k-¯n\v FSp-¡p¶ kabw ZoÀLn-¸n-¨mÂ B¡-hy-Xn-bm-\-¯nsâ \nc¡v IqSptam? Ipd-bptam? {Kq¸v eoUÀamÀ D¯-c-§Ä \bn-¡p-¶p. |
| **Consolidation** |
| 0.6 kg amkpÅ {In¡äv t\_mÄ 20 m/s {]th-K-¯nÂ hcp-t¼mÄ AXnsâ B¡w 12kg m/s Bbn-cn¡pw. t\_mÄ ssI¿nÂ \nÝ-e-am-Ip-t¼mÄ AXnsâ B¡w ]qPy-ambn amdp-¶p. 12kg m/s Â \n¶pw ]qPy-am-hm³ Hcp sk¡âv FSp-¯mÂ B¡-hy-Xn-bm-\-¯nsâ \nc¡v = 12kg m/s2 BIp-¶p. B¡w 12kg m/s \n¶pw ]qPy-am-Im³ 3 sk¡âv FSp-¯mÂ B¡-hy-Xn-bm-\-¯nsâ \nc¡v 4kg m/s2 Bbn Ipd-bp-¶p. AXm-bXv B¡-hy-Xykw kw`-hn-¡m³ FSp¯ kabw ZoÀLn-¸n-¨mÂ B¡-hy-Xn-bm-\-¯nsâ \nc¡pw X³aqew BLm-Xhpw Ipd-bp-¶p. |
| **b) Monitoring:-** | {Kq¸p-IÄ XmÂ]-cy-]qÀÆw {]Xn-I-cn¨p |
| * B¡hy-Xn-bm-\-¯nsâ \nc¡v Ipd¨v BLmXw Ipd-¡p-¶Xv F§n-s\-bm-sW¶v DZm-l-c-W-§-fpsS klm-b-t¯msS So¨À hni-Zo-I-cn-¡p-¶p.
* hnhn[ DZm-l-c-W-§-fn-eqsS ]Tn¨ Imcy-§Ä hyà-ambn a\-Ên-em-bn-«pt­m F¶v Nn´n-¡p-hm³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.
* B¡-s¯-¡p-dn-¨v Ip«n-IÄ¡pÅ ap¶-dnhv F{X-t¯mfw D]-Im-c-s¸«p F¶v Nn´n-¡p-hm³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.
 |
| **Consolidation** |
| B¡-hy-Xymkw kw`-hn-¡m³ FSp-¡p¶ kabw ZoÀLn-¸n-¨mÂ B¡-hy-Xn-bm-\-¯nsâ \nc¡pw X³aqew BLm-Xhpw Ipd-bp-¶p.  |
| **c)Evaluation or reflection** |
| A[ym-]-I³ Xmsg ]d-bp¶ tNmZy-§Ä¡v D¯-c-§Ä Is­-¯p-hm³ Ip«n-I-tfmSv ]d-ªp. 1. B¡-hy-Xn-bm-\-¯nsâ \nc¡v Ipd¨v BLmXw Ipd-¡p¶ IqSp-XÂ kµÀ`-§Ä \n§-fpsS \nXy-Po-hn-X-¯nÂ \n¶pw Is­-¯pI. |
| **Metacognitive Review** |
| 1. Cu ]mTw ]Tn-t¡­ Bh-iy-apt­m?2. Cu ]mT-¯nÂ D]-tbm-Kn-¨n-cn-¡p¶ Nn´-IÄ icn-bmb coXn-bn-emtWm?3. Cu ]mTw ]Tn-¡m³ \n§-sf Gähpw IqSp-XÂ klm-bn¨ ap¶-dn-sh´v? |

**8**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

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| --- |
| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Ne\w |
| Topic | \yq«sâ c­mw Ne\ \nbaw |
| Duration | 40 minutes |

**Content overview:-**

Hcp hkvXp-hn-\p-­m-Ip¶ B¡-hy-Xn-bm-\-¯nsâ \nc¡v AXnÂ {]tbm-Kn-¡p¶ Ak-´p-enX \_mly-\_-e-¯n\v t\À A\p-]m-X-¯nepw B¡-hy-Xymkw kw`-hn-Iv#p-¶Xv \_e-¯nsâ Zni-bn-ep-am-bn-cn-¡pw.

|  |
| --- |
| **Content analysis** |
| Terms | c­mw Ne\ \nbaw. |
| Fact | \yq«sâ c­mw Ne\ \nbaw. |
| Concept | Hcp hkvXp-hn-\p-­m-Ip¶ B¡ hyXn-bm-\-¯nsâ \nc¡v AXnÂ {]tbm-Kn-¡p¶ Ak-´p-enX \_mly-\_-e-¯n\v t\À A\p-]m-X-¯nepw, B¡-hy-Xymkw kw`-hn-¡p-¶Xv \_e-¯nsâ Zni-bn-ep-am-bn-cn-¡pw. |

**Curricular Objectives**:- \yq«sâ c­mw Ne\ \nbaw a\-Ên-em-¡m\pw Ah \nXy-Po-hn-Xs¯ F§s\ kzm[o-\n-¡p¶p F¶v Xncn-¨-dn-bp-¶-Xn\pw

**Learning strategies**:- Group activities, self evaluation, charts

**Subject Reality**:- B¡-hy-Xymkw kw`-hn-¡m³ FSp-¡p¶ kabw ZoÀLn-¸n-¨mÂ B¡-hy-Xn-bm-\-¯nsâ \nc¡v Ipdbpw F¶v Ip«n-IÄ¡-dn-bmw.

**Learning Resources**:þ t\_mÄ, NmÀ«v

|  |  |
| --- | --- |
| **Learning Activity:** | **Response** |
| **Stage 1** |
| **Metacognitive Knowledge** |
| Ip«n-I-tfmSv Ah-cpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn Nne-tNm-Zy-§Ä tNmZn-¡p-¶p.1. apI-fn-te-s¡-dnª Hcp sNdnb IÃv Xmtg¡v hcp-t¼mÄ ssI Xmgv¯n-s¡m­pw Xmgv¯m-sXbpw ]nSn-¨mÂ F´m-bn-cn¡pw A\p-`hw F¶v \n§Ä¡-dn-bmtam?2. BZy {]thKw F¶mÂ F´v?3. A´y {]thKw F¶mÂ F´v? | ssIXm-gv¯msX ]nSn-¨mÂ ssI th-Z-\n-¡p-sa¶v Ip«n-IÄ ]dªpssI th-Z-\n-¡p-sa¶v adp-]Sn ]d-bp¶p |
| Ip«n-IÄ Ah-cpsS ap¶-dn-hn-s\-¡p-dn¨v IqSp-XÂ t\_m[-hm-·m-cmbn |
| {In¡äv Ifn-¡p-t¼mÄ t\_mÄ ]nSn-¡-p¶-bmÄ ssI Aev]w ]nd-tIm«v \o¡msX t\cn«p ]nSn-¨mÂ F´p kw`-hn¡pw F¶v Ip«n-I-tfmSv tNmZn-¡p-¶p. CXp-t]m-epÅ IqSp-XÂ DZm-l-c-W-§Ä \½psS \nXy Pohn-X-¯nÂ \n¶pw Is­-¯m-\m-h-iy-s¸-Sp-¶p. |
| **Stage II** |
| **Metacognitive monitoring and Regulation** |
| 1. **Planning or Organisation**
 |
| So¨À Hcp Ip«nsb hnfn¨v Hcp t\_mÄ Fdnªp sIm-Sp-¯-tijw ssI Xmgv¯msX ]nSn-¡m³ ]d-bp¶p. XpSÀ¶v AtX thK-X-bnÂ t\_mÄ Fdnªp sIm-Sp-¯-tijw ssI Xmgv¯n-]n-Sn-¡m³ ]d-bp-¶p. c­p kµÀ`-§-fnepw D­mb A\p-`-h-§Ä NÀ¨ sN¿m³ Ip«n-IÄ {Kq¸p-I-fmbn Xncn-bp-¶p.m amkpÅ Hcp hkvXp-hnsâ BZy-{]-thKw u F¶pw A´y-{]-thKw v F¶pw {]th-K-am-ä-¯n-\pÅ kabw t F¶pw Icp-Xp-I. tu vNn{Xw hni-I-e\w sNbvXv Xmsg sIm-Sp-¯n-cn-¡p¶ tNmZy-§Ä¡v D¯-c-sa-gp-Xm³ So¨À Ip«n-I-tfm-Sm-h-iy-s¸-Sp¶phkvXp-hnsâ BZy B¡w F{X-bm-bn-cn-¡pw. hkvXp-hnsâ A´y B¡w F{X-bm-bn-cn¡pw?hkvXp-hn-\p-­m-Ip¶ B¡-hy-Xymkw F{X-bm-bn-cn-¡pw?B¡ hyXn-bm-\-¯nsâ \nc¡v F{X-bm-bn-cn¡pw? |
| **Consolidation** |  |
| {Kq¸v eoUÀamÀ D¯-c-§Ä hmbn-¡p-¶p. hkvXp-hnsâ BZy B¡w P1=mu A´y B¡w P2=mv B¡-hy-Xymkw P2- P1=mv-mu=m(v-u)B¡-hy-Xnbm-\-¯nsâ \nc¡v =  |
| 1. **Monitoring**
 |
| So¨À c­v kµÀ`-§Ä \ÂIp-¶p. \nÝ-e-am-bn-cn-¡p¶ Hcp Hmt«m-dn£ ]ndsI \n¶p-sIm­v HcmÄ t sk¡âv ka-b-t¯¡v XÅn-\o-¡p-¶p. At¸mÄ AXnsâ {]thKw 2m/s Bbn hÀ²n-¨p. \nÝ-e-am-bn-cn-¡p¶ AtX Hmt«m-dn£ 2 t]À tNÀ¶p XÅnbt¸mÄ t sk¡âv sIm­p Xs¶ {]thKw 3m/s Bbn- hÀ²n-¸n-¨p. Cu kµÀ`-§-Ä hni-I-e\w sNbvXv Xmsg sIm-Sp-¯n-cn-¡p¶ tNmZy-§Ä¡v D¯-c-sa-gp-Xm³ So¨À Ip-«n-I-tfm-Sm-h-iy-s¸-Sp¶p.1. GXp kµÀ`-¯n-em-bn-cn¡pw B¡-hy-Xymkw IqSp-XÂ?2. GXp kµÀ`-¯n-em-bn-cn¡pw B¡-hy-Xnbm-\-¯nsâ \nc¡v IqSp-XÂ?3. F´mhmw ImcWw? |
| **Consolidation** | So¨À ]d-ªp-sIm-Sp¯ c­v kµÀ`-§fpw Ip«n-IÄ hni-I-e\w sNbvXp. |
| m kg amkpÅ \nÝ-e-am-bn-cn-¡p¶ Hmt«m-d-£sb t sk¡âv ka-b-t¯¡v XÅn \o¡p-t¼mÄ B¡-hy-Xn-bm-\-¯nsâ \nc¡v kgm/s2 c­v t]À tNmÀ¶v XÅn-b-t¸mÄ B¡-hy-Xn-bm-\-¯nsâ \nc¡v kgm/s2B¡-hy-Xymkhpw B¡-hy-Xn-bm-\hpw c­m-as¯ kµÀ`-¯n-em-bn-cn¡pw IqSp-XÂ. Hcp hkvXp-hnÂ {]tbm-Kn¨ \_e-¯nsâ Afhv IqSp-t¼mÄ B hkvXp-hn-\p-­m-Ip¶ B¡-hy-Xn-bm-\-¯nsâ \nc¡pw hÀ²n-¡p¶p.  |
| 1. **Evaluation or Reflection**
 |
| ~Hcp NmÀ«nsâ klm-b-t¯msS So¨À \yq«sâ c­mw Ne\ \nbaw Ip«n-IÄ¡v hni-Zo-I-cn-¨p-sIm-Sp-¡p-¶p.Hcp hkvXp-hn-\p-­m-Ip¶ B¡-hy-Xn-bm-\-¯nsâ \nc¡v AXnÂ {]tbm-Kn-¡p¶ Ak-´p-enX \_mly-\_-e-¯n\v t\À-A-\p-]m-X-¯nepw B¡-hy-Xymkw kw`-hn-¡p-¶Xv \_e-¯nsâ Zni-bn-ep-ambn-cn-¡pw. CXmWv \yq«sâ c­mw Ne\ \nb-aw.  F∞ F∞ma F=ma F=kma F=ma k=1Xmsg sIm-Sp-¯n-cn-¡p¶ tNmZy-§Ä¡v D¯-c-sa-gp-Xm³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p. 5kg amkpÅ Hcp hkvXp-hnÂ 2 sk¡âv t\c-t¯¡v Htc Af-hn-epÅ \_ew {]tbm-Kn-¡p¶p. XÂ^-e-ambn hkvXp-hnsâ {]thKw 3m/s Â \n¶v 7m/s Bbn hÀ²n-¡p¶p. F¦nÂ {]tbm-Kn¨v \_e-¯nsâ Afhv IW-¡m-¡pI? |
| **Metacognitive Review** |  |
| 1. Cu ]mT-`mKw a\-Ên-em-¡m³ \n§Ä Fs´ms¡ Nn´m-[m-c-IÄ D]-tbm-K-s¸-Sp-¯n.2. Cu ]mT-`mKw IqSp-XÂ hyà-ambn \n§Ä¡nt¸mÄ a\-Ên-em-Ip-¶pt­m? |

**9**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

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| --- |
| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Ne\w |
| Topic | B¡-kw-c-£W \nbaw |
| Duration | 40 minutes |

**Content overview:-**

\_mly-\_ew {]tbm-K-s¸-Sp¶nsÃ-¦nÂ Hcp hyql-¯nsâ BsI B¡w Ft¸mgpw Ønc-am-bn-cn¡pw

|  |
| --- |
| **Content analysis** |
| Terms | B¡-kw-c-£W \nbaw |
| Fact | \_mly-\_ew {]tbm-Kn-¡-s¸-Sp-¶n-sÃ-¦nÂ Hcp hyql-¯nsâ BsI B¡w Ft¸mgpw Ønc-am-bn-cn-¡pw.  |
| Concept | Hcp hyql-¯nsâ BsI B¡w Ne-\-¯n\v ap¼pw Ne-\-¯n\v tijhpw ]qPy-am-bn-cn-¡pw.  |

**Curricular Objectives**:- B¡ kwc-£W \nb-a-s¯-¡p-dn¨v [mcW ssIh-cn-¡p-¶-Xn\v

**Learning stragesis:-þ** charts, group activities, group discussion, self monitoring

**Subject Reality:-** Nen¨psIm-­n-cn-¡p¶ hkvXp-¡Ä¡v aäv hkvXp¡fnÂ BLmXw GÂ]n-¡m-\pÅ Ign-hp-s­¶v Ip«n-IÄ¡-dn-bmw.

**Learning Resources:--þ**Nq­ \qÂ, ¹mÌn-Iv t\_mfp-IÄ, NmÀ«v

|  |  |
| --- | --- |
| **Learning Activity** | Response |
| **Stage 1** |
| **Metacognitive Knowledge** |
| Ip«n-I-fpsS Ah-cpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn Nne tNmZy-§Ä tNmZn-¡p-¶p.1. B¡w F¶mÂ F´v?2. ~Hcp hyql-¯nsâ BsI B¡w Ne-\-¯n\v ap¼pw Ne-\-¯n\v tijhpw ]qPy-am-Im³ Imc-W-sa´v? |  |
| Ip«n-IÄ Ah-cpsS ]T\ -{]-{In-b-sb-¸än IqSp-XÂ t\_m[-hm-·m-cmbn |
| Hcp hyql-¯nsâ BsI B¡w Ne-\-¯n\v ap¼pw Ne-\-¯n\v tijhpw ]qPy-am-Im³ Imc-W-sa-s´¶v Nn´n-¡m³ Ip«n-I-tfm-Sm-h-iy-s¸-«p. |
| **Stage II** |
| **Metacognitive and Regulation** |
| 1. **Planning or Organising**
 |
| So¨À "B¡ kwc-£W \nbaw' Fgp-Xnb NmÀ«v Ip«n-Isf ImWn-¡p-¶p.NmÀ«v hmbn-¡m\pw B¡ kwc-£W \nbas¯¡p-dn¨v Nn´n-¡m\pw So¨À Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.B¡ kwc-£W \nbaw \½psS Pohn-X-¯nÂ F{X-t¯mfw D]-Imc {]Z-am-sW¶v Nn´n-¡m³ So¨À Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.So¨À tNmZn-¡p¶p, \n§-sf-Ãm-hcpw Imcwkv Ifn-¡m-dnsÃ? Imcw-knÂ kvss{S¡À X«n aäp tImbn-\p-I-fnÂ sImÅn¡p-t¼mÄ kvss{S¡-dnsâ Ne\w \ne¨v aäp tImbn-\p-IÄ \o§p¶sX´v sIm-­m-sW¶v \n§Ä Nn´n-¨n-«pt­m? CXp-t]m-epÅ aäv DZm-l-c-W-§Ä Is­-¯m\pw {Kq¸nÂ NÀ¨-sN-¿m\pw kb³kv Ub-dn-bnÂ Ipdn-¨n-Sm\pw So¨À Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p. |
| **Consolidation** | Ip«n-IÄ DÕm-l-]qÀÆw ]co-£Ww sNbvXv \nco-£n-¡p-¶p. |
| Ip«n-IÄ \nc-h[n Pohn-tXm-Z-l-c-W-§Ä ]cn-K-Wn¨v B¡ kwc-£W \nb-a-s¯-¡p-dn¨v IqSp-XÂ a\-Ên-em¡n |
| 1. **Monitoring**
 |
| Nq­ \qenÂ 5 ¹mÌnIv t\_mfp-IÄ GI-tZiw a[y-`m-K¯v ]c-kv]cw kv]Àin-¡p¶ hn[-¯nÂ tImÀ¯n-Sp-I. Cu NcSv Xnc-Ýo-\-ambn \nÂ¡-¯¡ hn[w c­-ähpw hen¨p sI«m³ ]d-bp-¶p. AXnÂ Hc-ä-¯pÅ Hcp t\_mÄ Aev]w ]nd-tIm«v \o¡n-b-Xn-\p-tijw AXv hnc-ep-sIm­v apt¶m«v X«n-s¯-dp-¸n¨v aäp t\_mfp-I-fnÂ CSn-¸n-¡m³ ]d-bp-¶p. XpSÀ¶v 2 t\_mfp-IÄ \o¡n Ah sIm-­v CSn-¸n-¡m³ ]d-bp-¶p. \nco-£Ww kb³kv Ub-dn-bnÂ tcJ-s¸-Sp-¯m³ Bh-iy-s¸-Sp-¶p. Xmsg sIm-Sp-¯n-cn-¡p¶ tNmZy-§Ä¡v D¯-c-§Ä Is­-¯m³ So¨À Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.1. sN¶nSn-¡p¶ t\_mfn-\v B¡-apt­m?2. sN¶n-Sn-¡p¶ t\_mfnsâ B¡w CSn-tbmsS XoÀ¶p t]mIp-¶pt­m?3. CSn-¡p¶ t\_mfnsâ B¡w sXdn-¨p-t]mb t\_mfn-te¡v ssIamäw sN¿-s¸-Sp-¶pt­m?4. CSn-¡p¶ t\_mfp-I-fpsSbpw sXdn-¨p-t]m-Ip¶ t\_mfp-I-fp-sSbpw B¡-§Ä Xpey-am-tWm? |
| **Consolidation** | CSn-¡p-¶-Xn\v ap¼pw CSn-¡p-¶-Xn\v tijhpw c­v kµÀ`-§fpw Ip«n-IÄ Xmc-X-ay-s¸-Sp¯n |
| {Kq¸v eoUÀamÀ D¯-c-§Ä hmbn-¡p-¶p. So¨À t{ImUo-I-cn-¡p-¶p. sN¶n-Sn-¡p¶ t\_mfn\v B¡-ap-­v. sN¶n-Sn-¡p¶ t\_mfnsâ B¡w CSn-tbmsS XoÀ¶p-t]m-Ip-¶p. CSn-¡p¶ t\_mfnsâ B¡w sXdn-¨p-t]mb t\_mfn-te¡v ssIamäw sN¿-s¸-Sp-¶p. CSn-¡p¶ t\_mfp-I-fp-sSbpw sXdn-¨p-t]m-Ip¶ t\_mfp-I-fp-sSbpw B¡-§Ä Xpey-am-Wv.  |
| **c) Evaluation or Reflection** |
| Hmtcm ¹mÌnIv t\_mfn-sâbpw amkv 15 gm hoX-am-sW¶v Icp-Xp-I. H¶m-as¯ t\_mÄ sIm­v aäp t\_mfp-Isf CSn-¸n-¡p-t¼mÄ H¶m-as¯ t\_mfnsâ {]th-Khpw CSn-¡p-t¼mÄ sXdn-¨p-t]m-Ip¶ t\_mfnsâ {]th-Khpw 5m/s BsW-¦nÂ CSn-¡p-ap-¼pÅ BsI B¡hpw CSn-¡p-ti-j-apÅ BsI B¡hpw IW-¡m-¡m³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.Xmsg X¶n-cn-¡p¶ tNmZy-§-Ä¡v D¯-c-§Ä Is­-¯m³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.CSn-¡p-¶-Xn\v sXm«v ap¼v1. H¶m-as¯ t\_mfnsâ B¡w F{X-bm-bn-cn-¡pw?2. \nÝ-e-am-bn-cn-¡p¶ \_m¡n 4 t\_mfp-IfpsS B¡w F{X-bm-bn-cn¡pw?3. BsI B¡w F{X-bm-bn-cn-¡pw?CSn-¨-Xn\v tijw1. sXdn-¨p-t]m-Ip¶ t\_mfnsâ B¡w F{X-bm-bn-cn-¡pw?2. sXdn-¨p-t]m-ImsX \nÂ¡p¶ \_m¡n 4 t\_mfp-I-fpsS B¡w F{X-bm-bn-cn¡pw?3. BsI B¡w F{X-bm-bn-cn-¡pw?CSn-¡p-¶-Xn\v ap¼v H¶m-as¯ t\_mfnsâ B¡w 0.075 kgm/s. \_m¡n 4 t\_mfp-Ifpw \nÝ-e-am-bn-cn-¡p¶Xn-\mÂ Ah-bpsS B¡w ]qPy-am-bn-cn-¡pw AXp-sIm­v BsI B¡w 0.75 +0=0.075 kgm/sCSn¨ tijw sXdn-¨p-t]m-Ip¶ t\_mfnsâ B¡w 0.015 kg x 5m/s = 0.075 kgm/s Dw sXdn¨p t]mIm¯ 4 t\_mfp-IfpsS B¡w ]qPyhpw BsI B¡w 0.075 +0 = 0.075 kgm/s Dw Bbn-cn-¡pw. AXm-bXv CSn¡v ap¼pw CSn¡v tijhpw B¡w 0.075 kgm/s Bbn-cn-¡pw.\_mly-\_ew {]tbm-Kn-¡-s¸-Sp-¶n-sÃ-¦nÂ Hcp hyql-¯nsâ BsI B¡w Ft¸mgpw Ønc-am-bn-cn¡pw F¶v So¨À hni-Zo-I-cn-¡p¶p. Npäp-]m-Sp-I-fnÂ \n¶v B¡ kwc-£-W-¯n\v DZm-c-l-W-§Ä Is­¯n tcJ-s¸-Sp-¯pI?B¡-s¯-¡p-dn¨v \n§Ä¡p-­m-bn-cp¶ ap¶-dnhv Cu ]mT`mKw ]Tn-¡m³ \n§Äs¡-{Xt¯mfw {]tbm-P-\-s¸-«p.  |
| **Metacognitive Review** |  |
| 1. CXnepw sa¨-s¸« coXn-bnÂ Cu ]mT-`mKw a\-Ên-em-¡m³ \n§Ä¡v Ign-bp-tam?2. Cu ]mT-`mKw a\-Ên-em-¡m³ \n§Ä F{X-t¯mfw ]pXnb Adnhp-IÄ D]-tbm-Kn¨p?3. Cu ]mT-`mKw ]Tn¨ tijw \n§-fpsS ap¶-dn-hnÂ Fs´-¦nepw hyXymkw ht¶m? |

**10**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

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| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Xcw-K-N-e\w |
| Topic | kn¼nÄ s]âpew |
| Duration | 45minutes |

**Content overview:-**

\½psS \nXy Pohn-X-¯nÂ \mw Ft¸mgpw ImWp¶ Duªm-Â, s]âpew t¢m¡v XpS-§n-b-h-sbÃmw kn¼nÄ s]âp-e-¯n\v DZm-l-c-W-§-fm-Wv.

|  |
| --- |
| **Content analysis** |
| Terms | kn¼nÄ s]âp-ew, tZme\w, t\_m\_v, Xpe\ \_nµp, Bb-Xn, ]ncn-b-Uv, Bhr¯n |
| Facts | Duªmem-Sp-t¼mÄ Duªm-ensâ \of-¯n-\-\p-k-cn¨v B«w ]qÀ¯n-bm-¡-s\-Sp-¡p¶ kabw hyXy-kvX-amWv. 1. Hcp hyql-¯nsâ BsI B¡w Ne-\-¯n\v ap¼pw Ne-\-¯n\v tijhpw ]qPy-am-bn-cn-¡pw. 2. t¢m¡nsâ kabw {Iao-I-cn-¡p-¶-Xn-\mbn s]âp-e-¯nsâ \ofw {Iao-I-cn-¡m-dp-­v.3. s]âp-e-¯nsâ Ne\w Øm\-´c Ne-\-¯nÂ \n¶pw hyXy-kvXam-Wv. |
| Concept | 1. Hcp \nÝnX \_nµp-hns\ Bkv]-Z-am¡n s]âp-e-¯nsâ apt¶m«pw ]nt¶m«papÅ Ne-\-amWv tZme\w2. s]âvepw \nÝ-em-h-Ø-bn-em-bn-cn-¡p-t¼mÄ DÅ Øm\-amWv Xpe\ \_nµp3.Xpe\ \_nµp-hnÂ \n¶pw t\_m\_n-\p-­m-Ip¶ Gähpw IqSnb Øm\m-´-c-amWv Bb-Xn. |

Curricular Objectives:-1. kn¼nÄ s]âpew ]cn-N-b-s¸-Sp-¶-Xn\v

2. kn¼nÄ s]âp-e-¯nsâ {]tXy-I-X-IÄ, AXns\ kw\_-Ôn¨ ]pXnb ]Z-§Ä F¶nh a\-Ên-em-¡p-¶-Xn-\v.

**Learning Strategies:-** Group discussion, self evaluation, self questioning and self monitoring

**Subject Reality:-** DuªmÂ, s]âvpew t¢m¡v XpS-§n-bh Ip«n-IÄ I­n-«p-­v. Ch kn¼nÄ s]âp-e-¯n\v DZm-l-c-W-§-fm-sW¶v Ip«n-IÄ¡-dn-bmw.

**Learning resources**:þ kn¼nÄ s]âpew, NmÀ«v

|  |  |
| --- | --- |
| **Learning Activity** | Response |
| **Stage: I** |
| **Metacognitive Knowledge** |
| Ip«nI-fpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn So¨À Ip«n-I-tfmSv Nne tNmZy-§Ä tNmZn-¡p-¶p.* \n§Ä Duªmem« aÕcw I­n-«pt­m?
* Hcp B«w ]qÀ¯n-bm-¡m³ \ofw IqSnb Duªm emtWm \ofw Ipdª Duªm-emtWm IqSp-XÂ kabw FSp-¡p-¶Xv?
 | \osf Ipdª Duªm-enepw \ofw IqSnb Duªm-enepw Ip«n-IÄ Xmc-X-ayw-sN-¿p¶p |
| Ip«n-IÄ Ah-cpsS ]T\ {]{In-b-sb-¡p-dn¨v IqSp-XÂ t\_m[-hm-·m-cmbn | Ip«n-IÄ Bth-i-]qÀÆw NÀ¨-bnÂ ]s¦-Sp-¡p-¶p.  |
| Hcp B«w ]qÀ¯n-bm-¡m³ \ofw IqSnb DuªmÂ F´v sIm­v IqSp-XÂ kabw FSp¯p F¶v Nn´n-¡m³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.  |
| **Stage: II** |
| **Metacognitive monitoring and Regulation** |
| 1. **Planning or organizing**
 |
| kn¼nÄ s]âp-e-s¯-¸än So¨À ¢mÊnÂ NÀ¨ kwL-Sn-¸n-¡p-¶p. DuªmÂ, s]âpew t¢m¡v XpS-§n-b-h-sb-¡p-dn¨v Ip«n-I-tfmSv kwkm-cn-¡p-¶p.\ofw Ipdª DuªmÂ cm[¡pw \ofw IqSnb DuªmÂ cmPp-hn\pw \ÂInb tijw Duªm-em« aÕcw \S-¯n-bmÂ Bcv Pbn-¡p-sa¶pw AsX-´p-sIm-­m-sW¶pw Ip«n-I-tfmSv tNmZn-¡p-¶p, ¢mÊnÂ NÀ¨ kwL-Sn-¸n-¡p-¶p.Pohn-X-¯nÂ C¯cw A\p-`-h-§-fp-­m-bn-«p-t­m-sb¶pw Ds­-¦nÂ AXv ¢mÊnÂ NÀ¨ sN¿m\pw Bh-iy-s¸-Sp-¶p. |
| **Consolidaton:-** |
| \ofw IqSp-¶-Xn-\-\p-k-cn¨v Hcp kn¼nÄ s]âpew Hcp tZme\w ]qÀ¯n-bm-¡m-s\-Sp-¡p¶ kabw IqSp¶p |
| 1. **Monitoring:-**
 |
| So¨À tZme-\w, Xpe\ \_nµp, BbXn F¶n-h-bpsS \nÀÆ-N-\-§Ä Fgp-Xnb NmÀ«v ¢mÊnÂ Xq¡p-Ibpw kn¼nÄ s]âpew D]-tbm-Kn¨v Ch hyà-ambn ImWn-¡p-Ibpw sN¿p-¶p.Ip«n-Isf {Kq¸p-I-fmbn Xncn¨v NÀ¨ kwL-Sn-¸n-¡p¶p. C§s\ ]Tn¨ Imcy-§Ä hyà-ambn a\-Ên-em-¡n-bn-«p- t­m F¶v Nn´n-¡p-hm³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.  |
| **Consolidation:-** | Ip«n-IÄ NÀ¨-bnÂ ]s¦-Sp-¡p-¶p. |
| tZme\w, Xpe\ \_nµp, BbXn F¶n-hsb¸än Ip«n¡v hyà-amb Hcp [mc-W-bp­v |
| 1. **Evaluation or Reflection**
 |
| Nne tNmZy-§Ä¡v D¯cw Is­-¯m³ So¨À Ip«n-I-tfm-Sm-h-iy-s¸-Sp¶p1. th\Â¡m-e¯v ]gb s]âpew t¢m¡p-IÄ aµ-KXnbnem-Ip-¶-sX-´p-sIm­v2. Hcp s]âpew t¢m¡nsâ ka-b-Ir-Xy-X-bnÂ amäw hcp-¯m³ s]âp-e-¯nsâ GXv LS-I-¯nÂ amäw hcp-¯n-bmÂ aXn-bmIpw |
| **Metacognitive Review** |
| 1. Cu ]mTw ]Tn¨v ]qÀ¯n-bm-bt¸mÄ \n§Ä¡v e`n¨ ]pXnb Adn-hp-IÄ Fs´Ãmw?2. Cu ]mT-`mKw a\-Ên-em-¡m³ \n§Ä D]-tbm-Kn¨ Nn´m-[m-c-IÄ Fs´Ãmw? |

**11**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

|  |
| --- |
| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Xcw-K-N-e\w |
| Topic | ]ncn-b-Uv, Bhr¯n |
| Duration | 40 minutes |

**Content overview:-**

]ncn-bUpw Bhr-¯nbpw X½n-epÅ \_Ôw

]ncn-b-Uv, Bhr¯n F¶n-h-bpsS \nÀÆ-N-\-§Ä

|  |
| --- |
| **Content analysis** |
| Terms | ]ncn-b-Uv, Bhr-¯n, slSvkv |
| Facts | Duªmem-Sp-t¼mÄ sNdnb Duªm-enÂ BSp-¶-hÀ¡v hep-XnÂ BSp¶h-tc-¡mÄ IqSp-XÂ {]hmiyw Htc kabw sIm­v BSm³ km[n-¡p-¶p.  |
| Concept | 1. Hcp s]âpew Hcp tZme\w ]qÀ¯n-bm-¡m³ FSp-¡p¶ ka-b-amWv ]ncn-b-Uv.2. Hcp sk¡ânÂ D­m-Ip¶ tZme-\-§-fpsS F®-amWv Bhr¯n bqWnäv Hz. |

**Curricular Objectives**: 1. kn¼nÄ s]âpew, AXnsâ {]tXy-I-X-IÄ F¶nh a\-Ên-em-¡p-¶-Xn\v.

2. ]ncn-b-Uv, Bhr¯n Ch X½n-epÅ \_Ôw a\-Ên-em-¡p-¶-Xn\v

3. hkvXp-X-IÄ¡v ]n¶nÂ imkv{Xob XXz-§Ä Ds­¶v Adn-bp-¶-Xn\v

**Learning strategies:-** Group activity, black board usage, self evaluation, self monitoring, calculator.

**Subject Reality:-** DuªmÂ, s]âpew t¢m¡v XpS-§n-b-h-sbms¡ kn¼nÄ s]âp-e-¯n\v DZm-l-c-W-§-fm-sW¶v Ip«n-IÄ¡-dn-bmw.

**Learning Resources:-** kn¼nÄ s]âp-ew, tÌm¸v hm¨v

|  |  |
| --- | --- |
| **Learning Activity:-** | **Response** |
| **Stage: I** |
| **Metacognitive Knowledge** |
| Ip«n-I-fpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn Nne tNmZy-§Ä tNmZn-¡p-¶p. |  |
| 1. Hcp kn¼nÄ s]âp-e-¯nsâ Hcp B«w ]qÀ¯n-bm-¡m-s\-Sp-¡p¶ ka-bs¯ \_m[n-¡p¶ LS-I-§Ä Gh?2.\n§-fpsS \nXy-Po-hn-X-¯nÂ kn¼nÄ s]âp-e-hp-ambn \_Ô-apÅ aäv DZm-l-c-W-§Ä Is­-¯p-I.  |
| Ip«n-IÄ Ah-cpsS ]T-\-{]-{In-b-sb-¸än t\_m[-hm-·m-cmbn |
| hnhn[ Xcw DZm-l-c-W-§-fpsS klm-b-t¯msS kn¼nÄ s]âpew F´m-sW¶v Ip«n-IÄ¡v hyà-am-¡n-s¡m-Sp¡p¶p kn¼nÄ s]âpe¯nsâ ]ncn-b-Uv, Bhr¯n F¶n-h-sb-¸än IqSp-XÂ hyà-am-¡n-s¡m-Sp-¡p-¶p. Hcp kn¼nÄ s]âpe¯nsâ Bhr-¯nbpw ]ncn-bUpw X½n-epÅ \_Ô-s¯-¸än Nn´n-¡p-hm³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p. |
| **Stage: II** | Ip«n-IÄ NÀ¨-bnÂ ]s¦-Sp-¡p-¶p.]ncn-bUv ImWm-\pÅ kq{X-hmIyw Ip«n-IÄ a\-Ên-em-¡p¶p |
| **Metacognitive monitoring and Regulation** |
| 1. **Planning or Organising**
 |
| Hcp kn¼nÄ s]âp-e-¯nsâ Bhr-¯n, ]ncn-bUv F¶n-h-sb-¡p-dn¨v So¨À ¢mÊnÂ NÀ¨ kwL-Sn-¸n-¡p-¶p. {Kq¸-I-fmbn Xncnª tijw Bhr-¯nbpw ]ncn-bUpw X½n-epÅ \_Ôw NÀ¨ sN¿m\pw t{ImUo-I-cW¯nÂ G¯n-t¨-cm\pw Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.\½psS \nXy-Po-hn-¯nÂ Bhr-¯nbpw ]ncn-bUn\pw Fs´-¦nepw {]mtbm-KnI D]-tbm-K-§-fpt­m F¶v ]cn-tim-[n-¡m\pw Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p. NÀ¨ XpS-cp-¶p. |
| **Consolidation** |
| ]ncn-bUv = Hcp tZme-¯n-\m-h-iy-amb ka-b-amWv ]ncn-bUv* ]ncnbUv = \nÝnX F®w tZme-\-§-fpsS BsI kabw

 tZme\-§-fpsS F®w T=* Bhr¯n = Hcp sk¡ân-ep-­m-Ip¶ tZme-\-§-fpsS F®-amWv Bhr-¯n.

 f=Bhr-¯n-bpsS bqWnäv slSvkv  |
| 1. **Monitoring**
 |
| So¨À Hcp kn¼nÄ s]âpew D]-tbm-Kn¨v AXnsâ Bhr¯n, ]ncn-bUv F¶nh X½n-epÅ \_Ôw hyà-ambn ImWn-¨p-sIm-Sp-¡p-¶p.Ip«n-IÄ¡v s]âp-ew, kvtäm]v hm¨v, aoäÀ kvsIbnÂ, hyXykvX `mc-apÅ t\_m\_p-IÄ F¶nh \ÂIp-¶p. Hcp NmÀ«nÂ s]âp-e-¯nsâ \ofw, tZme-\-§-fpsS F®w, ka-bw, ]ncn-b-Uv, {^oIz³kn F¶nh tImfw hc¨v FgpXn ImWn-¡p-¶p. Ip«n-I-tfmSv CXp-t]mse hc¨v s]âpew {]hÀ¯n-¸n¨v kabw, tZme-\-§-fpsS F®w F¶nh \nco-£n¨v tcJ-s¸-Sp-¯m³ ]d-bp-¶p. tZme-\-§-fpsS F®w hyXy-k-s¸-Sp¯n ]co-£Ww BhÀ¯n-¡m³ ]d-bp-¶p. s]âp-e-¯nsâ \ofw, t\_m\_nsâ amkv F¶nh hyXym-k-s¸-Sp¯n ]co-£Ww BhÀ¯n-¡m³ Ip«n-I-tfmSv ]d-bp-¶p. Xmsg sIm-Sp-¯n-cn-¡p¶ tNmZy-§Ä¡v D¯cw Fgp-Xm³ Ip«n-I-tfm-Sm-h-iy-s¸-S-¶p.1. tZme-\-§-fpsS F®w?2. tZme-\-§-Äs¡Sp¯ kabw F{X?3. CXnÂ \n¶pw Hcp tZme-\-¯n-\m-h-iy-amb kabw F§ns\ I­p-]n-Sn¡mw?4. ~Hcp sk¡ânÂ F{X tZme-\-§Ä D­m-Ip-¶p F¶v F§s\ Af-¡mw.5. hyà-ambn Imcy-§Ä a\-Ên-em-bn«pt­m F¶v Nn´n-¡p-hm³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.  |
| **Consoldiaton** | t\_m\_nsâ `mcw ]ncn-b-Uns\ \_m[n-¡p-¶nÃ F¶v Ip«n-IÄ a\-Ên-em-¡p¶p |
| Ip«n-IÄ 10, 15, 20, 25 F¶o F®w tZme-\-§Ä¡m-h-iyam kabw IW-¡m-¡p-¶p. CXnÂ \n¶v Hcp tZme-\-¯n-s\-Sp¯ kabw Ip«n-IÄ IW-¡m-¡p-¶p. CXns\ ]ncn-bUv F¶p ]d-bp-¶psh¶v Ip«n \nK-a-\-¯nÂ F¯n-t¨-cp-¶p. ]n«n-I-bnÂ tcJ-s¸-Sp-¯p-¶p.]ncn-bUv = \nÝnX tZme-\-§-fpsS kabw tZme-\-§-fpsS F®w T=Hcp sk¡ânÂ F{X tZme-\-§Ä D­m-Ip-¶p-sh-\\v Ip«n-IÄ IW¡v Iq«p-¶p. CXns\ Bhr¯n F¶p ]d-bp-¶p-sh¶ Ip«n a\-Ên-em-¡p-¶p.Bhr¯n = f=Bhr¯n IW-¡m-¡p-¶-Xn-\pÅ kq{X-hmIyw Ip«nÄ cq]o-I-cn-¡p¶p Bhr-¯n-bpsS bqWnäv slSvkv (Hz) F¶v ]d-bp-¶p-sh-¶pw Ip«n a\-Ên-em-¡p¶p.\ofw amdp-t¼mÄ ]ncn-bUpw amdp-¶p-sh¶pw Hcp \of-¯nÂ s]âpew F{X thK-¯nÂ BSn-bmepw ]ncn-bUv amdp-¶nÃ F¶pw Ip«n-IÄ ]co-£n-¨-dn-bp-¶p. am{X-aÃ Hcp \of-¯nÂ t\_m\_nsâ `mcw hyXym--k-s¸-Sp-t¼mgpw ]ncn-b-Uns\ AXv kzm[o-\n-¡p-¶nÃ F¶pw Ip«n-IÄ \nco-£n-¡p-¶p.  |
| 1. **Evaluation or Reflection**
 |  |
| Nne tNmZy-§Ä¡v D¯cw Is­-¯m³ So¨À Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p. 1. ]mT-¯nsâ Cu `mKw icn-bmbn a\-Ên-em-¡m³ \n§Ä¡v Ign-bp-¶pt­m?2. Cu ]mT-¯nÂ \n¶pw \n§Ä¡v e`n¨ ]pXnb Bi-b-§Ä Fs´Ãmw?3. s]âp-e-¯nsâ Ncn-{Xw, Ne\ XXz-§Ä Is­-¯nb imkv{X-Ú³ F¶nh Is­-¯pI? |
| **Metacognitive Review** |  |
| 1. Cu ]mTw ]Tn-¨-Xn-\p-tijw Cu ]mT-`m-K-hp-ambn \_Ô-s¸«v \n§Ä¡p­m-bn-cp¶ ap¶-dn-hp-IÄ amdntbm?2. Fs´ms¡ Nn´-I-fmWv Cu ]mTw ]Tn-¡p-t¼mÄ \n§Ä¡p­m-bn-cp-¶Xv?3. `mhn Pohn-X-¯nÂ Cu Adn-hp-IÄ F§s\ {]tbm-P-\-s¸-Sp¯mw? |

**12**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

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| --- |
| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Xcw-K-N-e\w |
| Topic | A\p-{]Ø XcwKw |
| Duration | 40minutes |

**Content overview:-**

Xcw-K-N-e-\-s¯-¡p-dn¨v Ip«n-IÄ¡-dn-bmw. IS-enÂ InS-¡p¶ hÅ-§Ä Xnc-tbm-sSm¸w hcp-¶nÃ F¶v Ip«n-IÄ \nco-£n-¨n-«p-­v.

A\p{]Ø Xcw-K-§Ä¡v hnhn[ DZm-l-c-W-§Ä Ip«n-IÄ I­n-«p­v.

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| **Content analysis** |
| Terms | A\p-{]Ø XcwKw |
| Fact | Xcw-K-§sf c­mbn Xcw Xncn¨n-cn-¡p¶p A\p-{]Ø Xcw-K-§fpw A\p-ssZÀLy Xcw-K-§fpw |
| Concept | am[ya-¯nse IWn-I-IÄ I¼\w sN¿p-¶Xv Xcw-K-¯nsâ k©m-c-Zn-i¡v ew\_-amb Zni-bn-em-sW-¦nÂ A¯cw Xcw-K-§-fmWv A\p-{]Ø Xcw-K-§Ä |

**Curricular Objectives**:þ A\p{]Ø Xcw-K-s¯-¡p-dn¨v a\-Ên-em-¡p-¶-Xn\pw Ahsb Xncn-¨-dn-bp-¶-Xn\pw.

**Learning Strategies :-** Group discussion, group activities, self evaluation, self questioning, self monitoring

**Subject Reality:-** IS-enÂ InS-¡p¶ hÅ-§Ä Xnc-tbm-sSm¸w hcp-¶nÃ F¶v Ip«n-IÄ¡-dn-bmw.

**Learning Resources:-** IbÀ, dnºÀ

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| **Learning Activity:-** | **Response** |
| **Stage: I** |
| **Metacognitive Knowledge** |
| Xmsg ]d-bp¶ tNmZy-§Ä Ip«n-I-tfmSv tNmZn-¡p¶p 1. \n§Ä IS-ense hÅ-§Ä I­n-«pt­m?2. \n§Ä Ft¸m-sg-¦nepw Nn´n-¨n«pt­m F´v sIm-­mWv Xnc-tbm-sSm¸w Ic-bnÂ hcm-¯Xv?Ip«n-I-fpsS Nn´ DWÀ¶v {]hÀ¯n-¡m³ XpS§n |  |
| C¯cw IqSp-XÂ DZm-l-c-W-§Ä Is­-¯m³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p. {Kq¸p-I-fmbn Xncnªv NÀ¨ XpS-cp-¶p. |
| **Stage: II** |
| **Metacognitive Monitoring and Regulation** |
| 1. **Planning or Organising**
 |
| So¨À, A\p-{]Ø Xcw-K-§Ä¡v hnhn[ DZm-l-c-W-§Ä \nc-¯p-¶p. NmÀ«nsâ klm-b-t¯msS hni-Zo-I-cn-¡p-¶p. Xmsg ]d-bp¶ tNmZy-§Ä Ip«n-I-tfmSv tNmZn-¡p-¶p.1. \n§Ä Ft¸m-sg-¦nepw C¯cw Xcw-K-§-sf-¡p-dn¨v Nn´n-¨n-«pt­m?2. \n§Ä¡v ap¼p-­m-bn-cp¶ Adnhv Ct¸m-gp-­mb Adn-hp-ambn Xmc-Xayw sN¿m³ Ign-bp-¶pt­m? |
| **Consolidation:-** | {Kq¸p-IÄ DÕm-l-]qÀÆw NÀ¨-bnÂ ]s¦-Sp-¡p¶p |
| Ip«n-IÄ Nn´n¨p XpS-§p-Ibpw Ah-cpsS ap¶-dnhv Ct¸m-gpÅ Adnhpambn Xmc-Xayw sN¿p-Ibpw sNbvXp.  |
| 1. **Monitoring:-**
 |
| FÃm {Kq¸p-IÄ¡pw Hcp Ib-dnsâ IjvWhpw Hcp dn\_Wpw \ÂIp-¶p. Ib-dnsâ Hc{Kw P\-ensâ Agn-bnÂ sI«n Dd-¸n¨ tijw Xq§n-¡n-S-¡m¯ hn[w Ib-dnÂ Hcp dn\_¬ Npän-s¡-«m³ ]d-bp-¶p. IbÀ ssIsIm­v hen¨p ]nSn-¨vv apI-fn-te¡pw Xmtg¡pw Nen-¸n-¡m³ ]d-bp-¶p. \nco-£Ww tcJ-s¸-Sp-¯m³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.Xmsg ]d-bp¶ tNmZy-§Ä Ip«n-I-tfmSv tNmZn-¡p-¶p.1. Ib-dnse IWn-I-I-fpsS Ne\w F{]-Im-c-amWv?2.dn\_-Wnsâ Ne\w F{]-Im-c-Wm-Wv?3. Ib-dnse dn\_-Wn\v Ib-dnÂ Øm\-amäw Dt­m?4. apt¶m«v \o§p¶ XcwK Ne-\-t¯m-sSm¸w dn\_¬ \o§p-¶pt­m? |
| **Consolidation:-** |
| {Kq¸v eoUÀamÀ D¯-c-§Ä hmbn-¡p-¶p. Xcw-K-¯nsâ k©m-c-Zn-i¡v ew\_-k-am-bmWv dn\_-Wnsâ Ne\wIb-dn-ep-­m-Ip¶ XcwKw k©-cn-¡p-t¼mÄ AXnÂ sI«nb dn\_¬ Db-cp-Ibpw Xmgp-Ibpw sN¿p-¶-X-ÃmsX AXnsâ Øm\w amdp-¶n-Ã. Xcw-K-¯nsâ k©mc Zni¡v ew\_-ambn IWnIIÄ I¼\w sN¿p-¶p-sh-¦nÂ AsXmcp A\p-{]Ø Xcw-K-am-Wv. |
| 1. **Evaluation or Reflection**
 |  |
| Ip«n-IÄ DÕm-l-]qÀÆw ]co-£-W-¯nÂ GÀs¸-«p.FÃm {Kq¸p-I-fp-sSbpw D¯-c-§Ä ]qÀ®-ambpw icn-bm-bn-cp-¶p.Xmsg ]d-bp¶ tNmZy-§Ä Ip«n-I-tfmSv tNmZn-¡p-¶p.1. \n§-fpsS I­p-]n-Sp-¯-§Ä icn-bmtWm F¶v Nn´n-¡pI?2. \n§-fpsS ap¶-dnhv C¡m-cyw ]Tn-¡m³ F{X-t¯mfw D]-tbm-Kn-¨p.3. \n§-fpsS `mhn Pohn-X-¯nÂ Cu Adnhv \n§Ä¡v F{X-t¯mfw D]-Imcw {]Z-am-bn-cn¡pw? |
| **Metacognitive Review**  |
| 1. ¢mÊnÂ sNbvX {]hÀ¯-\-§-sf-¸änbpÅ \n§-fpsS Nn´-IÄ icn-bmb coXn-bn-emtWm?2. A\p-{]Ø Xcw-K-§Ä F´m-sW¶v \n§Ä¡v hyà-ambn a\-Ên-emtbm?3. \n§-fpsS `mhn Pohn-X-¯nÂ Cu Adnhv F§s\ {]tbm-P-\-s¸-Sp-¯mw? |

**13**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

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| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Xcw-K-N-e\w |
| Topic | λ, v, f |
| Duration | 40 minutes |

**Content overview:-** Hcp Xcw-K-s¯-¸än ]Tn-¡p-t¼mÄ Xcw-K-ssZÀLyw, {]th-Kw, Bhr¯n F¶n-h-sb-¡p-dn¨v ]Tn-t¡-X-­-Xp-­v.

A\p-{]Ø Xcw-K-s¯-¡p-dn¨v DZm-l-c-W-§Ä klnXw Ip«n-IÄ¡-dn-bmw.

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| **Content analysis** |
| Terms | XcwK ssZÀLyw, {]th-Kw, Bhr¯n |
| Facts | Hcp Xcw-K-¯nsâ Xcw-K-ssZÀLyw, {]th-Kw, Bhr¯n F¶nh X½nÂ \_Ô-s¸-«n-cn-¡p-¶p.  |
| Concepts | 1. kam\ I¼-\m-h-Ø-bn-epÅ ASp-¯-Sp¯ c­v \_nµp-¡Ä X½n-epÅ AI-e-amWv Xcw-K-ssZÀLyw.2. Hcp sk¡ânÂ D­m-Ip¶ Xcw-K-§-fpsS F®-amWv Xcw-K-¯nsâ Bhr¯n3. Hcp sk¡ânÂ XcwKw k©-cn¨ Zqc-amWv Xcw-K-¯nsâ {]th-Kw. |

**Curricular Objectives**:þXcw-K-¯nsâ Bhr-¯n, Xcw-K-ssZÀLyw, {]thKw F¶n-h-sb-¡p-dn¨v a\-Ên-em-¡p-¶-Xn-\v.

**Learning Strategies** :þ group activities, charts, self evaluation, group discussion

**Subject Reality:-** A\p-{]Ø Xcw-K-s¯-¸än DZm-l-c-W-§Ä klnXw Ip«n-IÄ¡-dnbmw.

**Learning Resources:-** Charts, scale, pencil etc

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| **Learning Activity:-**  | **Response** |
| **Stage: I** |
| **Metacognitive Knowledge** |
| Ip«n-I-tfmSv Ah-cpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn Nne tNmZy-§Ä tNmZn-¡p-¶p. 1. A\p-{]Ø Xcw-K-§Ä F¶mÂ F´v? DZm-l-c-W-§Ä ]d-bp-I?2. A\p-{]Ø Xcw-K-§-fpsS {]tXy-I-X-IÄ Fs´m-s¡-bmWv? |  |
| Ip«n-IÄ Ah-cpsS ]T\ {]{In-b-bn-te¡v IqSp-XÂ Bgv¶n-d§n Nn´n-¡m³ XpS§n |
| A\p-{]Ø Xcw-K-¯nsâ khn-ti-j-X-I-sf-¡p-dn¨v IqSp-XÂ ]Tn-t¡­Xnsâ Bh-iy-I-X-sb-¡p-dn¨v Nn´n-¡p-hm³ Bh-iy-s¸-Sp-¶p. \½psS \nXy-Po-hn-X-¯nÂ \n¶v A\p-{]Ø Xcw-K-§Ä¡v IqSp-XÂ DZm-l-c-W-§Ä Is­-¯m\pw Ah-bpsS khn-ti-j-X-sf-¡p-dn¨v Nn´n-¡p-hm\pw Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.  |
| **Stage:II** | Ip«n-IÄ NmÀ«v \nco-£n-¡p¶pIp«n-IÄ Nn{Xw hni-I-e\w sNbvXpIp«n-IÄ {i²m-]qÀÆw D¯-c-§Ä FgpXn c­v {Kq¸p-I-sfm-gnsI FÃm {Kq¸p-I-fp-sSbpw D¯-c-§Ä icn-bm-bn-cp-¶p. |
| **Metacognitive Monitoring and Regulation** |
| Hcp NmÀ«nÂ hc¨ Nn{X-¯nsâ klm-b-t¯msS A\p -{]Ø Xcw-K-§-fpsS {]tXy-I-X-IÄ Fs´m-s¡-bm-sW¶v So¨À hni-Zo-I-cn-¡p-¶p.C:\Documents and Settings\user\Desktop\01.jpgNn{Xw \nco-£n¨v Xmsg X¶n-cn-¡p¶ tNmZy-§Ä¡v D¯cw Is­-¯p-I.kam\ I¼-\m-h-Ø-bn-epÅ IW-§Ä GsXm-s¡-bmWv?1) A,E----2) C,----3) D,----4) B,---- |
| **Consolidation:-** |
| {Kq¸v eoUÀamÀ D¯-c-§Ä hmbn-¡p-¶p. So¨À t{ImUo-I-cn-¡p¶p. 1) A,E,I 2) C,G 3) D,H 4) B,F F¶n-h-bmWv kam\ I¼-\m-h-Ø-bn-epÅ IW-§Ä. A F¶ IWn-I-bpsS Øm\hpw AtX I¼-\m-h-Ø-bn-epÅ ASp¯ IWn-I-bpsS Øm\hpw X½n-epÅ AI-e-s¯-bmWv B Xcw-K-¯nsâ XcwK ssZÀLy-ambn IW-¡m-¡p-¶-Xv. Hmtc I¼-\m-h-Ø-bn-epÅ ASp-¯-Sp¯ IWn-I-IÄ X½n-epÅ AI-e-amWv B Xcw-K-¯nsâ Xcw-K-ssZÀLyw. |
| 1. **Monitoring:-**
 |
| So¨À, XcwKssZÀLyw, Xcw-K-¯nsâ {]thKw, Xcw-K-¯nsâ Bhr¯n F¶n-h-sb-¸än NmÀ«nsâ klm-b-t¯msS hni-Zo-I-cn-¡p-¶p.Ip«n-I-tfmSv Xmsg ]d-bp¶ Imcyw \nÀt±-in-¡p-¶p.1. apI-fnÂ sImSp¯n-cn-¡p¶ Nn{X-¯nse Xcw-K-¯nsâ Xcw-K-ssZÀLyw Is­¯n tcJ-s¸-Sp-¯p-I. |
| **Consolidation:-** |  |
| X¶n-cn-¡p¶ Nn{Xw \nco-£n¨ tijw Ip«n-IÄ {Kq¸p-I-fmbn Xncnªv Xcw-K-ssZÀLyw IW-¡m-¡p-¶p. {Kq¸v eoUÀamÀ D¯-c-§Ä hmbn-¡p-¶p.  |
| **c)Evaluation :-** |
| Xmsg X¶n-cn-¡p¶ tNmZy-§Ä Ip«n-I-tfmSv tNmZn-¡p¶p1. \n-§Ä¡n-t¸mÄ a\-Ên-em-Ip-¶pt­m F§-s\-bmWv Hcp Xcw-K-¯nsâ Xcw-K-ssZÀLyw IW-¡m-¡p-¶sX¶v?2. Xcw-K-§-fpsS khn-ti-j-X-Isf¡pdn¨v \n§Ä Ft¸m-tg-¦nepw Nn´n-¨n-«pt­m?3. Cu ]mT-¯nÂ \n¶pw \n§Ä¡v In«nb ]pXnb Adn-hp-IÄ Fs´Ãmw? |
| **Metacognitive Review** |
| 1. Cu ]mT-`mKw a\-Ên-em-¡m³ \n§Ä GsXms¡ Xc-¯n-epÅ Nn´m-[m-c-IÄ D]-tbm-Kn-¨p.2. Cu Adn-hp-IÄ \n§-fpsS Pohn-X-¯nÂ GsXÃmw Xc-¯nÂ D]-tbm-K-s¸-Sp-¯mw?3. Cu ]mT-`mKw CXn-t\-¡mÄ sa¨-s¸« coXn-bnÂ a\-Ên-em-¡m³ Ign-bptam? |

**14**

**LESSON PLAN-BASED ON METACOGNITIVE LEARNING STRATEGIES**

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| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Xcw-K-N-e\w |
| Topic |  Xcw-K-¯nsâ λ, v, f F¶nh X½n-epÅ \_Ôw |
| Duration | 40 minutes |

**Content overview:-** Xcw-K-¯nsâ Bhr-¯n, Xcw-K-ssZÀLyw, {]thKw F¶nh X½n-epÅ \_Ôw.

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| **Content analysis** |
| Terms | Bhr-¯n, XcwKssZÀLyw, {]th-Kw |
| Fact | Xcw-K-¯nsâ Bhr¯n, Xcw-K-ssZÀLyw, {]thKw F¶nh X½nÂ \_Ô-s¸-«n-cn-¡p-¶p.  |
| Concepts | V= f λ Hcp Xcw-K-¯nsâ Bhr-¯nbpsSbpw Xcw-K-ssZÀLy-¯n-sâbpw KpW-^-e-am-bn-cn¡pw AXnsâ {]thKw |

**Curricular Objectives**:þ Xcw-K-¯nsâ Bhr¯n, Xcw-K-ssZÀLyw, {]thKw F¶nh X½n-epÅ \_Ôw a\-Ên-em¡n {]iv\-§Ä \nÀ[m-cWw sN¿p-¶-Xn-\pÅ Ignhv t\Sp-¶-Xn-\v.

**Learning Strategies**:þ Group activities, group discussion, self monitoring, black board usage

**Subject Reality** :þ Hcp Xcw-K-¯nsâ Bhr¯n, XcwKssZÀLyw, {]thKw F¶n-h-sb-¸än Ip«n-IÄ¡-dn-bmw.

**Learning Resouces**:þ Charts, scale, pencil etc

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| **Learning Activity**:þ | **Response** |
| **Stage:I** |
| Ip«n-I-tfmSv Ah-cpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn Nne tNmZy-§Ä tNmZn-¡p-¶p. |  |
| 1. Hcp Xcw-K- ssZÀLy-¯nsâ Bhr-¯n, Xcw-K-ssZÀLyw, {]thKw F¶n-h-sb-¸än \n§Äs¡-´-dnbmw?2. ~Hcp Xcw-K-¯nsâ Bhr-¯nbpw Xcw-K-ssZÀLyhpw hn]-co-X-\p-]m-Z¯n-emtWm? |
| Ip«nIÄ Ah-cpsS ]T-\-{]-{In-b-bnse t\«-§fpw t]mcm-bva-Ifpw Xncn-¨-dnªp |
| Ip«n-I-tfmSv Hcp Xcw-K-¯nsâ Bhr-¯n-bpw Xcw-K-ssZÀLyhpw {]th-Khpw X½n-epÅ \_Ô-s¯-¸än Nn´n-¡p-hm³ Bh-iy-s¸-«p. hyXykvX Xcw-K-§Ä¡v hyXykvX Bhr-¯nbpw hyXykvX Xcw-K-ssZÀLyhpw Bbn-cn¡pw D­m-bn-cn-¡p-I. AXn-\-\p-k-cn¨v hyXykvX {]th-Khpw D­m-bn-cn-¡p-tam-sb¶v {Kq¸nÂ NÀ¨ sNbvXv kb³kv Ub-dn-bnÂ Ipdn-¡m³ Bh-iy-s¸-Sp-¶p.  |
| **Stage:II** |
| **Metacognitive Monitoring and Regualations** |
| 1. **Planning or Organising**
 |
| Hcp NmÀ«v D]-tbm-Kn¨v So¨À Hcp sk¡âv sIm­v Hcp XcwKw k©-cn-¨-Xnsâ Xcw-K-Nn-{Xo-I-cWw Ip«n-Isf ImWn-¡p-¶p. CXv hni-I-e\w sNbvXv Xmsg X¶n-cn-¡p¶ tNmZy-§Ä¡v D¯-c-sa-gp-Xm³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p. C:\Documents and Settings\user\Desktop\03.jpg1. Nn{X-¯nÂ F{X Xcw-K-§Ä D­v?2. XcwssZÀLyw (λ) F{X?3. Bhr¯n (f) F{X?4. Xcw-K-¯nsâ {]thKw (v) F{X? | Ip«nIÄ Nn{Xw hni-Ie\w sNbvXpFÃm {Kq¸p-I-fp-sSbpw D¯cw icn-bm-bn-cp¶p |
| **Consolidation:-** |
| {Kq¸v eoUÀamÀ D¯-c-§Ä hmbn-¡p-¶p. So¨À t{ImUo-I-cn-¡p-¶p. Nn{X-¯nÂ 2 Xcw-K-§Ä ImWmw. Xcw-K-ssZÀLyw=4 m. Hcp sk¡âp-sIm­v 8 m k©-cn-¡p-¶-Xn-\mÂ {]thKw 8 m/s2~Hcp sk¡âp-sIm­v 2 ssk¡n-fp-IÄ ]qÀ¯n-bm-¡p-¶-Xn-\mÂ Bhr¯n = 2 HzCXp-t]mse asämcp XcwKw Hcp sk¡âp-sIm­v k©-cn- ¨Xnsâ Nn{Xw {]ZÀin-¸n-¡p¶p. CXnsâ λ ,V,f F¶nh AS-bm-f-s¸-Sp-¯m-\m-h-iy-s¸-Sp-¶p. CXnÂ \n¶pw Hcp \nK-a-\-¯nÂ F¯n-t¨-cp-¶p.Hcp Xcw-K-¯nsâ Bhr-¯nbpsSbpw Xcw-K-ssZÀLy-¯n-sâbpw KpW-\-^-e-am-bn-cn¡pw AXnsâ {]th-Kw.{]thKw = Bhr¯n X Xcw-K-ssZÀLyw |
| 1. **Monitoring:-**
 | Hcp tNm-Zy¯nsâ D¯cw FÃm {Kq¸p-Ifpw sXän¨pD¯-c-§Ä kb³kv Ub-dn-bnÂ tcJ-s¸-Sp¯nIp«n-IÄ {]iv\-¯n\v D¯-cw -I-s­-¯p-¶p. |
| So¨À Xcw-K-¯nsâ Bhr¯n, {]th-Kw, Xcw-K-ssZÀLyw F¶n-h-sb-¡p-dn¨v Hcp eLp-hn-h-cWw \ÂIp-¶p. Ch X½nÂ F§ns\ \_Ô-s¸-«n-cn-¡p-¶p-sh¶pw So¨À hni-Zo-I-cn-¡p-¶p. C§\ ]Tn¨ Imcy-§Ä hyà-ambn a\-Ên-em-bn-«pt­m F¶v Nn´n-¡p-hm³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.Xcw-K-§-fpsS aäv khn-ti-j-X-I-sf-¡p-dn¨v I­p-]n-Sn-¡m\pw kb³kv Ub-dn-bnÂ Ipdn-¨n-Sm\pw Bh-iy-s¸-Sp-¶p.»m¡v t\_mÀUnÂ X¶n-cn-¡p¶ tNmZyw Fgp-Xp-¶p.Hcp Xcw-K-¯nsâ Bhr¯n 256 Hz Dw Xcw-K-ssZÀLyw 2 m Dw BsW-¦nÂ {]thKw IW-¡m-¡p-I.  |
| **Consolidation:-** |
| Ip«n-IÄ t\_mÀUnÂ X¶n-cn-¡p¶ tNmZy-¯n\v D¯cw Is­¯n  V=f λ V=? F= 256Hz λ = 2mthere fore V= 256 X 2 =512m/s |
| **c)Evaluation or Reflection:-** |
| A[ym-]-I³ Xmsg ]d-bp¶ tNmZy-§Ä¡v D¯-c-§Ä Is­-¯p-hm³ Ip«n-I-tfmSv ]d-ªp.1. FÃm Xcw-K-§-fp-sSbpw Bhr-¯nbpw Xcw-K-ssZÀLyhpw Xpey-amtWm?2. Xcw-K-ZÀLy-¯nsâ hnhn[ khn-ti-j-X-I-sf-¡p-dn¨v Adn-hp-IÄ e`n-¡p¶ Dd-hn-S-§Ä Gh?3. Ct¸mÄ Cu ]mTw \n§Ä¡v IqSp-XÂ hyà-ambn a\-Ên-em-Ip-¶pt­m?4. Xpey-{]-th-K-apÅ c­v hyXykvX Xcw-K-§sf Xmc-Xayw sNbvXmÂ Ah-bpsS Bhr-¯nbpw Xcw-K-ssZÀLyhpw X½n-epÅ \_Ôw a\-Ên-em-¡p-I.  |
| **Metacognitive Review** |  |
| 1. \n§Ä Ct¸mÄ ]Tn¨ ]mT-`mKw \n§-fnÂ GsX-¦nepw Xc-¯n-epÅ Adnhv k¼m-Zn-¡m-\pÅ XmÂ]cyw hÀ²n-¸nt¨m?2. Cu ]mT`mKw ]Tn-¡m³ \n§-fpsS ap¶-dnhv \n§sf F{X-t¯mfw klm-bn-¨p. |

**15**

**LESSON PLAN BASED ON METACOGNITIVE LEARNING STRATEGIES**

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| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | Xcw-K- N-e\w |
| Topic | A\p-ssZÀLy XcwKw |
| Duration | 40 minutes |

**Content overview:-** A\p-{]Ø Xcw-K-§sf¡qSmsX aäp-Xcw Xcw-K-§fpw D­v. Ah-bmWv A\p-ssZÀLy XcwKw

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| --- |
| **Content analysis** |
| Terms | A\p-ssZÀLy XcwKw |
| Facts  | Xcw-K-§sf c­mbn XcwXn-cn-¨n-cn-¡p-¶p.1. A\p-{]Ø Xcw-K-§Ä2. A\p-ssZÀLy Xcw-K-§Ä |
| Concepts | am[ya-¯nse IW-§Ä Xcw-K-¯nsâ k©m-c Zni¡v kam-´-c-ambn I¼\w sN¿p-¶p-s­-¦nÂ A¯cw Xcw-K-§-fmWv A\p-ssZÀLy Xcw-K-§Ä  |

**Curricular Objectives**:þ A\p-ssZÀLy Xcw-K-s¯-¡p-dn¨v a\-Ên-em-¡p¶Xn\pw Ahsb Xncn-¨-dn-bp-¶-Xn\pw

**Learning Strategies** :þcharts, self questioning, individual activity, group discussion, self evaluation

**Subject Reality:-** Ip«n-IÄ¡v Xcw-K-§Ä F¶mÂ F´m-sW¶pw Ahsb c­mbn Xcw-Xn-cn-¨n-cn-¡p-¶p-sh¶pw AXnÂ H¶v A\p-{]Ø Xcw-K-§-fm-sW¶pw Adn-bmw.

**Learning Resources:-** Én¦n, SyqWnwKv t^mÀ¡v, NmÀ«v

|  |  |
| --- | --- |
| **Learning Activities:-** | **Response** |
| **Stage: I** |
| **Metacognitive Knowledge** |
| Ip«n-I-tfmSv Ah-cpsS ap¶-dnhv ]cn-tim-[n-¡m-\mbn Nne tNmZy-§Ä tNmZn-¡p-¶p. |  |
| 1. XcwK Ne-\s¯¡pdn¨v \n§Äs¡s´Ãmw Adnbmw?2. Xcw-K-§Ä GsXÃmw Xc-¯n-ep­v?3. \n§-fpsS \nXy-Po-hn-X-¯nÂ \n¶pw XcwK Ne-\-¯n\v hyXykvX DZm-l-c-W-§Ä Is­-¯n-sb-gp-XpI  |
| Ip«n-IÄ Ah-cpsS ]T\ {]{In-b-sb-¸än IqSp-XÂ t\_m[-hm-·m-cmbn |
| Xcw-K-§sf¸än IqSp-XÂ ]Tn-t¡-­-Xnsâ Bh-iy-I-X-Isf¡pdn¨v Ip«n-Isf So¨À t\_m[-hm-·m-cm-¡p-¶p.A\p-{]Ø Xcw-K-§-sf-¡q-SmsX asämcp Xcw Xcw-K-§Ä IqSn-bp-s­¶pw hni-Zo-I-cn-¡p-¶p. Ahbv¡v DZm-l-c-W-§Ä Is­-¯m³ Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p. |
| **Stage :II** |
| **Metacognitive Monitoring and Regulation** |
| 1. **Planning or Organising**
 |
| \mw Znh-khpw ]e-Xcw i\_vZ-§Ä tIÄ¡m-dp-­v. GXp cq]¯n-emWv i\_vZw k©-cn-¡p-¶-sX¶v \n§Ä¡-dn-bmtam? i\_vZw Xcw-K-cq-]-¯n-emWv k©-cn-¡p-¶-Xv. i\_vZ-X-cw-K-§Ä A\p-{]Ø Xcw-K-§-fmtWm F¶v \ap¡v ]cn-tim-[n¡mw. CXn\v th­n Ip«nIÄ {Kq¸p-I-fmbn Xncn-bp-¶p. FÃm {Kq¸p-IÄ¡pw \of-apÅ Hcp Én¦n \ÂIp-¶p. \of-apÅ Hcp Én¦n Xnc-Ýo-\-ambn Aev]w hen-¨p-]n-Sn¨v Én¦n-bpsS A{K¯p \n¶v \mtem At©m Npcp-fp-IÄ AaÀ¯n hn«p-t\m-¡m³ ]d-bp-¶p. Xmsg sImSp¯n-cn-¡p¶ tNmZy-§Ä¡v D¯-c-§Ä Is­-¯m³ Bh-iy-s¸-Sp-¶p.1. Én¦n-bnse Xcw-K-¯nsâ Zni Ft§m-«mWv?2. ImWn-I-fpsS I¼-\-¯nsâ Zni Ft§m-«mWv? |
| **Consolidation :-** | Ip«n-IÄ {i²m-]qÀÆw ]co-£Ww sN¿p-¶p.SyqWnwKv t^mÀ¡v D]-tbm-Kn¨v Ip«n-IÄ i\_vZ-X-cw-K-fp-­m-¡n Ahsb {ihn-¡p¶p |
| {Kq¸v eoUÀamÀ D¯-c-§Ä hmbn-¡p-¶p. So¨À t{ImUo-I-cn-¡p-¶p. Én¦-nbnse GXm\pw Npcp-fp-IÄ tNÀ¯v AaÀ¯nb tijw hnSp-t¼mÄ Xcw-K-N-e-\-¯nsâ Zni ssI¿psS ASp¯v \n¶pw Npa-cn-\-Spt¯¡mbn-cn-¡pw. Cu Xcw-K-§Ä Npa-cnÂ sI«nb Aä¯v F¯nb tijw Xncn-¨p-h-cp-¶-Xmbn ImWmw.  A\p-ssZÀLy Xcw-K-§-fpsS Ne\ Zni-bnÂ Xs¶-bm-bn-cn¡pw am[y-a-¯nse IW-§-fpsS I¼-\-¯nsâ Zni-bpw. am[y-a-¯nse IW-§Ä Xcw-K-¯nsâ k©m-c- Znibv¡v kam-´-c-ambn I¼\w sN¿p-s¶-¦nÂ A¯cw Xcw-K-§-fmWv A\p-ssZÀLy-X-cw-K-§Ä. FÃm {Kq¸p-IÄ¡pw Hmtcm SyqWn§v t^mÀ¡v \ÂIn-b-Xn\v tijw Ah D]-tbm-Kn¨v i\_vZ Xcw-K-§Ä D­m¡n Ah-bpsS {]tXy-I-X-IÄ kb³kv Ub-dn-bnÂ Ipdn-¡m³ Bh-iy-s¸-Sp-¶p. |
| 1. **Monitoring:-**
 |  |
| A\p-ssZÀLy Xcw-K-§-sf-¡p-dn¨v So¨À Hcp eLp-hn-h-cWw \ÂIp-¶p. hmbp-hnse IWn-I-IÄ ASp¯-Sp-¯mbn ImWp¶ aÀ±w IqSnb {]tZ-i-§sf compressions F¶pw aÀ±w Ipdª {]tZ-i-§sf ravefactions F¶p ]d-bp-¶p. A\p-ssZÀLy Xcw-K-§fpsS Xcw-K-ssZÀLyw F¶Xpw kam\ I¼-\m-h-Øn-bn-epÅ ASp-¯-Sp¯ c­v IW-§Ä X½n-epÅ AI-e-amWv |
| **Consolidation:-** |
| Ip«n-IÄ¡v A\p-tbm-Py-ssZÀLy Xcw-K-§-sf-¡p-dn¨v hyà-amb Hcp [mcW e`n-¨p. \nXy-Po-hn-X-¯nÂ \n¶pw A\p-ssZÀLy Xcw-K-§Ä¡v IqSp-XÂ DZm-l-c-W-§Ä Ip«n-IÄ Is­-¯n. A\p-ssZÀLy Xcw-K-¯nsâ Nn{Xw Ip«n-IÄ kz´w t\m«v \_p¡nÂ ]IÀ¯nb tijw aÀ±w IqSnb {]tZ-i-§sf "C' F¶pw aÀ±w Ipdª {]tZ-i-§sf "R' F¶pw tcJ-s¸-Sp-¯n.  |  |
| 1. **Evaluation or Reflection:-**
 |
| Xmsg ]d-bp¶ tNmZy-§Ä¡v D¯-c-§Ä Is­-¯m³ So¨À Ip«n-I-tfm-Sm-h-iy-s¸-Sp-¶p.1. A\p-ssZÀLy Xcw-K-§Ä¡v IqSp-XÂ DZm-l-c-W-§Ä Is­-¯pI?2. Xcw-K-§-sf-¡p-dn¨v Ct¸mÄ \n§Ä¡v hyà-amb Hcp [mc-W-bpt­m?3. A\p-{]Ø Xcw-K-§-sfbpw A\p-ssZÀLy Xcw-K-§-sfbpw hyà-ambn DZm-l-c-W-k-lnXw Xmc-Xayw sN¿m³ \n§Ä¡nt¸mÄ Ign-b-p¶pt­m? |
| **Metacognitive Review:-** |  |
| 1. Cu ]mTw a\-Ên-em-¡m³ th­n \n§Ä D]-tbm-Kn¨ Nn´m-[m-c-IÄ Fs´Ãmw?2. Ct¸mÄ e`n¨ Adn-hp-IÄ \n§Ä¡v \n§-fpsS {]mtbm-KnI Pohn-X-¯nÂ D]-tbm-Kn-¡m³ Ign-bptam? |

**Appendix II**

**LESSON PLAN BASED ON CONSTRUCTIVIST METHOD OF TEACHING**

|  |
| --- |
| **General information** |
| Name of the teacher | FATHIMATH SAMEERA. M |
| Name of the school | G.G.V.H.S.S, FEROKE. |
| Standard | IX­­­TH P |
| Strength | 54 |
| Subject  | PHYSICS |
| Unit | XcwK Ne\w |
| Lesson Unit | kn¼nÄ s]âpew |
| Duration | 40 minutes |

|  |
| --- |
| **Content analysis** |
| Terms | kn¼nÄ s]âpew, tZme-\w, t\_m\_v, Xpe-\-\_nµp |
| Facts | 1. DuªmemSpt¼mÄ Duªm-ensâ \of-¯n-\-\p-k-cn¨v B«w ]qÀ¯n-bm-¡m-s\-Sp-¡p¶ kabw hyXy-kvX-am-Wv.2. t¢m¡nsâ kabw {Iao-I-cn-¡p-¶-Xn-\mbn s]âpe¯nsâ \ofw {Iao-I-cn-¡m-dp-­v.3. s]âp-e-¯nsâ Ne\w Øm\-´c Ne-\-¯nÂ \n¶pw hyXy-kvX-am-Wv. |
| Concepts:- | 1. Hcp \nÝnX \_nµp-hns\ Bkv]-Z-am¡n s]âp-e-¯nsâ apt¶m«pw ]nt¶m-«p-apÅ Ne-\-amWv tZme\w2. s]âpew \nÝ-em-h-Ø-bn-em-bn-cn-¡p-t¼mÄ DÅ Øm\-amWv Xpe-\-\_n-µp.3. Xpe\ \_nµp-hn³ \n¶v t\_m\_n-\p-­m-Ip¶ Gähpw IqSnb Øm\-´-c-amWv Bb-Xn.4. Hcp tZme-\-¯n-\m-h-iy-amb ka-b-amWv ]ncn-bUv.5. Hcp sk¡ân-ep-­m-Ip¶ tZme-\-§-fpsS F®-amWv B Bhr-¯n.  |

**Learning Objectives :-** 1.kn¼nÄ s]âpew ]cn-N-b-s¸-Sp-¶-Xn\v

2. kn¼nÄ s]âp-e-¯nsâ ]ncn-b-Uv, Bhr¯n F¶nh X½n-epÅ \_Ôw Adn-bm³

3. kn¼nÄ s]âp-e-¯nsâ {]tXy-I-X-IÄ, AXns\ kw\_-Ôn¨ ]pXnb ]Z-§Ä F¶nh a\-Ên-e-¡p-¶-Xn\v.

**Process Skills :-** Observation, identified, analysis, infers

**Pre requisities**:- t\ÀtcJm Ne-\w, hÀ¯pf Ne-\w, I¼-\w, tZme\w F¶n-§s\ ]e-hn[ Ne-\-§Ä D­v.

**Resources/Learning Materials:-**

**Apparatus :** kn¼nÄ s]âpew

**Improvised aids** : NmÀ«v

**Product/Value**

1. Ip«n-I-fnse \nco-£W ]mShw hÀ²n-¸n-¡p-¶p.

2. Ip«n-I-fnse imkv{X IuXp-Ihpw XmÂ]-cyhpw hÀ²-¡p-¶p.

|  |  |
| --- | --- |
| Process | Evaluation |
| ~Hcp IY-bn-epsS ¢mÊv XpS-§p-¶p. cmPphpw cm[bpw Duªm-e« aÕ-c-¯n-em-Wv. cmPp \¶mbn {ian¨n«pw Ft¸mgpw cm[-bmWv Pbn-¡p-¶-Xv. BcmWv GähpamZyw 10 B«w ]qÀ¯n-bm-¡pI F¶-XmWv aÕ-cw. F´m-bn-cn¡pw Ft¸mgpw cm[ Pbn-¡p-¶-Xnsâ ImcWw? \n§Ä¡q-ln-¡mtam? |  |
| **Activity - I** |  |
| \of-§Ä hyXy-kvX-amb c­v Duªm-ep-I-fpsS sNdnb amXrI Ip«n-IÄ¡v ImWn¨p sIm-Sp-¡p-¶p. c­v Duªmepw Htc kabw B«m³ XpS-§p-¶. Duªm-em«w \nco-£n¨v \nK-a-\-§Ä kb³kv Ub-dn-bnÂ tcJ-s¸-Sp-¯m³ Bh-iy-s¸-Sp-¶p. |
| **NÀ¨m kqN-I-§Ä** |
| 1. GXv Duªm-emWv thK-¯nÂ BSp-¶Xv?2. F´m-bn-cn¡pw ImcWw?3. Duªm-ensâ thKX F´-ambn \_Ô-s¸-«n-cn-¡p-¶p. |
| **t{ImUoI-cWw** |
| sNdnb DuªmÂ thK-¯nÂ BSp-¶p-sh¶pw Duªm-ensâ thKX Duªm-ensâ \ofs¯ B{i-bn-¡p-¶p-sh¶pw Ip«n-IÄ a\-Ên-em-¡p-¶p. |
| **Activity -2** |
| Ip«n-IÄ¡v kn¼nÄ s]âpew \ÂIp-¶p. s]âp-e-¯nsâ LS-I-`m-K-§Ä a\-Ên-em-¡m\pw Ne-\-¯nsâ khn-ti-j-X-IÄ kb³kv Ub-dn-bnÂ tcJ-s¸-Sp-¯m\pw Bh-iy-s¸-Sp-¶p. |
| NÀ¨m kqN-I-§Ä |
| 1. s]âp-e-¯n\v GsX-Ãmw `mK-§-fp­v ?2. s]âp-e-¯nsâ Ne\w GXv Xc-¯n-ep-Å-XmWv?  |
| **t{ImUo-I-cWw** |
|  s]âp-e-¯nsâ LS-I-§Ä : t\_m\_v, s]âp-e-¯nsâ \ofw, t\_m\_nsâ amkv F¶nh Ip«n-IÄ¡v So¨À a\-Ên-em¡n sImSp¡p-¶p. s]âp-e-¯nsâ Ne-\s¯ tZme\w F¶mWv ]d-bp-¶-sX-¶pw, Xpe-\-\_n-Ôp, Bb-Xn, ]ncn-bUv, Bhr¯n F¶n-h-sb-s´m-sW¶pw So¨-dpsS klm-b-t¯msS Ip«n-IÄ a\-Ên-em-¡p-¶p. Ch-bpsS \nÀÆ-N-\-§Ä NmÀ«nÂ Fgp-Xn-bXv Ip«n-I-sf-s¡m­v hmbn-¸n-¡p-¶p.kn¼nÄ s]âpew C:\Documents and Settings\user\Desktop\02.jpgt\_m\_v: s]âp-e-¯nsâ tKmf-`mKwtKmf `mKw.\ofw: t\_m\_nsâ tI{µw apXÂ NcSv Ìm³UnÂ Xq¡n-bn-«n-cn-¡p-¶Xv hscbpÅ AIew |
| tZme\wXpe-\-\_nµp BbXn]ncn-bUvBhr¯nC:\Documents and Settings\user\Desktop\05.jpg |  |
| **Follow up activities** |
| 1. tZme\ Ne\w A\p-`-h-s¸-Sp¶ amäp PohnX kml-N-cy-§Ä Gh?2. ]g-b-Ime s]âpew t¢m¡p-I-fnÂ kab IrXyX hcp-¯p-¶Xv s]âp-e-¯nsâ GXv LS-I-¯nÂ amäw hcp-¯n-bm-bn-cp-¶p. At\z-jn¨v Is­-¯p-I. |

**EFFECTIVENESS OF METACOGNITIVE LEARNING STRATEGIES**

**ON THE ACHIEVEMENT IN PHYSICS OF**

**STANDARD IX PUPILS**

**FATHIMATH SAMEERA M.**

Dissertation

Submitted to the University of Calicut

In partial fulfillment of requirements

for the degree of

**MASTER OF EDUCATION**

**FAROOK TRAINING COLLEGE**

**UNIVERSITY OF CALICUT**

**2013**

**DECLARATION**

I, **FATHIMATH SAMEERA. M,** do hereby declare that this dissertation entitled **“EFFECTIVENESS OF METACOGNITIVE LEARNING STRATEGIES ON THE ACHIEVEMENT IN PHYSICS OF STANDARD 1X PUPILS”**, has not been submitted by me for the award of any Degree, Diploma, Title or Recognition before.

**Farook Training College FATHIMATH SAMEERA. M**

Date:

**T.K. UMER FAROOQUE**

Assistant Professor

Farook Training College

Farook College (P.O)

Calicut

**CERTIFICATE**

I, **T.K.UMER FAROOQUE**, do hereby certify that the dissertation entitled **“EFFECTIVENESS OF MATACOGNITIVE LEARNING STRATEGIES ON THE ACHIEVEMENT IN PHYSICS OF STANDARD IX PUPILS”**, is a record of bonafide study carried out by **FATHIMATH SAMEERA.M,** under my supervision and guidance. The report has not been submitted by her for the award of a Degree, Diploma, Title or Recognition before.

**Farook Training College T.K. UMER FAROOQUE**

Date: (Supervising Teacher)

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Farook Training College **FATHIMATH SAMEERA. M**

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**Chapter I**

INTRODUCTION

* **Need and Significance**
* **Statement of the Problem**
* **Definition of the Key Terms**
* **Variables Selected for the Study**
* **Objectives of the Study**
* **Hypotheses of the Study**
* **Methodology**
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* **Major Findings of the Study**
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8606461209 – Sameera