

CONSTRUCTIVIST APPROACH TO TEACHING- LEARNING: KNOWLEDGE, ATTITUDE AND PRACTICES OF ELEMENTARY SCHOOL TEACHERS IN MIZORAM

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DECLARATION

I, Grace Kim Khaute, hereby declare that the thesis/subject matter of Thesis entitled “Constructivist Approach to Teaching-Learning: Knowledge, Attitude and Practices of Elementary School Teachers in Mizoram”, is a record of work done by me, that the content of this Thesis did not form basis of the award of any previous degree to me, or to the best of my knowledge, to anybody else; and that the Thesis has not been submitted by me for any research degree in any other University/ Institute.

This is being submitted to the Mizoram University, Aizawl for the award of Doctor of Philosophy in Education.

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CHAPTER-I

INTRODUCTION

1.01: Prologue

The importance of teaching and the central role that teachers play in determining the quality of learning in classrooms cannot be undermined. As learners, nearly every one of us has been a product of teacher centred instructions characterised by fact based subject matter, home works and rote memorisation. In most classrooms learning is conceived of as a process in which students absorb information passively and store it in easily retrievable fragments as a consequence of regular exercise and reinforcement. But researchers have established that teachers can make a difference in how much students learn, and the difference depends on the approaches they follow to teach, mainly behaviourist or constructivist.

Our traditional classrooms are characterised by the importance accorded to the teacher who holds the supreme authority and is the most knowledgeable. On the other hand, students are raised to be devoted and obedient followers who would never question the teacher's precepts. Generally students are directed to work individually on similar, ability based assignments to guarantee consistency in learning. These practices miserably failed to promote the skills of independent thinking in the students. Unfortunately these practices still continue to dominate today's classrooms. Research findings from psychology indicate that learning does not occur by passive absorption alone. *Resnick (1987)* (in Simon & Schifter, 1992, 187). Instead, in various situations individuals approach a new task with prior knowledge, assimilate new information, and construct their own meanings.

Behaviourists' views of learning predominated in teaching-learning process for a long time. The importance of observable, external events on learning and the role of reinforcers in influencing those events were emphasised. It was the goal of behaviourists to determine how external instructional manipulations brought about changes in students' behaviour. However, in the late 1950s a paradigm shift took place in learning psychology. Developments in cognitive psychology focused attention on teachers, researchers and educationists and the fundamental role that learners engage in creating or constructing new knowledge. The works of Jean Piaget and Lev Vygotsky, as well as many linguistics and anthropologists have significantly influenced the manner in which teaching and learning is viewed today.

Changing the status accorded to the teacher and their influence and shifting the trend from teacher centred to that of learner centred will necessitate effort, persistence, faith and determination. Classroom teaching practice becomes more effective, when it is directed by an understanding of how students' learn and if students are given the opportunity to explain or clarify their ideas learning will be more successful. Therefore, in terms of pedagogy, the improvement in education and our educational system would require teaching strategies that emphasize students' involvement in their learning, where the focus on learning should be geared towards knowledge construction rather than knowledge transformation. Similarly, the shift to constructivist teaching would require teachers to reflect upon their existing practices and understand the basic principles involved in constructivist teaching which cannot be grafted on traditional teaching methods. For the realisation of these changes in the classroom culture, constructivist pedagogy calls for the modification and transformation of existing classroom traditions.

The importance given to education and the various steps taken by the government in our country to ensure "Education For All", and the ever increase and expansion of education definitely highlights the fact that teachers occupy an indispensable role in exerting an escalating amount of authority on everyone's life. No doubt the type of future the children will experience is liable to be influenced more by teachers. As such, what students learn today, the way they learn it, and the manner in which knowledge is presented today will determine how students will solve problems tomorrow. Teachers are, therefore, expected to educate themselves with a rich understanding of facts and theories about learning so that learning can be viewed more realistically. Moreover, it is necessary that teachers augment their knowledge and understanding of the different ways to teach students that will be most beneficial and meaningful for their learning.

Everywhere we find teachers who do not only vary in their age, experience, educational qualifications, professional trainings, but also in their knowledge, attitude, and practices and on many more variables. These variables matter in the way they teach to their students. Constructivist teaching-learning approach has become popular very recently, more particularly in our country. This approach is very much important at the elementary school level to develop proper study habits among the children at their formative period of life which will have long term implications in

their future life. The teachers have to follow the approach both in and out of their class rooms. But the question arises ‘what is the helm of affair?’

1.02: Importance of Approaches to Teaching-Learning

Teaching is a highly complex activity requiring the use of various skill based components like methods, strategy and tactics of teaching. A monotonous, routine and fixed way of teaching will never succeed in achieving a wide range of instructional objectives. It is essential that a teacher makes use of different styles, methods and a variety of tactics and strategies of teaching to match and fulfil the objectives of teaching. It is necessary to keep in mind that students have a multi-dimensional personality and each of them is unique with their own unique learning styles. The strength of teaching resides in the intelligent application of productive, innovative and a powerful variety of teaching strategies and approaches corresponding to a set of different goals and mixture of students’ characteristics and personality. Therefore, teachers should be able to identify and use the teaching approaches that will lead to effective learning. Approaches to teaching-learning are concerned mainly with the modus operandi, procedure, style or techniques of learning. Learning theories that emerged during the twentieth century have been supported by extensive experimentation. These theories may be classified into four major approaches/ faculties of learning or the schools of thought namely behaviouristic, humanistic, cognitive, and constructivist approaches. The approaches are briefly discussed here.

Behaviouristic Approach

The behaviouristic perspectives of learning originated in the early 20th century. Behaviourism is the school of psychology which was founded by John B. Watson based on the conviction that behaviours can be measured, trained, and changed. Behaviourism was established with the publication of Watson’s classic paper “Psychology as the Behaviourist Views It” (1913). In fact, Watson is often considered the “father” of behaviourism.

The central idea of behaviourism is that learning consists of a change in behaviour due to the acquisition, reinforcement and application of associations between stimuli from the environment and observable responses of the individual.

Behaviourists pay attention to quantifiable changes in behaviour and claim that all behaviours were results of conditioning. Conditioning takes place in the course of interaction with the environment, and our responses to environmental stimuli form our actions. Behaviourists believe that, anyone irrespective of their gender or background could be taught to act in a particular way given the right conditioning. According to this school of thought, behaviour can be studied in a systematic and observable manner with no consideration of internal mental states. It suggests that only observable behaviours should be considered since internal states such as cognition, emotions, and moods are too subjective.

Although behaviourism is not as popular today as it was during the middle of the 20th-century, it continues to play an influential force in psychology. Apart from its extensive use in psychology, the principles of behaviourism remain useful to animal trainers, parents, teachers, and many others. Successful curative techniques like intensive behavioural intervention, behaviour analysis, and discrete trial training are all embedded in behaviourism. They have been found to be very helpful in altering maladaptive or harmful behaviours in both children and adults.

Several critics believe and dispute that behaviourism is a one-dimensional approach to understanding human behaviour. They suggest that behavioural theories do not account for free will and internal influences such as moods, thoughts and feelings. This approach to learning does not take into account other types of learning, especially learning that occurs without the use of reinforcement and punishment. This is especially true in the case of people and animals, because they can adapt their behaviour when new information is introduced, even if a previous behaviour pattern has been established through reinforcement.

Humanistic Approach

The term 'humanistic' originates from 'humanism', which has been derived from the Latin word 'Homo' meaning 'human being'. Literally humanism is the philosophy in which the human being occupies a central place. Humanists think of learning as the way in which the individual develops his unique way of controlling his environment and attaining his best potential. It emerged during the 1950s as a reaction to the psychoanalysis and behaviourism that dominated psychology at that time. Psychoanalysis was focused on understanding the unconscious motivations that drive

behaviour while behaviourism studied the conditioning processes that produce behaviour. Humanist thinkers felt that both psychoanalysis and behaviourism were too pessimistic, either focusing on the most tragic of emotions or failing to take into account the role of personal choice.

The important characteristics of the humanistic approach are:

- It is concerned with the welfare of all human beings.
- This approach emphasises on learning in natural environment of human love, peace, cooperation, freedom, equality rather than of physical, values, money, wealth, etc.
- It believes in co-existence.
- It considers the best learning as based truth, goodness and beauty.
- It believes that learning becomes effective when it is need-based.
- Its emphasis is on learning at the higher level, i.e., self-transcendence and self-actualization.
- Learning is experience-based.
- It emphasises on self-motivation for better learning.
- It increases learner's self-direction and independence.
- It helps students take more responsibility for determining what they are learning.
- It increases learner's reactivity.
- It fosters creativity.

In the latter half of the twentieth century, it was felt that other theories failed to study the human being as "human being". In 1961, a journal of humanistic psychology was published which made it clear that humanistic psychology addresses such issues as individual's needs, creativity, belongingness, self-development, self-actualization, freedom, mental health, values, responsibilities, etc. Individualism, existentialism, empiricism and culturalism, etc, are different landmarks in this approach. Some of the major ideas and concepts that emerged as a result of the humanist movement include an emphasis on things such as: Self-Concept, Hierarchy of Needs, Unconditional Positive Regard, Free Will, Client-Centred Therapy, Self-Actualization, Fully-Functioning Person, and Peak Experiences.

The early development of humanistic psychology was heavily influenced by the works of a few key theorists, especially Maslow and Rogers.

Humanistic approach recommends educational reforms like open schools, upgraded classes, free schools, etc. The main implications of the humanistic approach to the learning process are that it believes in 'child-centred-education'. Therefore it emphasizes on reach, touch and teach the child according to his nature, interests and aptitudes. Teachers have to know their students: their personality, interests, capabilities and their backgrounds so that they can use teaching methods and contents accordingly. This approach emphasises on individuality, learner's readiness, mental set and motivation, and encourages self-discipline and self-control. It also recognises the teacher as a guide, friend and helper of the students in their learning. It is a democratic approach which recognises the child, and advocates the importance of providing a rich environment with a view to aid in the all round development. The teacher is therefore considered as the milestone in the journey of total development of the child.

Today, the concepts central to humanistic philosophy can be seen in many disciplines including different branches of psychology, education, therapy, political movements and other areas. Its goals remain as relevant today as they were in the 1940s and 1950s.

The philosophy of Humanism is often considered subjective because of the importance given to individual experience. It is hard to study and measure humanistic phenomena objectively. It totally depends upon the thinking of an individual not others. For instance, it is difficult to objectively tell if someone is self-actualized or whether he/she has unconditional positive regard for others. It is possible to only rely upon the individual's own assessment of their experience which may or may not be correct. At the same time it is difficult to accumulate objectively verified knowledge because there is no accurate way to measure or quantify these qualities.

Cognitive Approach

The word 'cognition' is derived from the Latin word 'cognoscere' which means to know, or to perceive. Cognitive theories discuss how people gain an understanding of themselves and their environment and how, in using this, they act in relation to their environment. It was initiated in the late 1950s, and contributed to the shift from behaviourism. It studies the mental processes including how people think, perceive, remember, and learn. According to cognitive theorists, teaching is a process of developing understanding or insight in the learner. Learning is the organization of precepts and purposes by the learner. Classroom experiences are related to the

individual goals of students. These experiences are encouraged to discover relationship to create the consequences of their efforts. Cognitive approach emphasizes and gives importance to cognition (perception) in learning. According to this approach, learning is a complex process and it is viewed as acquiring changes in the cognitive structure. These changes (learning) take place generally in basically three ways: Differentiation, Generalisation, and Restructurisation.

Unlike behaviouristic approach which sees learning as the overt behaviours of learners, in the cognitive approach, learning is considered as inner psychological functioning such as perception, concept formation, attention, memory and problem-solving. In this approach the learner first perceives the total situation/object in the problem field, finds a relationship between the elements of the object or the problem, and deduces a strategy of solving the problem.

Literature reveals the main characteristics of cognitive approach as follows:

- It places more importance on the human mental process.
- Learning is considered as an active and dynamic process.
- In this approach the perceptions of the learner are processed through differentiation, generalisation and restructuring which help the learner in reacting to the specific cognitive structure to get a clear picture of the environment.
- The cognitive approach is represented by a dynamic system and the learner is purposive, and interacting within the field of his/her goals.
- It is most suited for concept formation, problem solving and other higher mental processes.

Major topics that are dealt by this approach are – Perception, Language, Attention, Memory, Problem-Solving, Decision-Making and Judgement, and Intelligence.

Some of the people who are associated with this approach are Wilhelm Wundt, Hermann Ebbinghaus, William James, Wolfgang Kohler, Edward Tolman, and Jean Piaget.

Unlike behaviourism, which focuses only on observable behaviours, cognitive psychology is concerned with internal mental states. Unlike psychoanalysis, which relies heavily on subjective perceptions, cognitive psychology uses scientific research methods to study mental processes. Since this approach touches on many

other disciplines, it can be studied by people in other fields as well such as behavioural neuroscience, linguistics, industrial-organisational psychology, artificial intelligence etc.

Constructivist Approach

Constructivism emerged in the 1970s and 1980s, popularising the idea that people actively construct knowledge when interacting with their environment by reorganisation of their mental structures, and not just passive recipients of knowledge and information. In fact formalization of the theory of constructivism is generally credited to Jean Piaget (1896-1980), who suggested that through processes of accommodation and assimilation, individuals construct new knowledge from their experiences. Learners are, therefore, considered to make their own senses and interpretations of the world around them. Constructivist view of learning has led to a shift from the conventional “*knowledge-acquisition*” to “*knowledge-construction*” metaphor. It advocates learner-centred approach to teaching-learning which is evident from the works of influential theorists like Jean Piaget and Jerome Bruner.

Based on the different theories of learning and schools of thought many models of teachings have emerged. The emergence of Models of teaching can be attributed to Bruce Joyce and Marsha Weil (1972) who have transformed prevailing theories and theoretical knowledge into different ‘Models of Teaching’ which can be readily used by teachers in school settings. Today, teachers can select the teaching approaches based on different models of teaching best suited for their classroom.

Joyce & Weil (1985, 1) explain the models of teaching in the following way:

A model of teaching is a plan or pattern that can be used to shape curriculum (long-term courses of studies), to design instructional materials, and to guide instruction in the classroom and other settings.

The significant characteristics of models of teaching have been summarily presented by Siddique (2008, 142-143)

- Models of teaching are some sort of plans or guidelines or patterns or strategies of teaching.
- Models of teaching are not a haphazard combination of facts but are, on the other hand, systematic procedures to modify the behaviour of the learners.

- Models of teaching specify the learning outcomes or instructional objectives in terms of observable and measurable performance of students.
- Models of teaching specify in definite terms the environmental conditions under which a student's response should be observed.
- Models of teaching specify the criteria of acceptable performance expected from the students.

Researchers have proposed many models of teachings which are classified under four families:

- Behaviour Modification Family
- Information Processing Family
- Personal Family
- Social Interaction Family

Out of the four families of models of teaching, the last three models are found to be related to constructivism while behaviour modification family of models is found to be related to behaviourism.

The two approaches of learning that are very popular and relevant today are behaviourism and constructivism. Comprehensive discussions on these two approaches have been made in sections 1.03 and 1.04 respectively.

1.03: Behaviourism as an Approach to Teaching-Learning

Behaviourism, as a learning theory, can be traced back to Aristotle, whose essay "memory" focussed on associations being made between events such as lightning and thunder. The theory of behaviourism concentrates on the study of overt behaviours that can be observed and measured. According to behaviourists, the mind is viewed as a "black box" in the sense that response to stimulus can be observed quantitatively, totally ignoring the possibility of thought processes occurring in the mind. (Doolittle & Camp 1999 in Woldab, 2011, 88).

Behaviourism is dominated by the constraints of its attempts to emulate the physical sciences, which involves a refusal to speculate about what happens inside the

organism. Anything which relaxes this requirement slips into the cognitive realm. Much behaviourist experimentation is undertaken with animals and generalised. In educational settings, behaviourism implies the dominance of the teacher, as in behaviour modification programmes. It can, however, be applied to an understanding of unintended learning. (Sharma and Tomar, 2008, 145-146)

The behaviourist perspectives of learning originated in the early 1900s, and became dominant in early 20th century. The basic assumption of behaviourism is that learning occurs due to a change in the behaviour of an individual due to factors like acquisition, reinforcement and the application of associations between stimuli from the environment and the observational responses made by the individual. They are chiefly concerned with stimulus (S) and response (R) connections and so the alternative term 'connectionist', and these S-R links are of importance when they can be observed and measured. Basing upon the behaviouristic theory many models of teaching have been developed.

According to behaviourism, knowing is the ability to give correct answers when exposed to a particular stimulus. The behaviourists are not anxious about how or why knowledge is obtained, but whether correct responses are given or not. Following the behaviourist perspective, much of the educational practices were committed to organizing curricula and assessments according to behavioural objectives, based on analyses of complex skills into their components, and with instruction organized to ensure that students could master the pre-requisites of material they were expected to learn. (Gagne 1968, in Greeno, 1997, 91). Behaviouristic view of learning holds that learning is the resulting change in behaviour due to reinforcement strategies. In behaviouristic tradition learning is a process of changing or conditioning observable behaviour through selective reinforcement of learner's responses to stimuli (Khader, 2005, 6). We can see the stress placed on learner's efforts to accumulate knowledge and also to transmit knowledge. Space for learner imitated questions or independent thought is limited. The goal of the learner is to regurgitate the accepted explanation or methodology expostulated by the teacher. (Caprio1994, in Khader, 2005, 6). Preference for the learner's manifest behaviour, without looking for changes in mental states is the acceptable standard for identifying learning. Behaviouristic tradition invariably emphasises observable external behaviours and obviously, avoids reference to representation and thought of the learner. According to Fosnot (1996 in Khader,

2005, 6), When we study the behaviouristic epistemology, we cannot overlook the stress placed on intelligence, domains of objectives, levels of knowledge and reinforcement.

Behaviourists maintain that learning is acquisition of stimulus-response pair and the result of instruction. As such, the attainment of new knowledge and skills is considered to be a process controllable from the outside that has to be imposed on the individual learners. Learning through intrinsic motivation is widely ignored and learning targets are primarily formulated behaviouristically and this leads to the taylorisation of learning. (Jackson 1989, in Woldab, 2011, 88). As such the learning theory of behaviourism concentrates on the study of overt behaviour that can be observed and measured rather than what occurs in the mind. (Good & Brophy 1990, in Woldab, 2011, 88).

The use of behaviourist theory to the classroom is generally referred to as explicit or direct instruction. The teacher is the only active and dynamic driving force in the classroom, responsible for transmitting knowledge to students who are ordinarily assumed to soak up information without interest. Behaviouristic theory is a teacher directed and teacher controlled instructional system and this arrangement upholds competition, grading and standardised testing as the means to scrutinize the students' performance. However, this theory of learning is criticised for its inability to tackle and provide the prerequisite of high order critical and creative thinking, problem-solving and collaborative learning. According to this view of learning the major task of the teacher is to arrange the instructional environment to provide opportunities for supervised practice, rehearsal, exercise, feedback, and application.

The characteristics of behaviouristic approach can be summarised as below:

- Behaviouristic approach emphasises the objective study of observable behaviour of animal and human beings.
- Its gives more emphasis to environment in comparison to heredity in the determination of behaviour.
- It assumes that conditioning is the key to understand behaviour that is the link between stimulus and response which can be analysed scientifically.
- It suggests that conditioning is the chief method of learning.

- According to this approach, similarity, contrast or contiguity facilitates one unit of knowledge to get associated with a new unit of knowledge.

Basic questions raised on the behaviourist approach is whether it is viable to appraise the overall human or animal response by measurement, observing and analysing bits and pieces of the behaviour? How far is it essential to account for an organism's perception of a situation as a basis for responding to stimulation? Many have argued that human behaviour is too intricate and exhibits such original pathways to the solution of problems that a simple S-R theory could not possibly explain all of it. Now days, there is a paradigm shift in the teaching-learning approach i.e. from behaviourist to constructivist.

Some of the noted behaviourists are B. F. Skinner, John B. Watson, Ivan M. Sechenov, Ivan Pavlov, Vladimir M. Bekhterev, E.L. Thorndike, William McDougall, Clark Hull, E. C. Tolman, etc.

1.04: Constructivism as an Approach to Teaching-Learning

Constructivism has emerged as a dominant force to be reckoned in the context of school education across the world. Unlike the behavioural approach to education, constructivism believes in helping the child attain new knowledge, information, skills, etc, and construct meaning through his/her experiences, exploration, divergent, reflective, and critical thinking on account of prior knowledge, experience and skills.

About Constructivism, Siddique (2008, 139) writes:

Constructivism is an epistemology, a learning or meaning-making theory that offers an explanation of the nature of knowledge and how human beings learn. It maintains that individuals create or construct their own new understandings or knowledge through the interaction of what they already know and believe and the ideas, events, and activities with which they come in contact. Knowledge is acquired through involvement with content instead of imitation or repetition. Learning activities in constructivist settings are characterised by active engagement, inquiry, problem solving, and collaboration with others. Rather than a dispenser of knowledge, the teacher is a guide, facilitator, and co-explorer who encourage learners to question, challenge, and formulate their own ideas,

opinions, and conclusions. "Correct" answers and single interpretations are de-emphasised.

Dwivedi (2010, 16) states the following four epistemological assumptions which are at the heart of constructivist learning.

- Knowledge is physically constructed by learners who are involved in active learning.
- Knowledge is symbolically constructed by learners who are making their own representations of action.
- Knowledge is socially constructed by learners who convey their meaning making to others.
- Knowledge is theoretically constructed by learners who try to explain things they don't completely understand.

According to the constructivist philosophy, learner-centred pedagogies are concerned with student involvement in learning as active participants in construction of knowledge. They are actively engaged in the teaching-learning process. Goodyear (2000) summarized the following principles of constructivist learning, adapting from Darrouzet and Lynn (1999). (in Sreekala, 2010, 21)

- Learning is fundamentally social.
- Learning is integrated to the life of community.
- Learning is an act off participation.
- Knowing depends on engagement in practice.
- Engagement is inseparable from empowerment.
- Failure to learn is the exclusion from participation.
- People are natural lifelong learners.

Further, Pandey (2007, 24) has made a comparison of behaviourist and constructivist epistemology of learning as presented in the table below.

Changing Epistemology of Learning

| | Traditional (Behaviourist) | Constructivist |
|------------|--|---|
| Learning | Learning is a change in behaviour brought out through selective reinforcement of response. It is a product and external entity. | Learning is a process of subjective construction of knowledge based on personal experience of learner. |
| Knowledge | Passed on, transmitted, reproducible, and linear. | Reciprocally developed co-constructed, builds on prior-knowledge, spiral. |
| Pedagogy | Teacher centred <ul style="list-style-type: none"> • Evaluation and assessment of set knowledge • Practising, listening, reproducing • All students do the same tasks | Learner centred <ul style="list-style-type: none"> • Co-operative and experiential • Doing, stating, theorising • Range of possible responses • Tasks vary among students |
| Motivation | <ul style="list-style-type: none"> • Extrinsic, grade focus | <ul style="list-style-type: none"> • Intrinsic, learning focus |
| Teacher | <ul style="list-style-type: none"> • Imparter of knowledge • Asks questions • Explains concepts • Superior to learners | <ul style="list-style-type: none"> • Facilitator, guide • Raises questions • Facilitates students theorising • A learner among learners |
| Learners | <ul style="list-style-type: none"> • Are objects that learn • Passive listeners • Rarely asks questions beyond seeking clarification of instructions. | <ul style="list-style-type: none"> • Co-inquires • Active partners in learning • Raise questions. |

(Source: Pandey, 2007, 24)

1.05: Implications of Constructivist Approach on Teaching-Learning

Constructivist pedagogy

The traditional methods of teaching is generally associated with teacher-centric education where teaching is regarded as transmission of facts to students, who are considered passive recipients of whatever knowledge is shoved upon them. Lecture methods and rote memorisation predominate in such classrooms and teachers stress on finishing the huge syllabus without even enquiring whether students have actually

understood whatever has been taught. The relationships between teacher-students are regarded as distant and sometimes nonexistent because of lack of flexibility in communication and collaboration between the two. Teachers are considered and revered as the final authority of subject content, and they decide what should be taught and how it should be taught and students are to reproduce them in the light of the teacher's instruction.

Constructivist pedagogy is the pedagogy of liberation. It is also called the pedagogy of construction. (Andre Giordan, 1995, in Woldab, 2011, 89) Constructivism is the new buzz word in educational pedagogy that calls for a major rethinking about teaching and learning process which is unquestionably going to influence both curriculum and instruction. Apart from providing a 'new theory of learning' constructivism also provides a 'new theory of teaching'. The constructivist epistemology is based on the assertion that learning does not involve discovering the reality, but constructing the reality. Accordingly, the constructivist theory advocates that knowledge is being actively constructed by the individual and learning is an adoptive process based on the experiences of individual. Hence constructivist theory calls for a major alteration in the teaching-learning process by replacing teacher-centred direct instruction to a new and innovative student-centred curriculum and teaching practices.

Basing upon the constructivist theory many models of teaching have been developed. Some of the noted constructivists and their works include: the Information Processing family such as Concept Attainment Model of J. Bruner, and Cognitive Growth Model of Jean Piaget; and the Social Family of Models of teaching concerned with the social relationship of the individual with others in the society advocated By Lev Vygotsky.

Information Processing Family of models intends to cultivate the information processing ability in the learners and help them to improve their capability to master information. Information processing refers to the way people handle stimuli from the environment, organise data, sense problems, generate concepts and solutions to problems, and employ verbal and non-verbal symbols. Though information processing models are concerned with the intellectual skills and acquisition of knowledge by the students, they also contribute to the realisation of personal and social goals. The major models, in this family are: Inductive Thinking Model propounded by Hilda Taba and

Inquiry Training Model of Richard Suchman; Scientific Inquiry propounded by Joseph J. Schwab; Concept Attainment propounded by Jerome Bruner; Cognitive Growth propounded by Jean Piaget, Irving Sigel, Edmund Sullivan, and Lawrence Kohlberg; Advance Organizer Model propounded by David Ausubel; Memory model propounded by Harry Lorayne and Jerry Lucas.

Personal Family of models share an orientation towards the individual and the development of self-hood. These models emphasise the processes by which individuals construct and organise their unique reality. They pay attention to human feelings and emotions and try to move towards the development of an integrated functioning self. The major models in this family are: Non-Directive teaching propounded by Carl Rogers; Awareness Training model of Fritz Perls, and William Schutz; Synectics propounded by William Gordon; Conceptual Systems of David Hunt; and Classroom Meeting model propounded by William Glasser.

Social Interaction Family of models share an orientation towards the individual with emphasis on the development of capabilities for inter-personal relationships, the development of social skills and priority to the improvement of the individual's ability to engage in democratic processes and to work productively in the society. The important models in this family are: Group Investigation propounded by Herbert Thelen and John Dewey; Social Inquiry propounded Byron Massialas and Benjamin Cox; Laboratory Method designed by National training laboratory (NLT) Bethel, and Maine; Jurisprudential model propounded by Donald Oliver and James P. Shaver; Role Playing by Fannie Shaftel and George Shaftel; and Social Simulation propounded by Sarene Boocock and Harold Guetzkow.

Noted Constructivists are Jean Piaget, John Dewey, Lev Vygotsky Giambattista Vico, Immanuel Kant, John Dewey, Maria Montessori, Wladyslaw Strzeminski, Heinz Von Foerster, Herbert Simon, Paul Walzlawick, Ernst Von Glaserfeld, Edgar Morin, etc.

Characteristics of Constructivist Classrooms

Constructivist classrooms are planned in such a way that learners are engaged in experiences that leads to meaning-making inquiry, action, imagination, invention, interaction, hypothesis formation, experimentation and personal reflection. Teachers in constructivist classrooms are expected to be familiar with students' application of prior

knowledge, their individual experiences and their perceptions, in addition to their physical and interpersonal environment to construct knowledge and meaning. The intent is to make available a democratic classroom environment that provides meaningful learning experiences for independent learners.

There are a number of discernable qualities of a constructivist teacher and a constructivist classroom which are distinctly different from a traditional classroom. The view of learning presents diverse analysis of what is regarded as knowledge, suggestive of the fact that there may be many ways of interpreting or accepting the world. A teacher in such a classroom is not considered an expert, who has the final say, but one who has the quality to make the classroom more interactive and provides the environment leading to authentic student-student and student-teacher dialogue. Democratic environment of the classroom ensures that activities are student centred, flexible and the students are empowered by a teacher who operates at the backdrop as a guide and facilitator.

The capability of the teacher to integrate ongoing experiences innovatively in the classroom into the negotiation and construction of lessons with small groups and individuals is another characteristic of a constructivist classroom. Students are encouraged to use prior experiences to help them to form and reform interpretations.

Traditional classrooms have always been characterized by autocratic, teacher-centred learning environments. The teacher's authority and exalted personality over the students have been responsible for the impenetrable barrier that exists between the two. On the other hand, a constructivist classroom enables the teacher and the students to share responsibility in decision making and to demonstrate mutual respect for one another.

In the constructivist classroom, the centre of attention tends to transfer from the teacher to the students. A constructivist classroom operates in the background of constructivist learning environment which is the key principle of constructivism. Students are actively involved in the learning process and need to be given the opportunity to construct knowledge based on their own conditions. It is the responsibility of the constructivist teacher to set up problems and monitor students' exploration, to guide the direction of students' inquiry, and to promote new patterns of thinking. Constructivist Classes can take unanticipated turns because students are

given the independence to express their own observations, findings and explorations. Independent and interactive method of a constructivist classroom permits learners to be active and teachers to be more effective. Teachers in such classrooms are able to encourage communication and create flexibility so that the individual requirements of all students can be met.

Explicitly, a constructivist classroom bears the following characteristics:

- Student's autonomy and initiative are accepted and encouraged. Teacher helps students attain their own intellectual identity and assists them to take accountability for their own learning and become problem solvers.
- The technique of asking questions by the teacher and the way in which students react make-up the accomplishment of students' inquiry. The teacher asks open-ended questions and allows wait time for responses because reflective thought takes time and is often built on others' ideas, commentary, clarifications, remarks and explanations.
- It is the constructivist teacher who challenges students to reach beyond the simple factual response and encourages higher-level thinking. Students are encouraged to connect and abridge concepts by analyzing, predicting, justifying, and defending their ideas.
- Social dialogue helps students modify or strengthen their ideas. In a constructivist classroom students are occupied in exchange of ideas with the teacher and with each other. Given an opportunity to present what they think and hear others' ideas, they can pull together a personal knowledge base that they comprehend. It is only when they feel secure enough to articulate their ideas that meaningful classroom dialogue occur.
- The constructivist teacher provides ample opportunities for students to test their hypotheses, especially through group discussion of concrete experiences. When allowed to make prediction; students often produce varying hypotheses about natural phenomena.
- The constructivist classroom makes use of raw data, primary sources, and manipulative, physical, and interactive materials in order to involve students in real-world possibilities, and then helps them generate the abstractions that bind phenomena together.

Thus, constructivism asserts that knowledge resides in students and that knowledge cannot be transferred without any transformation from the head of a teacher to the heads of students (Prabha, 2010, 21).

In their book 'A Case for Constructivist Classroom', J.G. Brooks & M.G. Brooks (in Jha, 2009, 181-182) have stated the following twelve principles essential to constructivist teaching:

- Encouragement and acceptance of student autonomy and initiative.
- Utilization of raw data and primary sources along with manipulative, interactive and physical materials.
- When planning, teachers use cognitive terminology such as “classify”, “analyze”, and “create”.
- Allowance of student responses to drive lessons shift instructional strategies and alter content.
- Inquiry concerning students’ understanding of concept before sharing their own understanding of those concepts.
- Encouragement of students to engage in dialogue, both with the teacher and with one another.
- Encouragement of students’ inquiry by asking thoughtful, open-ended questions and encouraging students to ask questions of each other.
- Pursuit of elaboration of students’ initial responses.
- Engagement of students in experiences that might engender contradictions to their initial hypotheses and then encourage discussion.
- Allowance for wait time after posing questions.
- Providing time for students to construct relationships and create metaphors.
- Nurturing students’ natural curiosity through frequent use of the learning cycle model.

Role of the Teacher in Constructivist Teaching

Teaching based on constructivist philosophy is quite challenging for the teacher. Since the theory of constructivism is based on the idea that children learn by actively constructing knowledge and by reconciling new information with previous knowledge, the teacher’s role changes within the constructive paradigm. The teacher becomes

more of an investigator who endeavours to understand how the students are constructing knowledge and at the same time acts as a facilitator of learning by encouraging students to take responsibility of their own learning.

Constructivist teaching is based on the constructivist learning theory, according to which learning takes place as a result of the knowledge that a student already has, and is more effective when a student is actively involved in the construction of knowledge, rather than being a passive recipient of information.

According to Constructivist approach, individuals' behaviours and ideas that develop later are based on their previously constructed ideas, and that learning is a process involving association established by learners between their existing knowledge and new ideas and experiences. (Oludipe & Oludipe 2010; Palmer 2005, in Ongowo, 2013, 2).

In a constructivist classroom, the role of the teacher is to guide students by prompting and asking questions that will enable them to draw their own findings and make their own conclusions on the subject-matter, thereby giving meaning to the acquired knowledge based on their personal experiences.

According to Akinoglu and Tandogan (2007, in Ongowo, 2013, 2) the role of the teacher is to initiate and guide the learning process. It is essential for teachers to create learning environments that guarantee students to play an active role in their own learning process and access knowledge through investigation and questioning. In essence, the role of the teacher is not to dominate the learning environment, but allow students to become explorers and designers of experiments, testing hypotheses and comparing their findings with others. Thus, Constructivist teaching fosters critical thinking and creates active and motivated learners.

Yager (1991, in Oxford 1997, 55) concentrated on specific constructivist teaching techniques, which he said were based on Piaget's principles. Yager's list of teaching techniques reflects the role that a constructivist teacher is supposed to play. The teaching techniques include (a) seeking out and using student questions to guide lessons, (b) accepting and encouraging student initiation of ideas, (c) promoting student self-regulation and action, (d) using students' experiences and interests to drive lessons (and thus offering multiple branches of learning), (e) encouraging uses of

alternative sources of information, (f) using open-ended questions and encouraging student elaboration when possible, (g) encouraging students to suggest causes for events and situations and to predict consequences, (h) seeking out student ideas before presenting ideas from the text, (i) allowing adequate time for reflection and analysis, (j) facilitating reformulation of ideas in light of new experiences and evidence, and (k) encouraging social interaction.

Class Management and Organisation

From time immemorial, teachers have always occupied the top most position in the classrooms. They are considered the storehouse of knowledge and students are like 'tabula rassa' which needs to be filled up with knowledge. Whatever the teacher taught was considered sacred and ultimate truth. The teacher was basically the controller of the class. However, in the constructivist classrooms, the teacher is the manager of the class, who guides and facilitate the students' learning and does not interfere in any ways but assist them wherever necessary. Following the constructivist perspective, for effective class management and organisation, collaboration should be encouraged. Each student should be occupied in cognitive learning tasks and should be provided continuous reinforcement. Group discussions, brainstorming sessions, group-based project works could be presented in groups and each of the groups could share their ideas and at the same time select problems or tasks by negotiating with the teacher. The teachers have to provide feedback, comment or share their opinions through discussions. It is imperative for a constructivist teacher to ensure that all students in the groups are participating in their learning. However, to employ effective group work careful planning and organization is required.

The focus of constructivist teachers' philosophy is to encourage and support student empowerment. Autonomy and empowerment of students can take place only when students are made active learners which can be done by asking those questions which are more probing, more appropriate, and more effective providing them the opportunity to reflect and come up with their ideas. When students are allowed and encouraged to ask their individual questions, they develop more consciousness of and control over their thinking.

The constructivist teacher is to use indirect form of control. Control is not imposed on students. Instead students are involved in decision makings, by giving

them responsibility, and by encouraging them to be self-controlling and autonomous. Although the teacher relinquishes power and control to empower the students, the management and organization of the classroom is not out of control. On the contrary it is highly organised. Complete departure from the prescribed curriculum is not the aim of a constructivist classroom.

In brief, in a constructivist classroom, control comes from students' involvement in responsibility rather than through external imposition or obligations. Active involvement of students, negotiated curriculum, and relocation of power, control, and responsibility are some of the essentials that add to a positive rapport between students and teacher. Constructivist philosophy provides the platform and opportunity for all teachers, irrespective of their disciplines to build classroom environments where students can turn out to be self-sufficient and self-directed learners.

Evaluation

Evaluation is an important part of any teaching-learning process and is useful in providing information about achievement and measurement of learning outcomes. Evaluation always pre-supposes a universal goal for instruction and it is through the evaluation programme that measurement of the intended progress is achieved. Existing assessment practices in our schools are based on an objective concept of teaching which provides students with knowledge that is considered as truth or reality. As a result, evaluation involves testing to find out whether students can reproduce accepted truths or facts. Common testing exercise consists of objective questions intended to remove prejudice and teacher judgement from the grading. Generally the test constructor select the content of the questions and its wordings and accordingly students are expected to infer these questions as they were intended. They are required to provide their responses which should match with those of the test constructor. There is no place for different and unconventional solutions or understanding of words. Objective tests can only reveal what students know and how well their knowledge matches that of the test constructor. But, it can never reveal what each individual student is capable of. The constructivist perspective, on the other hand, allows students to give alternative solutions to a problem.

In constructivist perspective evaluation should be such that it inspects the thinking process. This can be done by incorporating different methods, tactics and

strategies which would endeavour to reveal the individual's construction of knowledge. Techniques like concept mapping, Venn diagrams, portfolios, peer teaching, scaffolding, performance-based tests and team-tests can be used in constructivist classrooms. Students can be encouraged to think aloud, address a problem in the field of content then defend their decision, or reflect on their own learning and document the process through which they have constructed their view of the content. Evaluation methods transform from standardized objective tests to performance tests, concept mapping and Venn diagrams. From a constructivist point of view, evaluation of students' learning should not be judged only on the particulars of the knowledge gained or understood, but whether the student has the knack to unravel the problem posed with a viable solution.

1.06: Backdrop of Mizoram

Mizoram is the southernmost state of north-eastern region of India. It covers a total area of 21,081 sq. km. Mizoram occupies an area of great strategic importance in the north-eastern corner of India. It shares international boundaries with the neighboring countries of Bangladesh in the west and Myanmar in the east and the south. In its north-east; states of Manipur, Assam, and Tripura share the boundary.

Little is known of Mizoram's early political history. Analysis of literature reveals that between 1750 and 1850, the Mizo (formally called *Lushai*) tribes migrated from the nearby Chin Hills. The Mizos developed an autocratic political system based on hereditary Chieftain-hood. The tribes of Mizoram remained unaffected by foreign political influence until the British annexed Assam in 1826. The British divided the Mizo community for their administrative convenience into Burma (now Myanmar) and India. For the first few years after the British annexation, Lushai hills in the north remained under Assam while the southern half remained under Bengal. Both these parts were amalgamated in 1898 into one district called Lushai Hill District under the Chief Commissioner of Assam. With the implementation of the North Eastern Reorganization Act in 1972, Mizoram became a Union Territory. Subsequently with the signing of the historic Memorandum of Settlement between the Government of India and the Mizo National Front (MNF) in 1986, it was granted Statehood on 20th February 1987 and thus became the 23rd State of the Indian Union. Mizoram has a single-chamber Legislative Assembly of 40 seats. The State is represented by two members to the Indian Parliament: one to the Rajya Sabha and one to

the Lok Sabha. The State has eight districts, 23 sub-divisions, 3 Autonomous District Councils. Mizo and English are the official languages of the State.

Administratively the state is organized into eight districts viz., Kolasib, Mamit, Aizawl, Champhai, Serchhip, Lunglei, Lawngtlai and Saiha. The capital of the state is Aizawl city, the most populous city of the state. The population of the statehood stands at 10, 91,014 with female population of 5, 38,675 and male population of 5, 52, 33,339 according to the 2011(P) Census of India. According to the 2011 census, Mizoram holds the third highest literacy rate of 91.58% in India, next to Kerala and Lakshadweep.

The climate in Mizoram is generally cool in summer and not very cold in winter. It is under the direct influence of the monsoon and rains heavily from May to September. Winter in Mizoram is dry and is very pleasant. Mizoram has great natural beauty and an endless variety of landscape which are very rich in flora and fauna. The hills are marvelously green.

The native people of the state are called Mizo's, meaning the highlanders. The Mizos believed to have migrated from north-western China and, therefore, Mongoloid in origin, similar to that of many tribes of the north-eastern Indian states. Since Mizos came under the influence of the British Missionaries in the 19th century, now most of them are Christians. Missionary activities lead to the spread of education in the state. The Missionaries were responsible for introducing the Roman script for the Mizo language and formal education. Hence the cumulative result is the present high percentage of literacy.

The Mizo code of ethics moved round "Tlawmngaihna", an untranslatable word generally meaning that everyone has to be welcoming, hospitable, kind, selfless and caring and supportive to others. It is an act of charity wherein self-interest is subordinated to the interest of the community, and the self sacrifice for the need of others is to come in spontaneously as a natural part of one's life.

The Mizo society is characterized by a close knit society without any class distinction or discrimination on grounds of sex. 90% of Mizos are cultivators and the village exists like a big family. The birth of a child, marriage and death of a person in the village or a community feast arranged by a member of the village are considered important occasions where the whole village is involved. The food of Mizo people differs from the rest of the country and people are mostly non-vegetarian.

Agriculture and allied activities is the mainstay of the economy of the people. There are not many major industries in the state due to lack of mineral resources, transport, communication and infrastructure. Industries in the state are mostly cottage industries of

handloom, handicraft and bamboo products. Mizoram has plenty of raw materials for industry mostly from forest, agriculture and horticulture, but that has not been properly exploited for boosting the economy. Festivals and dances of the Mizos have a unique tribal flavor. Though the music and dance of Mizoram differs from community to community, the most popular of the dances is the cheraw dance, performed on bamboo checks and requires a very smooth rhythm between the dancers and the instrumentalists.

The British did not attempt to bring about any radical change in the then village administration of Mizoram. The Chieftain system was abolished and a system of Village Council was introduced. The social fabric in the Mizo society has also undergone tremendous change over the years. The accepted faith of Christianity by majority of Mizos have to a large extent transformed their entire social life and thought process guided by the Christian Church organizations directly or indirectly and greatly influencing even their sense of values which has also undergone drastic changes.

The fabric of social life in the Mizo society has undergone tremendous change over the last few years. Like all other societies, the Mizo society aspires to march ahead on the path of modernization. Modernization implies scientific attitude and ways of thinking devoid of superstitions, dogmatism and irrationality. The Mizo society has a challenge to strike a proper balance between modernity and tradition as the society cannot progress without modernization but it should not be at the cost of its age-old traditions, especially those aspects of the traditions which have stood the test of time.

The political change process since 1972 opened up new avenues of employment. With the expansion of public administrator and other services, the demand for various categories of personnel increased and the education system responded by rapid expansion. The report of Sarva Shiksha Abhiyan (SSA), Mizoram describes the Educational scenario of the state as follows:

Formal education in Mizoram started with the arrival of Christian Missionaries. It was Rev. F.W. Savidge and Rev. J.H. Lorrain who prepared roman script for Lushai language and started the first primary school on 2nd April 1894. For more than half of the 20th century, i.e. from 1985 to 1952, the Church through Honorary Inspector of Schools looked after Elementary Education. The important landmarks in the field of education in Mizoram are given below:

| Events | Year |
|--|-------------|
| First Primary School at Aizawl | 1898 |
| First Primary School at rural areas | 1901 |
| Opening of the First Upper Primary School | 1907 |
| Opening of the First High School | 1944 |
| Establishment of the First College | 1958 |
| First PSLC Examination | 1903 |
| First MSLC Examination | 1909 |
| First Matriculation Examination | 1948 |
| Establishment of the First College of Teachers Education | 1975 |
| Establishment of Mizoram Board of School Education | 1975 |
| Establishment of SCERT | 1980 |
| Establishment of Mizoram University | 2000 |
| Establishment of ICFAI in the state | 2005 |
| Establishment of 6 Mini Diets in the state | 2005 |

By 30th September, 2014 the enrolment of students and number of teachers and the teacher pupil ratio at various stages of school education are given in table 1.01 below.

Table 1.01: Enrolment of Student and number of Teachers at different school stage in Mizoram in 2014-2015

| School Stage | No. of teacher | No. of student | Teacher Pupil Ratio |
|-------------------------|-----------------------|-----------------------|----------------------------|
| Primary school | 8,428 | 1,57,646 | 1: 18.71 |
| Middle school | 10,319 | 94,077 | 1: 9.12 |
| High school | 4,500 | 40,711 | 1: 9.05 |
| Higher secondary school | 1,520 | 22,562 | 1: 14.84 |

(Source: Annual Publication 2014-2015, Directorate of School Education: Government of Mizoram)

The above events clearly establish the fact that Mizoram is a late starter in the field of education. However, remarkable educational development has been achieved in the post independence period partly because of the part played by the government in the field of education. The state has realized the importance of education as the vital instrument for development. The numbers of schools as well as the enrolment of students have increased. The growth of literacy rate of the state which is given in table 1.02 since 1901 to 2011, gives clear picture about the outcomes of the education system, particularly of elementary level.

Table 1.02: Growth of Literacy Rate in Mizoram

| Year | Population | Literacy % |
|-------------|-------------------|-------------------|
| 1901 | 82,434 | 0.93 |
| 1911 | 91,204 | 3.98 |
| 1921 | 98,406 | 6.28 |
| 1931 | 1,24,404 | 10.7 |
| 1941 | 1,62,786 | 19.48 |
| 1951 | 1,96,202 | 31.13 |
| 1961 | 2,66,063 | 44 |
| 1971 | 3,22,260 | 53.79 |
| 1981 | 4,93,757 | 59.5 |
| 1991 | 6,89,756 | 82.27 |
| 2001 | 8,88,573 | 88.81 |
| 2011 | 10,91,014 | 91.58 |

(Source: Compiled from Census Reports, Government of India)

Keeping in view the key role of education in the transformation of the human resource in the pursuit of excellence and in achieving social and economic development, and in order to reform the system of education in the state, the Government of Mizoram set up the Education Reforms Commission (ERCM), Mizoram on 8th may, 2009, to recommend ways and means to raise standards of education and improve its quality. The commission's terms of reference were wide ranging, covering all sectors of education, namely, pre-school, elementary, secondary, higher and professional education. A wide spectrum of issues including quality of education in relation to academic achievement of students and performance level of schools, drastic reduction of school drop-out, development of skills for wage and self-

employment through vocationalization of education, rejuvenating curriculum reform process, language development, education in universal human values, overhauling the system of governance, have been reflected upon in the report of the Commission. The very setting up of this Commission is a pointer to the expectations the state has from the reformed system of education in the state. This is one of the states in the country which can be legitimately credited with this pioneering decision.

The recommendations of the commission have been seriously considered by the Government of Mizoram to address the ills of education in the state and for quality improvement at all levels of education. At present a good number of students are moving out of the state to pursue even their school education for better quality of education.

Along with education, the other sectors such as road communication, agriculture, power, health, family welfare etc. within the state are first improving indicating that the state of Mizoram is in transition. The most important feature of the state is that it is the most peaceful one of the country for which it is being possible to focus on the development of the state. If the pace of transition continues unhampered, Mizoram is sure to bypass the other north-eastern states in all aspects and will be an ideal state of the country. The foundation for development has to be deeply rooted in the system of education, all types and all levels.

1.07: Research position on Constructivism

Many research works abroad have been done on the theory of constructivism. While some of them are based on comparisons between traditional approaches and different constructivist techniques at different grades of learning, others are about the effectiveness of constructivist philosophy in teaching different subjects especially in mathematics, science and computer applications at higher levels of learning. Further, some studies are also related to teacher education.

As regards research position on constructivism in India, one can visualize going through the survey books of research in India, published by M.S. University, Baroda and NCERT, New Delhi since 1974. In the first, second, third and fourth survey of research in education 731,839, 1481 and 1652 research studies had been surveyed but there was no specific section devoted to this area due to lack of research studies related to constructivism. One can hardly get few studies directly or indirectly related to constructivism/ constructivist approaches in these four survey reports presented in different sections. Models of teaching which are related to constructivism were

reviewed keeping in view the constructivist theorists and their works. It was found that research on models of teaching seemed to be mainly concentrated upon the information processing family. Out of the twenty-four studies reported in Fifth Survey of Educational Research Vol.1 on the models of teaching, one is a critical review of research done on the Information Processing Model (Sau,T.1988) while two are review studies on the research done on Concept-Attainment Model (Bawa,M.S.1991; Khan,M.S. and Siddique, M. H.1992). The other studies are experimental in nature, conducted at school or teacher-training level. In some studies individual models have been taken up, such as Advanced Organizer Model has been compared with Concept Attainment Model by Sood, K. (1990), Jaimini, N.(1991) and Mahajan, J. (1992). Concept Attainment Model was also compared with the Inquiry Training Model (Singh, D. K.1990). The studies mentioned above are all constructivist models as they are concerned with the organization, presentation of verbal and non-verbal symbols in ways that helps in the formation of concept and solution of problems and development of social relationships and integrated personality. They are concerned with productive thinking and development of general intellectual ability, which has been emphasized by constructivism.

In the Sixth Survey of Educational Research (1993-2000), 18 studies on the models of teaching have been reported. Studies conducted on the Concept Attainment Model were undertaken by Joshi & Patra (1993); Mukherjee (1993); Srivastava (1995); Saxena (1994); Ayishabi (1996); and Kaur & Kaur (2000). Mishra (1998) and Saminathan (1999) conducted studies on Information Processing Model, while Panda (1994) and Patnaik & Mohanan (1993) have conducted studies on Advanced Organizer Model. However, no studies were found to reveal the knowledge, attitude and practices of elementary school teachers in relation to constructivist approach to teaching-learning in India.

The investigator found certain studies on constructivism conducted abroad and a few in India mostly on the models of teachings related to constructivism. The findings of the studies would be presented in chapter II. It was found that no researcher has done research work on teachers' knowledge, attitude and practices relating to constructivist approach to teaching-learning in Mizoram.

1.08: Rationale of the Study

After independence, India has emphasised to educate all its future citizens for which the following provision was made in the constitution of India under Article 45 of Directive Principles of State Policy.

The state shall endeavour to provide, within a period of ten years from the commencement of this constitution, free and compulsory education for all children until they complete the age of fourteen years. (Constitution of India, 1950)

This target was supposed to be attained within 10 years from the implementation of the constitution. Unfortunately, this could not be achieved by the end of the last century for which Government of India, in 86th amendment of constitution in the year 2002 made elementary education for all children within the age of 6-14 years a fundamental right incorporating article 21 A under Fundamental Rights. The article reads as follows:

The state shall provide free and compulsory education to all children of the age of six to fourteen years in such manner as the state may, by law, determine (86th Amendment, Article 21 A, Constitution of India, December 2002).

In the light of the article 21 A, the Right to Education Act 2009 was enacted which is implemented throughout the country, except Jammu and Kashmir, from 1st April 2010. The Right to Education Act not only emphasises on access and retention of children but also on quality education.

Considering the state of Mizoram, especially in the elementary levels of school education, behaviouristic approach to teaching-learning is widely practiced. Rote memorization is rampant from the pre-primary up to even the higher levels of education. In fact, in order to secure good grades and marks at the examinations it is undoubtedly encouraged. This trend does not contribute to good quality education. Elementary stage of education is the foundation for higher education. The study habits formed at this stage is crucial in deciding the kind of learning approach that a child will develop. If the teaching practices will encourage cramming and rote memorization then the child will resort to cramming at every level of education and will solely depend on the instruction and study materials provided to him instead of putting his own ideas and knowledge about the subject matter taught to him. The child will always

look for cooked up knowledge and will never put his mind, think critically, analyse, synthesise or construct his own. Therefore, the choice of teaching strategies adopted at this stage is very important to the shaping of the future progress of learners, and teachers play a very important and indispensable role in this context. In fact, their knowledge and attitude which reflect in their practices in teaching go a long way in determining the success or failure and career of students.

If we look at all the researches conducted in India, we find that constructivist approaches to teaching has been paid more attention due to its importance. However, no research has been done so far to assess the knowledge, attitude and practices of elementary school teachers in the country in general and in Mizoram in specific.

The teachers' approaches to teaching have significant bearing not only on students' learning and achievement but also on development of study habits. There is dearth of research on constructivist teaching-learning strategies in our country in general and in Mizoram in specific. Though, at any stage of education, it is not possible to focus the teaching-learning approach wholly on constructivism, there should be a transformation in the approaches that is from behaviourism to constructivism as the latter has long term effect upon students' creation of knowledge and promote self-learning. Choice of a right teaching approach depends largely on the knowledge and attitude of teachers. If teachers have adequate knowledge, understand the importance and develop positive attitude towards a teaching approach, then only they can put them in their practices. Thus knowledge and attitude are the prerequisites for practice. If we expect that our teachers should prefer constructivist approach to their teaching then it is essential that they should have the right kind of knowledge and attitude; then only they can put them in practice. In this context the following questions are raised:

- Do the elementary school teachers teaching different subjects in Mizoram have knowledge about constructivism as a teaching-learning approach? If so, to what extent?
- What type of attitude (positive/negative) the elementary school teachers teaching different subjects in Mizoram possess towards constructivism as a teaching-learning approach?

- Do the elementary school teachers teaching different subjects in Mizoram adopt constructivist approach to teaching-learning?
- Is there any variation in the knowledge of elementary school teachers teaching different subjects in Mizoram relating constructivist teaching-learning approach?
- Is there any variation in the attitude of elementary school teachers teaching different subjects in Mizoram relating constructivist teaching-learning approach?
- Is there any variation in the practices of elementary school teachers teaching different subjects in Mizoram in adopting constructivist teaching-learning approach?
- Is there any gender difference in the knowledge of elementary school teachers teaching different subjects in Mizoram relating constructivist teaching-learning approach?
- Is there any gender difference in the attitude of elementary school teachers teaching different subjects in Mizoram towards constructivist teaching-learning approach?
- Is there any gender difference in the practices of elementary school teachers in Mizoram in adopting constructivist teaching-learning approach with reference to their locale; and gender ?
- Is there any relationship among knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach?
- Are there any differences among various groups of elementary school teachers teaching different subjects in the relationship between their knowledge and attitude relating to constructivism as a teaching-learning approach?
- Do the elementary school teachers teaching different subjects in Mizoram encounter constraints in adopting constructivist teaching-learning approach?
- What type of measures can be taken for effective adoption of constructivist teaching-learning approach by the elementary school teachers in Mizoram?

1.09: Statement of the Problem

Constructivism is a theory of learning that is widely practiced in the west and is also gaining popularity in our country because of its effectiveness on teaching-learning process. As mentioned in the preceding section, in Mizoram, students at all levels of education widely practice cramming in order to secure good grades and marks at the examinations. Teachers are also not equipped to teach students according to constructivist approach because of their ignorance, lack of training, lack of seriousness and the like. Research support is essential to reveal the causes and to address the

issues, if any. Though many conceptual articles have been published in different journals and books, there is dearth of empirical studies in this area. To get answers to the questions raised in the preceding section, the following problem was undertaken for investigation.

Constructivist Approach to Teaching-Learning: Knowledge, Attitude and Practices of Elementary School Teachers in Mizoram

1.10: Objectives of the Study

1. To reveal the depth of knowledge of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach with reference to the subject they teach.
2. To reveal the attitude of elementary school teachers in Mizoram towards constructivism as a teaching-learning approach with reference to the subject they teach.
3. To assess the extent to which the elementary school teachers teaching different subjects in Mizoram adopt constructivist teaching-learning approach.
4. To reveal the variations if any in the knowledge of elementary school teachers teaching different subjects in Mizoram relating to constructivist teaching-learning approach.
5. To reveal the variations if any in the attitude of elementary school teachers teaching different subjects in Mizoram relating to constructivist teaching-learning approach.
6. To reveal the variations if any in the adoption of constructivist teaching-learning approach by elementary school teachers teaching different subjects in Mizoram.
7. To study the differences in the knowledge of elementary school teachers in Mizoram relating to constructivist teaching-learning approach with reference to their locale; and gender.
8. To study the differences in the attitude of elementary school teachers in Mizoram relating to constructivist teaching-learning approach with reference to their locale; and gender.

9. To study the difference in the practices of elementary school teachers in Mizoram in adopting constructivist teaching-learning approach with reference to their locale; and gender.
10. To find out the nature and extent of relationships among knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach.
11. To study the differences among various groups of elementary school teachers, teaching different subjects in the relationship between their knowledge and attitude relating to constructivism as a teaching-learning approach.
12. To reveal the constraints of elementary school teachers in Mizoram in adopting constructivist teaching-learning approach.
13. To suggest measures for effective adoption of constructivist teaching-learning approach in different subjects in elementary schools in Mizoram.

1.11: Hypotheses of the Study

1. Elementary school teachers teaching different subjects in Mizoram have adequate knowledge about constructivism as a teaching-learning approach.
2. Elementary school teachers teaching different subjects in Mizoram have positive attitude towards constructivism as a teaching-learning approach.
3. Elementary school teachers teaching different subjects in Mizoram adopt constructivist teaching-learning approach.
4. There are significant differences in the knowledge of elementary school teachers teaching different subjects in Mizoram relating to constructivist teaching-learning approach.
5. There are significant differences in the attitude of elementary school teachers teaching different subjects in Mizoram relating constructivist teaching-learning approach.
6. There are significant differences in the adoption of constructivist teaching-learning approach by elementary school teachers in Mizoram teaching different subjects.
7. There are significant differences in the knowledge of elementary school teachers in Mizoram relating to constructivist teaching-learning approach with reference to their locale; and gender.

8. There are significant differences in the attitude of elementary school teachers in Mizoram relating to constructivist teaching-learning approach with reference to their locale; and gender.
9. There are significant differences in the practices of elementary school teachers in Mizoram relating to constructivist teaching-learning approach with reference to their locale; and gender.
10. There are significant relationships among knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach.
11. There are significant differences among various groups of elementary school teachers teaching different subjects in the relationship between their knowledge and attitude relating to constructivism as a teaching-learning approach.
12. There are constraints faced by elementary school teachers in Mizoram in adopting constructivist teaching-learning approach.
13. There are measures for effective adoption of constructivist teaching-learning approach in different subjects in elementary schools in Mizoram.

1.12: Operational Meaning of the key terms used

Different words have their different connotations according to their place of reference. In the present study the words which are used in the title of the topic have the following operational meanings. For dictionary meaning, Cambridge Advanced Learner's Dictionary is referred and meanings of the words appropriate to the contexts have been cited.

Constructivist approach: Constructivist approach in the present study refers to learner-centred instruction in which learners use their own experiences to construct knowledge that makes sense to them, rather than having knowledge delivered to them in already organized form

Teaching-learning: The dictionary meaning of 'to teach' means "to give someone knowledge or to instruct or train someone". Thus, teaching is an act performed by the teacher following different approaches.

The dictionary meaning of 'to learn' means "to get knowledge or skill in a new subject or activity". Thus, learning means the activity of obtaining knowledge.

In the present context, teaching-learning refers to the teacher's and student's activities that help the learner to construct knowledge and gain knowledge.

Knowledge: The dictionary meaning of 'knowledge' means "understanding of or information about a subject which has been obtained by experience or study, and which is either in a person's mind or possessed by people generally".

In the present context, it refers to knowledge of the elementary school teachers in Mizoram relating to constructivist approach to teaching.

Attitude: The dictionary meaning of 'attitude' means "a feeling or opinion about something or someone, or a way of behaving that is caused by this".

In the present context, it refers to the attitude of the elementary school teachers in Mizoram relating constructivist approach to teaching.

Practices: The dictionary meaning of 'practice' means "action rather than thought or ideas".

In the present context, it refers to the practices adopted by the elementary school teachers in Mizoram relating constructivist approach to teaching.

Subjects: The dictionary meaning of 'subjects' means "an area of knowledge which is studied in school, college or university". Further, "subject is also used to explain the units of research".

However in the present context, elementary school teachers are to be classified on the basis of the subjects they teach in the school into four broad categories: mathematics, English, science and social science.

Elementary school Teachers: Elementary classes are from classes I to VIII. As such, in the present study elementary school teachers imply the teachers teaching from classes I to VIII.

1.13: Delimitations of the Study

Conceptually and geographically the study was delimited in its scope as follows:

1. It was limited to constructivist approach to teaching-learning.

2. The study was primarily focused on the knowledge, attitude and practices of elementary school teachers teaching the four key subjects: mathematics, English, science and social science.
3. It was confined only to the state of Mizoram.

1.14: Plan of the Report

The report of the present study is organized in 5 (Five) chapters to facilitate a systematic presentation.

In chapter I the study is introduced. The approaches to teaching-learning, constructivism as an approach to teaching-learning have been discussed in this chapter. The research position on teaching-learning, rationale of the study, statement of the problem, objectives and hypotheses of the study, and meaning of key terms used have also been presented in this chapter along with delimitation of the scope of study.

Chapter II will be devoted for review of related literature. In this chapter the findings of the researches conducted abroad and in India will be presented.

The procedure adopted for the conduct of present study will be narrated in chapter III. The research approach, sources of data, population and sample, tools used (with brief description on procedure of development of tools), procedure of data collection, organization of data, statistical techniques used and design of the study will also be narrated in this chapter.

Chapter IV will be devoted for the analysis and interpretation of data.

In chapter V findings of the study will be presented and discussed. Educational implications, limitations of the study, suggestions for further research and an epilogue on the study will also be presented in this chapter. A brief summary of the study, list of references and appendices will follow chapter V.

CHAPTER-II

REVIEW OF RELATED LITERATURE

A new research, unless it is based on a thorough review of the past researches it may not bear relevance to what has gone before and it simply becomes an isolated entity . (Fox, 1969, 75-76)

Researchers have to be up-to-date in their information about studies related to their own problems. References are to be made to similar studies and their evaluation too is to be made for benefit of the readers. Survey of related studies imply locating, studying and evaluating reports of relevant researches published as articles, encyclopaedias, research abstracts, comprehensive books on the subject and manuscripts, if any, for the worthwhile study. In any field of knowledge the researchers need adequate familiarity with the works which have already been done in the area. The researchers have to build upon the accumulated and recorded knowledge of the past and draw maximum benefit from the previous investigations.

Thus review of related literature shows the real path to be pursued by the researchers to conduct their studies and locate problems which have remained unexplored in previous studies. McMillan and Schumacher (1993, 113) write:

Related literature is that which is obviously relevant to the previous references to the theory and empirical testing of the theory; and studies of similar practices.

In relation to the present study, an attempt was made to go through the literature such as reference books, monographs, government records and publications, encyclopaedia on education, research papers and national research abstracts on education, journals and magazines.

It is worth to mention that constructivism is a recent phenomenon being emphasized since the last decade of 20th century. The theory of constructivism has influenced the development of many teaching strategies and tactics as well as different models of teaching. Constructivist approaches include anchored instruction, brainstorming, collaborative learning, concept mapping, inquiry approach, problem-based learning, use of hard ware and software materials, etc. Basing upon the constructivist theory many models of teaching have been developed. Some of the noted constructivists and their works include: the Information Processing family such as Concept Attainment Model of J. Bruner, and Cognitive Growth Model of Jean

Piaget; and the Social Family of Models of teaching concerned with the social relationship of the individual with others in the society advocated By Lev Vygotsky.

Information Processing Family of models intends to cultivate the information processing ability in the learners and help them to improve their capability to master information. Information processing refers to the way people handle stimuli from the environment, organise data, sense problems, generate concepts and solutions to problems, and employ verbal and non-verbal symbols. Though information processing models are concerned with the intellectual skills and acquisition of knowledge by the students, they also contribute to the realisation of personal and social goals.

Personal Family of models share an orientation towards the individual and the development of self-hood. These models emphasise the processes by which individuals construct and organise their unique reality. They pay attention to human feelings and emotions and try to move towards the development of an integrated functioning self

Social Interaction Family of models share an orientation towards the individual with emphasis on the development of capabilities for inter-personal relationships, the development of social skills and priority to the improvement of the individual's ability to engage in democratic processes and to work productively in the society.

Hence, the findings on studies on constructivist approaches and models of teaching related to constructivism are presented below in chronological order followed by alphabetical order under two headings: studies conducted abroad and studies conducted in India.

Studies Conducted Abroad

Chan et al (1992) in their study "Constructive Activity in Learning from Text" examined the constructive cognitive activity of children listening to text and assessed the contribution of this activity to learning. The study specified five embedded levels of constructive activity with age-related differences. The five levels were pre-factual confabulation, knowledge/detail retelling, assimilation, problem solving, and extrapolation. The three subtypes were declarative, interrogative, and evaluative responses. Instead of stating what unsuccessful learners cannot do, the

researchers had tried to identify their use of low constructive activities. The findings showed that age, prior knowledge, and constructive activity were all related to learning outcome. These results are consistent with the view that prior knowledge plays an important role in learning. Similarly path analysis showed that only constructive activity exerted a significant direct effect on learning. It was found that both age and prior knowledge exerted their effects on learning through the mediating role of constructive activity.

In their paper “Creating Constructivist Environments and Constructing Creative Mathematics”, Pirie & Kieren (1992) suggested that it was possible to define beliefs that must be held by teachers if they were to create constructivist environments for learning. It was found that in creating constructivist environments, students definitely showed individual understandings of mathematics being taught. And despite the intended goals of the teacher, students were free to construct mathematics based on their own structures and ideas, and under such an environment, students could still arrive at incomplete or profound understandings unanticipated by the teacher. It was the student’s response to the situation rather than the nature of the situation which determined the student’s pathway to understanding.

Simon and Schifter (1992) in their paper, “Assessing Teachers’ development of a Constructivist View of Mathematics Learning” discussed an in-service program-SummerMath for teachers, which was designed to stimulate teachers’ development of a constructivist view of learning to serve as a basis for mathematics instruction. It was found that while almost all teachers adopted new classroom techniques, project researchers were particularly concerned about the impact of the program on the epistemological perspectives that informed teachers’ instructional decision making. This paper describes the development of an assessment tool, the Assessment of Constructivism in Mathematics Instruction (ACMI) to meet two criteria: (1) the instrument must be sensitive to the developmental nature of the change in teachers’ thinking and practice, and (2) the instrument must allow for discrimination between basing instructional decisions on a constructivist view of learning (which involves changes in beliefs), on the one hand, and introducing particular, innovative teaching strategies (which may involve only changes in behavior) on the other. This tool was used to evaluate program effectiveness along the latter dimension mentioned above.

Davis, N. T., McCarty, B. Jo., Shaw, K. L., Sidani-Tabbaa, A. (1993) in their article “Transitions from Objectivism to Constructivism in Science Education” used Thomas Kuhn’s (1970) work as a basis to support change in guiding epistemological paradigms. The article was introduced by asserting that science education was in a state of crisis. The authors examined three persistent problems in education: curriculum, evaluation and discipline from the current dominating educational paradigm of objectivism and proposed a re-conceptualization by viewing teaching and learning from a constructivist perspective. These problems were illustrated by using a school-based research project that examined the processes teachers experienced as they attempted to change from traditional objectivist teaching to constructivist teaching. A model of change derived from this project included six interrelated requisites of change: perturbation, awareness of a need to change, commitment to change, establishment of a vision, projection of self into the vision and reflection. It was found that the idea of constructivism provided teachers with an alternative way of viewing their teaching; a vocabulary related to the problems they experienced so that they can discuss them with others; and the confidence that their ideas are valid.

Simon & Schifter (1993) in their study “Towards a Constructivist Perspective: The Impact of a Mathematics Teacher In-service Program on Students” tried to examine a constructivist-oriented in-service program by providing teachers of mathematics with intensive two-week summer institutes and weekly classroom follow-up. The study revealed that teachers participating in ELM (the educational leaders in mathematics) project paid more attention to problem-solving and conceptual development, thereby de-emphasizing computation and memorization. The outcome of the study was that student beliefs about mathematics learning led to an appreciation for the values of creativity and experimentation.

King (1994) in her study “Guiding Knowledge Construction in the Classroom: Effects of Teaching Children How to Question and How to Explain” compared two different guided questioning strategies and unguided questioning. It was found that when children used questions that guide them to connect ideas within a lesson together or connect the lesson to their prior knowledge, they engaged in complex knowledge construction which, in turn enhances learning; and these learning effects are stronger for questions that connect to prior knowledge. The study showed that elementary age children could be trained to generate these kinds of questions for

themselves, and they could also be taught how to formulate explanations which is one manifestation of complex knowledge construction.

Chaney, T. K. (1995) conducted a study on “Design and Implementation of a Constructivist Instructional Model to Support Teacher Change: A Case Study”, and explored how a constructivist instructional model, with the Strategic Teaching Framework multimedia system as a core information source, influenced teachers’ beliefs and practices about teaching and learning mathematics. The study revealed that teachers changed the way they taught mathematics. They incorporated cooperative learning groups, modified activities to increase mathematical problem – solving and communication, and began acting as facilitators of learning. Teachers were found willing to change when they were given time and support. Teachers needed time away from their classrooms to reflect about alternative approaches to teaching mathematics and support as they developed their conceptual understanding of this approach and attempted to incorporate it in their classrooms.

James (1999) analyzed two major constructivist positions in the context of mathematical knowledge construction, namely individualism and collectivism in her article “Construction of Mathematical Knowledge: Constructive Perspective: An Analysis”. She asserts that the constructivist perspectives are basically derived from the socio-cultural treatment of cognition. Constructivists believe that knowledge is not transmitted directly from one knower to another but is built up by learners as they involve themselves in cultural practices by repeatedly interacting with others. Mathematics learning is treated by Individual constructivists’ as a process of personal construction through active conceptual self-organization. While social interaction is considered as a catalyst, the understandings of mathematics are essentially social and cultural activities. Consequently, it is a process of enculturation because they reject the view that social interaction serves as a catalyst for otherwise autonomous development.

Tsai (1999) conducted a study entitled, “The Progression toward Constructivist Epistemological Views of Science: A Case Study of the STS Instruction of Taiwanese High School Female Students” and reported that STS (Science-Technology-Society) group students tended to have scientific epistemological views more oriented to constructivist views of science than traditional

group students. Among STS group of students, those originally having empiricist-aligned views of science tended to progress most in their epistemological views. As a result of STS instruction some of the students in the STS group tended to accept the theory laden quality of scientific exploration and to perceive the importance of social negotiations in science community and cultural impacts on science.

Tynjala, P. (1999) examined the potential of constructivist learning environments for developing prerequisites of expert knowledge during university studies. He compared the learning outcomes of students who studied the course material in a constructivist learning environment with those of students who learned it under traditional teaching and studying conditions. Students in the constructivist learning environment acquired more diversified knowledge. Most constructivist group students also emphasized gaining an ability to apply knowledge, the development of their critical thinking skills, changing their conceptions of the topics studied, and moving from epistemological dualism towards a more relativistic view of knowledge. These types of description were rare among the traditional group students.

Aldridge et al (2000) conducted a study on, “Constructivist Learning Environments in a Cross-National study in Taiwan and Australia” focusing on the validation and use of English and Chinese versions of the constructivist learning environment survey (CLES) in a cross-national study of high school science classrooms in Australia and Taiwan by combining quantitative and qualitative methods. It was found that Australian students perceived more critical voice and student negotiation and less personal relevance, uncertainty and shared control than students in Taiwan. The attitudes of Taiwanese students towards their science classes were more positive than for students in Australia. Interviews with teachers, students and researchers revealed that the CLES has proven to be a useful method for providing important insights into the key characteristics of teaching epistemologies in science classes in both Taiwan and Australia. As such, the CLES is a useful tool for examining the transformation of teaching and learning practices in accordance with a constructivist perspective.

Holt-Reynolds (2000) in her article “What does the teacher do? Constructivist Pedagogies and Prospective Teachers’ Beliefs about the Role of a Teacher” examined how constructivist pedagogies are increasingly used in teacher

education course works. This study highlights the challenges that prospective teachers face as they struggle to develop a sense for what role they might play in the learning of others. It was concluded that the teacher's role ends when she has activated learners, invited them to talk, and successfully engaged their participation.

Tsai (2000) studied the "Relationships between Student Scientific Epistemological Beliefs and Perceptions of Constructivist Learning Environments" and reported that students tended to perceive that actual learning environments were less constructivist oriented than what they perceived. Students having epistemological beliefs more oriented to constructivist views of science tended to have a view that actual learning environments did not provide sufficient opportunities for social negotiations and prior knowledge integration and moreover, they show significantly stronger preferences to learn in the constructivist learning environments where they could (1) interact and negotiate meanings with others, (2) integrate their prior knowledge and experiences with newly constructed knowledge and (3) meaningfully control their learning activities. He concluded that teachers need to be aware of students' epistemological orientation towards scientific knowledge, and to complement these preferences when designing learning experiences, especially to provide constructivist-based lessons to enhance science learning for students who are epistemologically constructivist oriented.

Staub & Stern (2002) conducted a longitudinal study of 496 students in 27 self-contained German elementary school classrooms on "The Nature of Teacher's Pedagogical Content Beliefs Matters for Student Achievement Gains: Quasi-Experimental Evidence from Elementary Mathematics". The performance in mathematical word problems and arithmetic tasks was measured at the end of grades 2 and 3. A questionnaire was used by the investigators to assess the degree to which teachers' pedagogical content beliefs in elementary mathematics reflected a cognitive constructivist orientation, rather than an associationist or direct-transmission view of learning and teaching. The findings indicated that a cognitive constructivist orientation was associated with larger achievement gains in mathematical word problems. In addition, teachers with a cognitive constructivist orientation were more successful than teachers with a direct transmission view in fostering students' computational proficiency.

Carr, Kathleen A. (2004) explored the use of reflective practice and constructivist learning design by parochial elementary school administrators through instructional leadership practices and reflective practice by teachers using constructivist learning designs when interacting with students in a learning environment, and reported that although a connection between high state assessment scores and reflective constructivist practices is not empirically established, the surveys, interviews, and observations, of the participants support the prior research (Abott, Fouts, and Baker, 2003) that connects constructivist practices to higher WASL (Washington Assessment of Student Learning) scores.

Gutherie et al (2004) compared three instructional methods for third-grade reading: a traditional approach, a strategies instruction only approach, and an approach with strategies instruction and constructivist motivation techniques including student choices, collaboration, and hands-on activities. The constructivist approach, called CORI (Concept-Oriented Reading Instruction), resulted in better student reading comprehension, cognitive strategies, and motivation.

Kaste (2004) conducted a study entitled, “Scaffolding through Cases: Diverse Constructivist Teaching in the Literacy Methods Course”, and reported that using cases with a conceptual framework may challenge pre-service teachers’ beliefs and provide opportunities for them to practice a diverse constructivist perspective. Qualitative analyses of university course videotapes and pre-service teachers’ assignments also revealed that over time many pre-service teachers showed beginning attempts at articulating a diverse constructivist orientation when assignments focused on actual students.

Kim, J. S. (2005) conducted a study on “The Effects of a Constructivist Teaching Approach on Student Academic Achievement, Self-Concept, and Learning Strategies”, and found that using constructivist teaching methods for 6th graders resulted in better student achievement than traditional teaching methods. Students also preferred constructivist methods over traditional ones. However, Kim did not find any difference in student self-concept or learning strategies between those taught by constructivist or traditional methods.

Acikalin, Mehmet (2006) designed a study to examine the use of computer-supported instructional strategies and to investigate the influence of these strategies

on the principles of constructivist pedagogy in the social studies education and reported that the Internet and Software programs such as Microsoft Word, Excel, and PowerPoint were the most common uses of computer supported instruction, while other software programs were rarely used in the observed classrooms; the lack of computers and software, teachers' lack of proficiency with various software programs, and limits on the time available in the curriculum were the major problems that prevented the participant teachers from not using computer supported instructional strategies more frequently; and although computer technologies have the potential to support the principles of constructivist pedagogy in the social studies classroom, whether these technologies are used effectively depends entirely on the quality of the instructional design which is formed by the teacher.

Abd Hamid, Nor Hashidah (2006) in the study "Analysis of Changes in Teachers Concerning Constructivist Perceptions, Philosophies, and Practices Resulting from The Year – Long Iowa Chautauqua Professional Development Project", tried to investigate the extent to which teachers were able to make changes needed to move toward the use of more constructivist behaviors after being involved in the year long Iowa Chautauqua Professional Development Program (ICPDP). Major findings of the study include the following:

- Teachers in the project showed significant growth concerning constructivist perceptions over time and for all six sub-scales of TCLES (Constructivist Learning Environment Survey), namely, student negotiation, and attitude toward science.
- Teachers in the project indicated significant growth concerning philosophy of teaching and learning as measured by the PTL (Philosophy of Teaching and Learning Instrument).
- Teacher's in the project indicated significant growth concerning constructivist teaching practices as evaluated by videotapes - using ESTEEM instrument (Expert Science Teaching Evaluation Model), and significant differences were found for all four sub –scales of the ESTEEM.
- Students in the project indicated significant growth concerning their constructivist perceptions over time for the total SCLES score and on the sub –scales of scientific uncertainty, shared control, and student negotiation. There were no significant

difference found for the sub—scales, personal relevance, critical voice, and attitude toward science.

- There were significant differences when comparing both teacher and student perceptions for the CLES and for the total CLES and for the sub-scales scientific uncertainty, critical voice, shared control, and student negotiation but not for personal relevance and attitude toward science.
- Teacher reflections provided positive reflections concerning their experiences with improving questioning skills and treating science as an inquiry.

Erdogen, Ibrahim (2006) conducted a study entitled “The Effect of Different Levels of Constructive Teaching Practices on Teacher Question Asking Behaviors”, and examined the effectiveness of the Iowa Chautauqua Professional Development Program (ICPDP) in moving elementary science teachers toward the use of more constructive teaching practices. He also investigated the effectiveness of different levels of teaching practices, especially in terms of a sample of teachers achieving “expert” state at the end of program and compared with some attaining only with “competent” level. His study revealed that teacher perceptions regarding their teaching and learning, and their actual teaching practices in classroom in terms of constructivist approaches were significantly changed after participation in the ICPDP.

Savasci (2006) attempted to identify science teachers’ beliefs and classroom practices related to constructivist teaching and learning, and examined factors that may influence teachers’ classroom practices. The findings of her study revealed that teachers generally reported that they held constructivist teaching and learning beliefs. However, they had difficulty in incorporating their beliefs into classroom practice. It was found that:

- Personal Relevance and Student Negotiation were the most frequently preferred constructivist components
- Critical Voice was the most perceived constructivist component in science classrooms.
- Shared Control was one of the least preferred and was in the least frequently perceived and implemented constructivist component in science classrooms.

- The nature of students and student ability were the most frequently self-reported factors that influenced teacher classroom practice.

Hmelo–Silver et al (2007) in their paper, “Scaffolding and Achievement in Problem-Based and Inquiry Learning: A Response to Kirschner, Sweller, and Clark (2006)” mention several studies supporting the success of the constructivist problem-based and inquiry learning methods. They describe a project called GenScope, an inquiry based science software application. They revealed that students using the GenScope software showed significant gains over the control groups, with the largest gains shown in students from basic courses.

Akar, H., & Yildirim, A. (2009) conducted a study to understand the conceptual change teacher candidates went through in a constructivist learning environment in a classroom management course and reported that a constructivist learning process may result in a change in teacher candidates’ conceptions of classroom management.

Afolabi, F. (2009) investigated “the effects of constructivist problem based learning technique on the academic achievement of physics students with low ability levels in Nigeria secondary schools”. For the study a pre-test-post-test control group design was adopted and a purposive sampling technique was used. Physics achievement test (PAT) and physics ability level test (PALT) were used to collect data. The results of the findings showed that the physics students with low ability level taught with problem based learning technique performed significantly better than those taught with conventional learning method. Also, students taught with problem-based learning performed significantly better than those taught with conventional method. It was recommended that problem-based learning technique should be used in schools to teach various concepts in physics.

Neo, M., & Neo, T. K. (2009) conducted a study entitled “Engaging Students in Multimedia-mediated Constructivist learning—Students’ perceptions”, in the faculty of creative multimedia, Multimedia University, Malaysia. The researchers studied the impact of using multimedia on students who have little experience with working in a problem-solving design environment. Students worked in groups and

created an interactive multimedia application and Macromedia Director. They were responsible for all project development decisions during their learning process. A survey questionnaire administered at the end of the project captured their perceptions. The students showed positive attitude towards the project with respect to their learning motivation and understanding, skills, and their team work abilities. By incorporating multimedia into a constructivist learning environment, students learned to design multimedia, as well as to experience critical-thinking, creative presentation and communication skills; enhanced motivation and understanding various levels of the subject domain. These skills would be useful in their future undertakings. Their findings provide strong support and encouragement for Malaysian educators to incorporate multimedia technology and constructivist learning into the classrooms for the enhancement of teaching and learning.

Bimbola, O., & Daniel, O. I. (2010) in their research paper “Effect of Constructivist-Based Teaching Strategy on Academic Performance of Students in Integrated Science at the Junior Secondary School Level” examined the effectiveness of constructivist-based teaching strategy on academic performance in integrated science by junior secondary school students in south-west Nigeria. Findings revealed that the constructivist instructed students had higher scores on the post-test and the delayed post-test, compared to those exposed to conventional (lecture) method of teaching. It was concluded that if integrated science teachers could incorporate constructivist-based teaching strategy into their teaching methods, there would be an improvement in academic performance of junior secondary school students in integrated science. The researchers recommended that integrated science teachers should incorporate constructivist-based teaching strategy in their methods of teaching.

Libman, Z. (2010) in her article describes an experience with a teaching method of “Integrating Real-Life Data Analysis in Teaching Descriptive Statistics: A Constructivist Approach” and suggests the potential of inculcating alternative teaching methods that encourage students to take a more active role in their own learning and participate in the process of assessing what they have learned. The article illustrates how this teaching method enabled students to realize that imparting meaning to sets of data is a complex activity which involves conceptual flexibility, integration of all the procedures that one has learned, and creative reasoning.

Vaca James, L., Jr. (2010) in his study “The Effect of Constructivist Teaching Strategies on Science Test Scores of Middle School Students” made use of a quasi- experimental quantitative study using a pretest-posttest control group design to examine how the use of a hands-on, constructivist teaching approach with low achieving eight grade science students affected student achievement on the 2007 Ohio Eighth Grade Science Achievement Test posttest. This study was an attempt to address International studies that revealed how American students were lagging behind other industrialized countries in science proficiency and showed little significant gain on standardized tests in science between 1995 and 2005.

Tuna, A., & Kacar, A. (2013) in their study examined “The Effect of 5E Learning Cycle Model in Teaching Trigonometry on Students’ Academic Achievement and the Permanence of their Knowledge” in 10th grade of elementary mathematics education. The participants of this research are 10th grade students registered for spring semester of 2010-2011 academic year to an Antolian High School in Kastamonu. These students divided into two equal groups, a control and an experimental group took the course about trigonometry from the researcher in an environment where the 5E learning model based on the constructivist approach is used. The students in the control group took the same course from their mathematics teacher in an environment where the activities of official mathematics curriculum are used. The statistical findings of the research show that the experimental group students’ scores of academic achievement and permanence of trigonometric knowledge are higher than those in the control group. The difference between these groups is statistically significant and is in favour of the experimental group.

Ali Abdi (2014) in his study investigated “The Effect of Inquiry-Based Learning Method on Students’ Academic Achievement in Science Course”. A total of 40 fifth grade students from two different classes were involved in the study. They were selected through purposive sampling method. The group which was assigned as experimental group was instructed through inquiry-based learning method whereas the other group was traditionally instructed. The results showed that students who were instructed through inquiry-based learning achieved higher score than the ones who were instructed by the traditional method.

In their study “Pre-Service Teachers’ Constructivist Teaching Scores based on their Learning Styles”, Kablan, Z., & Kaya, S. (2014) examined the relationship between pre-service teachers’ constructivist teaching and their learning styles based on Kolb’s experiential learning theory. The learning styles inventory-3 was administered at the beginning of the semester to determine preferred learning style. The constructivist teaching evaluation form was filled out by pre-service teachers following the microteaching session. Bivariate correlation and ANOVA analyses were conducted to evaluate the learning style-teaching relationship. Results showed that pre-service teachers who preferred constructivist learning strategies delivered better constructivist lessons based on their self reports.

Mogashoa, T. (2014) in his article, “Applicability of Constructivist Theory in Quantitative Educational Research” explores constructivism as a theory in qualitative educational research. The framework of applicability of constructivism as a theory includes the guiding principles of applying it as well as the various types qualitative educational research. It aims at revealing the applicability of constructivism and classroom practice. The article recognizes that constructing meaning is learning, there is no any other kind of learning other than constructing meaning. Knowledge is acquired through involvement with content instead of imitation or repetition. Drawing from literature, this study explored the various types of constructivism such as social, psychological, personal, radical and contextual constructivism. Constructivism is used for research, learning and teaching. Educational curricula and teaching methods are ever changing as well as educational policies on teaching and learning. Constructivism is a theory about teaching and learning which involves essential aspects such as culture, context, literacy, language, learners’ interests and needs, personal experiences, interpretation of reality, as well as application of knowledge, which the researcher can analyze to determine their impact on teaching and learning policies.

Roustae, R., Kadir, S. Abd. & Asimiran, S. (2014) in their paper, “A Review of Constructivist Teaching Practices” reviewed the purpose of teaching practices, two main theories of it and strategies for classroom practices. They emphasized that in contrast to previous theories of learning, constructivist theories engage the learner in learning process more. Since teachers are an important lever in education, they should be in line with new reforms and alter the environment of classroom accordingly. The

first step in changing environment of classroom is the practices that teacher implement in the classroom which should be consistent with new changes.

Anwar, K. (2015) conducted a study analyzing the use of constructive teaching method toward the students' motivation in learning content subject of introduction to research of English language teaching. By using a mix-method of qualitative and quantitative analysis, the data were collected by using questionnaire and classroom observation. The results showed that the constructive teaching method had stimulated students' motivation in learning especially on the students' engagement in individual and group activities, that is, the more the students engaged the more motivated they were. The motivation, in fact, can be triggered by two complementary ways that is from individuals to members of the group or from the group to individuals. This study implied that the process of learning content course in English language teaching is highly important to be considered because this will automatically influence the students' motivation to learn and finally achieve the learning materials better.

Lei Li & Guo, R. (2015) conducted a pilot study entitled "A Student-Centered Guest Lecturing: A Constructivism Approach to Promote Student Engagement". Grounded on the theory of constructivism, their paper introduces a student-centered guest lecturing that allows students to work in team and participate in each step of process, such as preparation, interviewing, and reflection. Because the pilot study showed promising result the researchers felt that the proposed approach would be beneficial to their colleagues in higher education who are interested in increased student engagement and as a result, student active learning.

Studies Conducted in India

Singh (1990) investigated the effectiveness of Inquiry Training Model (ITM) and Concept Attainment Model (CAM) over traditional teaching methods for teaching physical science. The study revealed that the post-test achievement scores were significantly higher than the pre-test scores when taught through ITM or CAM, but not in the case of TMT, and the achievement gain scores of both the ITM and CAM groups were higher than the TMT group. Both ITM and CAM were equally effective in inculcating a more favourable attitude towards physical sciences than TMT.

Sood (1990) made a comparison of advance organiser and reception strategies for acquisition of language concepts in relation to cognitive style, intelligence and creativity among class IX students. The study revealed that the concept attainment strategy was found to be a more effective mode of teaching Hindi concepts as compared to the advance organiser strategies. The interactions involving the variables of teaching model and intelligence level were found to be significant. The students taught with CAM retained much more in comparison to those taught with AOM.

In his study “conceptual learning and research possibilities: Bruner’s view”, Bawa (1991) tried to examine the concept of conceptual learning and Bruner’s ideas on the nature and acquisition of concepts and strategies that can be used in concept attainment. The study indicated that there is a dearth of research studies in the area of concept learning and that the concept attainment model (CAM) was more effective than the conventional method for the teaching of concepts especially at the knowledge and understanding levels, for retention of concepts, and for bringing about attitudinal changes.

A study on the use of drama in improving the teaching-learning process was executed on elementary level children by Kulkarni (1991). It was a workshop based study and the findings indicated that children grew on cognitive as well as affective plane by more meaningful and enjoyable experiences through drama. Children responded that they would like to study other subjects in the classroom through drama.

Jaimini (1991) in her study “Effect of Teaching Strategies on Conceptual-Learning Efficiency and Retention in Relation to Divergent Thinking” investigates the effect of AOM and CAM teaching strategies and their interaction with creativity on learning outcomes in terms of learning efficiency and retention. The findings of the study were:

- AOM and CAM were both more effective than the conventional method (CM) in fostering conceptual learning efficiency in terms of comprehension and application.
- AOM and CAM were both equally effective in concept-learning.

- Interaction of teaching strategies and divergent thinking was significantly in the concept-learning of pupils.
- The concept retention of the pupils was not significantly influenced by their divergent thinking ability; rather, it was significantly influenced by the teaching strategy.
- AOM was more effective than CAM in the retention of concepts by the pupils of high as well as low divergent thinking.

Mahajan (1992) made a comparative study of the effectiveness of two models of teaching, viz. Bruner's Concept Attainment Model and Ausubel's Advance Organiser Model, on the teaching abilities of student-teachers and on achievement of students in various schools. The findings indicated that during the peer-group sessions as well as classroom teaching sessions, the group which was taught by the concept attainment model was found to be superior to the group which was taught by the advance organiser model and the group which was taught by the routine method, so far as the teaching ability of the student-teacher was concerned. The achievement of students who were taught by the concept attainment model was found to be better than those who were taught by Advance Organiser Model and the routine method.

Joshi and Patra (1993) made an experimental study to assess the impact of concept attainment model on general mental ability of secondary school social science students. Comparison was done on the adjusted mean general ability scores of students studying through CAM with those studying through traditional method, when pre-general mental ability was taken as a covariate. It was found that the adjusted mean of the general mental ability scores of the students taught through CAM was significantly different from those who were taught through traditional method when pre-general mental ability scores were taken as a covariate. The adjusted mean general mental ability scores of the students taught through CAM was significantly higher than those taught through traditional method.

Mukherjee (1993) in his study attempted to develop a strategy to teach English through concept organisation approach. The major findings of this study were:

- Teacher concern and student respect for learning composition in English as second language were at considerably low priority. Content organisation strategy lacks elements that lead learners to mastery over task.
- Components and constituents of concept organisations strategy, as opposed to those of content organisations strategy appears to be more effective in teaching students' written composition in English.
- Concept organisation strategy proved to be more effective than content organisation strategy.
- Having been taught through concept organisation, subjects registered and acquired better performance in the target ability. Moreover, the loss of ability following the withdrawal of teachers guidance in concept organisation strategy was much less than that following withdrawal of teacher guidance in content organisation strategy among subjects.

Patnaik & Mohanan (1993) investigated the effectiveness of the advance organiser model on the attainment of history concepts by cl.VII students. The study revealed that:

- The results in terms of students' achievements, taught by the use of advance organiser, were better than the students taught by conventional method.
- There was no significant difference between the experimental and the control group in case of retention.
- There was significant difference between the boys and girls in the experimental group, i.e. the girls accepted the advance organiser than the boys.

Panda (1994) studied the effect of advance organiser and set induction on learning and transfer among cl. IX students. It was found that:

- There were significant difference between the mean achievement of students studying through advance organiser, set induction and traditional method.
- There was no significant difference between the mean achievement of students studying through advance organiser and set induction.
- Students studying through advance organiser scored higher than the students studying through the traditional method.

- Students studying through set induction scored higher than the students studying through traditional method.
- The mean achievement scores of the above three groups were higher in immediate retention test than the delayed transfer test.
- There was no interaction between methods of instruction, sex and immediate and delayed test.
- There was no significant difference between the mean achievement of boys and girls measured through the criterion test.

Saxena (1994) identified prevailing alternative frameworks among senior secondary and under-graduate students of physics, with a view to develop a suitable strategy using concept mapping. Major findings of the study revealed that:

- In school-A, out of seven units under study, four units showed significantly higher gain scores of experimental group. Two units showed that control group gained significantly more than the experimental group.
- In school-B, only five units could be taught with the prescribed strategy. Out of the five units, only in one unit experimental group gained significantly more in comparison to control group in one unit the gains of experimental and control groups were not significantly different. For the other units, no definite trends could be seen.
- Continuity of using the strategy played an important role in terms of gains.
- Concept mapping was mentioned as one of the elements of the conceived strategy. It was found that the students took time to learn drawing the concept map.

Swamy (1995) evaluated the effect of inquiry training model of teaching science on science process skills, creativity and curiosity of secondary school students. It was found that inquiry training model of teaching science was more effective than the conventional method in developing science process skills, fostering fluency and originality components of creativity and in boosting curiosity. Inquiry training model of teaching science was more effective than the conventional method in developing science process skills for students belonging to above average and average groups. Inquiry training model of teaching science is equally effective for all the three levels of students in fostering fluency and

originality components of creativity. The students sustained science process skills developed through inquiry training model of teaching science. The students sustained fluency and originality components of creativity fostered through inquiry training model of teaching science. The students' sustained curiosity boosted through inquiry training model of teaching science.

Alam (1997) looked into the effectiveness of inductive thinking and inquiry training models of teaching biology to secondary school students. The study revealed that for concept learning and retention in biology, inductive thinking model and inquiry training model were more effective than conventional teaching method; and Inductive thinking model was more effective as compared to inquiry training model in terms of students' concept attainment in Biology.

Mishra (1998) investigated the learning style patterns in relation to information processing modes and multiple talents of university students of different disciplines and to determine the effect of gender as well as the influence of concerned disciplines on the above mentioned variables. Major findings of the study were:

- University students differed in their learning style pattern and models of information processing ways in terms of their gender as well as the type of concerned disciplines to which they belonged.
- University students displayed multi talent characteristics as indicated from their "versatility" as an index of multi talent perception. Gender, however, had no influence on this variable, but the type of faculty to which they belonged seemed to have an effect on the versatility dimension of the students.

Kumar and Kaur (1998) evaluated the effectiveness of inquiry training model in the development of process skills in geography in relation to cognitive style and personality types and found that the experimental group differed significantly better than the control group on the terminal behaviour supporting that the inquiry training model was more effective for developing process skills in geography than the conventional method.

Chaudhari, U. S., Vaidya, S., Navalakhaa, N. G. & Mahapatra, B. C. (1999) made a study of the effect of Synectics model, gaming strategy and traditional method upon self-concept, creativity and achievement of class VI students. It was found that the gaming and Synectics model strategy treatment

were found superior to the traditional method in enhancing the self-concept of learners and on achievement scores.

Saminathan (1999) in his study attempted to develop new innovative and effective strategies for teaching physics in classroom through information processing approach which aim at enhancing problem solving ability of the students. He found that learning through information processing approach model was effective in enhancing the problem solving ability in physics at higher secondary level.

Bhairagya et al (2005) in their study “A Study on Relative Effectiveness between Concept Attainment Model and Traditional Method of Teaching in Economics” purposively selected class-XII pupils as the sample of the study that was divided into two homogenous groups on the basis of intelligence. The experimental group was taught by CAM (concept attainment model) and the control group was taught by TMT (traditional method of teaching). It was found that the CAM is found to be more effective than the TMT in economics particularly in respect to the higher order learning of the cognitive domain of the students.

Mehra & Mondal (2005) in their study “Effects of Peer Tutoring on Learning Outcomes of High School Science Students” found that the students exposed to peer tutoring exhibited better gain in achievement as compared to those taught by traditional instruction. At the knowledge category of objectives, the students taught using the experimental method performed better than their counterparts taught by traditional instruction. Students taught by the experimental method yielded more mean gain score at the knowledge than at comprehension category of objectives.

Prakash & Patnaik (2005) conducted a study on “Effect of Co-Operative Learning on Development of Process Skills in Biology”. The major findings of this study are:

- Co-operative learning has significantly helped in improvement of different components of process skills in biology such as observation, generalization, interpretation, inference and prediction.
- The flexible environment of the co-operative learning helped the students to observe, explore, think divergently and share ideas with their friends. Prakash &

Patnaik (2005) conducted a study on “Effect of Co-Operative Learning on Achievement Motivation and Achievement in Biology”. The study revealed that there was positive effect of co-operative learning on achievement motivation. Co-operative learning has a positive effect on achievement in Biology in terms of knowledge, understanding and application objectives as well as total achievement.

In their study “Effect of Constructivist Approach in Fostering Creativity of Primary School Children”, Nayar & Senapathy (2009) tried to determine the effect of constructivist approach on students’ creative ability. The study revealed that students in the constructivist class significantly improved in their creative ability as a whole and also in fluency and flexibility dimension of CAT (the creative ability test) as compared to the students in the traditional expository teaching class.

Deoghare & Wanjari (2013) studied the concept understanding ability of students by using self guided learning method and teacher guided learning method exposed to constructivist approach, and found that those who studied with teacher guided constructivist approach did perform significantly better on the test than those who studied in the normal way (control group), but they did not perform significantly better than those who studied with self guided constructivist approach.

Jayalekshmi, S. & Pereira (2013) conducted a study “Assessment Practices in Constructivist Paradigm at the Higher Secondary Level in Kerala” to bring out innovative practices in assessment at the higher secondary level. The findings of the study proved that the principles of assessment developed to suit the needs of higher secondary students in Kerala context was very appropriate and the methods of assessment and its recording were effective and practicable at the higher secondary level according to critical pedagogy and constructivist approach.

Mehar & Singh (2014) conducted a study entitled “Effect of Concept Mapping Strategy on Achievement in Biology in Relation to Attitude towards Biology” and found that the performance of students in biology who were taught through concept mapping strategy was significantly higher than those who were taught through the conventional teaching strategy.

Mishra, P. K. (2014) in his article “Teaching Social Science through Constructive Approach at Secondary Level” emphasize that constructivism is the pedagogy adopted by the national curriculum framework (NCF)-2005 developed by the NCERT. It is a major document for school education and the basis for implementation of all the educational practices now. Therefore, focus should be on the essence of constructivism reflected in the NCF-2005 in developing the social science curriculum and implementing through the adoption of the constructivist approaches with the use of appropriate instructional materials suitable for it.

Kalpana, T. (2014) in her article, “A Constructivist Perspective on Teaching and Learning: A Conceptual Framework” attempted to examine constructivist teaching and learning by providing in-depth analysis of features of constructivist theory and its two forms, viz. psychological and social, and the organization of a constructivist classroom. The paper highlights the importance of the theory of constructivism in the present scenario of information explosion due to advancement in technologies.

Rout, S. & Behera, S. K. (2014) in their article “Constructivist Approach in Teacher Professional Development: An Overview” emphasized professional development to be a critical component in the implementation of the NCFTE-2009. They argued that teacher professional development within a constructivist framework can fit more specifically in outcomes-based settings. They proposed a move away from a mechanistic world-view (modernist and behaviorist approach) to a holistic world-view (constructivist and situational or contextual approach) of teacher professional development.

Bhattacharjee, J. (2015) in the article “Constructivist Approach to Learning- An Effective Approach of Teaching Learning” discusses on the concept of constructivist learning, salient features of constructivist learning approach, difference between constructivist learning and traditional approach of learning, teacher’s position in constructivist learning approach, learner’s position in constructivist learning approach and implications of constructivist learning approach.

Conclusion:

An analysis of the research studies and articles cited in this chapter reveals that constructivism has been given importance by researchers abroad and also in our

country. It is due to the fact that constructivism is the theory of learning that leads to effective teaching-learning process and also aids in the construction of new knowledge by the learners. However, it is revealed that there are very few studies on constructivism as a teaching-learning approach. Most of the studies on constructivism presented in this chapter are from abroad and very few are from India. Among the studies conducted in India, some are pilot studies and others are mostly conceptual in nature. The researcher has cited the studies that reflect some aspects of constructivism, if not all aspects. Most of the studies conducted in India are focused on different models of teaching which are related to constructivism. The studies of Sood (1990); Bawa (1991); Kulkarni (1991); Jaimini (1991); Joshi & Patra (1993); Saminathan (1999); Bhairagya et.al (2005); Nayar & Senapathy (2009); Deoghare & Wanjari (2013); Mehar & Singh (2014) etc have established the superiority and effectiveness of constructivist approaches over the traditional methods of teaching.

Little research effort has been made to examine if the findings of researches are used in the actual classroom situations or not. Moreover, the researcher did not find a single study related to the knowledge, attitude and practices of elementary school teachers in our country. It is the knowledge and attitude of teachers which have implications on their practices. Therefore, it is very important to develop proper knowledge and attitude with the teachers for adopting constructivist teaching-learning approach. Teachers should be convinced of the advantages and effectiveness of constructivist pedagogy in their normal classroom teaching situations over their traditional pedagogy. For this purpose research support is very much essential. As already mentioned, there is dearth of research studies on constructivism which would strengthen the teaching-learning process in our country. Moreover, the present researcher did not find any study on the knowledge, attitude and practices of elementary school teachers on constructivism in Mizoram.

CHAPTER-III

PLAN AND PROCEDURE

This chapter is divided into seven sections (i.e. 3.01 to 3.07). It describes the plan and procedure adopted for the conduct of the study. Section 3.01 describes research approach and section 3.02 deals with the sources selected for the collection of data. Population and sample of the study is described in section 3.03 followed by description of the tools and techniques used for the study in section 3.04. In sections 3.05, 3.06, and 3.07 the procedures followed for collection of data, organization of data, and analysis of data are narrated respectively.

3.01: Research Approach

To decide about the research approach is important on the part of the researchers in conducting any research work, which they would use in dealing with their research problems. Research approach is utmost important in any research processes. It describes the various steps of the plan of attack to be adopted in the research process.

The present study is primarily intended to assess the knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivist teaching-learning approach. As such, descriptive survey approach was followed for the conduct of the study.

3.02: Sources of Data

Researchers are required to collect data from appropriate sources, may be primary or secondary or both, according to the objectives and hypotheses of their study. In order to fulfil the objectives of the present study, the following primary and secondary sources were considered to be appropriate for collection of data.

Primary Sources: The elementary school teachers teaching the four key subjects viz., mathematics, English, science and social science were considered to be important primary sources for this study as the study aimed at assessing their knowledge, attitude and practices relating to constructivist approach to teaching-learning.

Secondary Sources: The reports of the Dissertations Abstracts International, National and State Survey Reports, books, journals, official records, internet, published and

unpublished documents are major sources that are of utmost importance for any research. For the present study these sources were also considered important.

3.03: Population and Sample

In education and other social science researches, the appropriate techniques for sampling have been increasingly used to get information necessary about a specific population during recent years because it is very difficult for a researcher to collect information about the whole population (target population). It is possible to draw a representative sample from the population using appropriate sampling techniques so that the inferences drawn from a study can be safely extended to target population.

The present study is related to constructivist approach to teaching-learning focussing on knowledge, attitude and practices of elementary school teachers in Mizoram. Though, there are both government and private schools in the state, majority of the schools are under the control of Mizoram government. It was decided to focus this study on government schools as most of them are trained and also undergo in-service trainings. Therefore, all the elementary government school teachers teaching the four key subjects, viz., mathematics, English, science and social science in the state was the population of the study. Elementary school teachers imply teachers teaching at classes I –VIII (primary level: Classes I - IV and upper primary level: classes V - VIII). It was decided to include the teachers teaching at classes VI and VII in the sample in order to maintain homogeneity.

In the study, gender (male and female) and service locality (urban and rural) were the independent variables along with the teaching subjects. To have a representative sample, it was decided to take 30 teachers in each of the 16 sub-groups making the total sample of 480 elementary school teachers i.e. 120 teachers in each of the four subjects. Further, out of the 120 teachers teaching each of the four specific subjects, 60 would be from urban areas and the rest 60 would be from rural areas with 30 male and 30 female teachers.

For selection of the sample stratified random sampling technique was followed. Out of the eight districts of Mizoram, two districts were randomly selected. The lists of elementary schools in the two districts were obtained from State Project Office of SSA Mission, Mizoram both for urban areas and rural areas. The schools having Classes V to VIII were sort listed. From among the sort listed schools, 60 schools from each of the two districts were randomly selected out of which 30 were from urban areas and 30 from rural areas. The teachers teaching the subjects at classes

VI and VII were included in the sample keeping the number of male and female teachers as 30 in each subject. The list of district and locality wise of the sampled schools is given in Appendix B.

3.04: Tools and Techniques Used

Every researcher requires data gathering tools or techniques which may vary in their complexity, design, administration and interpretation. Each tool/technique is appropriate for the collection of certain kind of data. To debate on the superiority of one over the other is like to argue on which tool of the carpenter is better “*A hammer or a handsaw?*” Like the tools in the carpenter’s chest, each is appropriate in a given situation. The researchers have to select from the available tools, which can help in collecting the relevant data that they require for the study. In some situations, the researchers may find that the existing research tools do not suit their purpose. In such cases, they have to construct their own. For the present study no readymade tool was found suitable. Keeping the characteristics of the sources and objectives of the study in view, it was decided to use questionnaire, observation schedule and check list as the tools for collection of relevant data for the study.

As such, the following tools were developed by the investigator.

- I. Questionnaire to assess the knowledge of elementary school teachers relating to constructivist teaching-learning approach.
- II. Questionnaire to assess the attitude of elementary school teachers relating to constructivist teaching-learning approach.
- III. Questionnaire to assess the practices of elementary school teachers relating to constructivist teaching-learning approach.
- IV. Separate observation schedules for observation of the teaching practices of elementary school teachers teaching the four key subjects: mathematics, English, science and social science. Though there were some common criteria in the observation schedules, specific criteria were also there for different subjects.
- V. A checklist for teachers teaching the four subjects - mathematics, English, science and social science for revealing the constraints that they face in adopting constructivist approach in teaching.

A brief discussion on the procedure followed for development of each of the above tools is made in the following pages.

i. Development of Questionnaire on Awareness (knowledge) of Elementary School Teachers relating to Constructivist Teaching-Learning Approach

Knowledge implies awareness about any construct and its implications etc. In the present study constructivist approach to teaching-learning was the construct. From literature, four broad underlying components were identified as concept, classroom climate, process and product considering the level of the teachers and students for writing the items for the questionnaire. Initially 40 items were prepared on these components and reviewed by the investigator and the supervisor. The preliminary draft of the questionnaire was given to 12 (Twelve) Professors/Associate Professors/Readers of different departments of Education, Psychology, and Social Work of Mizoram University, five Headmasters/Principals of schools, and four senior lecturers of DIETs having specializations in the pedagogy of the four subjects for their comments and suggestions on direction, ambiguity in items, language difficulty, adequacy and technical defects. On the basis of the comments and suggestions received, improvements were made in the items for the final version of the questionnaire. The final version of the questionnaire consisted of twenty-five (25) statements of multiple choice types with four choices but, having one correct answer. The respondents had to read the statements and alternatives and put a tick mark in the response of their choice. The questionnaire was common for the four groups of teachers teaching different subjects, viz., mathematics, English, science and social science. The questionnaire was administered twice to twenty elementary school teachers individually with an interval of two to three weeks to find out the test-retest reliability of the questionnaire. The reliability coefficient was found to be 0.73.

Further, it was decided to get the questionnaire translated into Mizo language to facilitate the teachers in comprehending the statements and the choices. Thus, the final version of the English questionnaire was translated into Mizo by the investigator and was improved with the help of two Mizo language experts. Thus, the questionnaire was bilingual (English and Mizo). A copy of the questionnaire is given in Appendix-A1.

ii. Development of Questionnaire to assess the Attitude of Elementary School Teachers on Constructivist Approach to Teaching-Learning

Though attitude of teachers was to be assessed, no scaling procedure like that of Likert or Thurstone was followed keeping the nature of the components of constructivist approach to teaching-learning in view. It was decided to assess the attitude with direct questions with simple alternative response form of items in the light of the following suggestions of Edward: *It might seem logical to assume that if we want to know how individuals feel about some particular psychological object; the best procedure would be to ask them. Direct questioning may, indeed, be satisfactory for some purposes.* (Edward, 1957, 3)

Further Edward (1957, 3) writes:

Only when the social atmosphere is free from felt or actual pressures toward conformity might we expect to obtain evidence about a person's attitudes by means of direct questioning.

Initially 50 items were prepared and reviewed by the investigator and the supervisor. Preliminary drafts were prepared. The preliminary draft of the questionnaire was got checked by the same group of experts, who had reviewed the first questionnaire, for their comments and suggestions. On the basis of the feedbacks received from the experts, improvements were made in the items for the final version of the questionnaire. In the final version of the questionnaire thirty-four items were retained. All the items were alternative response type having three suggested responses in terms of 'agree', 'undecided' and 'disagree'. The reliability coefficient for this questionnaire was computed following the same procedure as has been explained in case of the first questionnaire and found to be 0.76. The questionnaire was common for all categories of respondents.

Further, the final version of the questionnaire was translated into Mizo following the same procedure as explained in case of the first questionnaire in order to make it bi-lingual. A copy of the questionnaire is given in Appendix-A2

iii. Development of Questionnaire to assess the Practices adopted by Elementary School Teachers relating to Constructivist Teaching-Learning Approach

The same procedure as explained in the case of above two questionnaires was also followed for development of this questionnaire with the same experts. Initially 50 items were prepared. On the basis of the comments and suggestions received from the experts, improvements were made in the items for the final version of the questionnaire and finally thirty questions of alternative response types were retained to which the respondents have to respond by putting a tick mark against the response of their choice. Like the two other questionnaires, the reliability of this questionnaire was found administering twice to the same group of twenty teachers and the reliability coefficient was found to be 0.68. It was also translated into Mizo language following the same procedure. A copy of the questionnaire is appended in appendix A3.

iv. Development of Observation Schedules

Four observation schedules were developed for assessing the classroom practices followed by elementary school teachers teaching the four key subjects – mathematics, science, English and social science. As a whole, 27 tactics were identified from literatures which are suitable for teaching all school subjects in constructivist teaching approach. The observation schedules were prepared including appropriate tactics to the concern subject. The numbers of tactics used in different subjects are mathematics-11, English-11, science-17, and social science-13. Brief explanations of the 27 tactics used as criteria in the observation schedules are presented here.

Asking Questions: The purpose of asking questions is to engage students in sustained discourse structured around powerful ideas. They are used to stimulate students to process and reflect on content, recognise relationships among and implications of its key ideas, think critically about it, and use it in problem solving, decision making or other higher-order applications. Some primarily closed-end and factual questions might be appropriate when teachers are assessing prior knowledge or reviewing new learning, but accomplishing the most significant instructional goals requires open-ended questions that call for students to apply, analyse, synthesise or evaluate what they are learning. Some questions will admit of a wide range of possible correct answers, and some will invite discussion or debate.

Because questions are intended to engage students in cognitive processing and construction of knowledge, they should ordinarily be addressed to the class as a whole. This encourages all students, not just the one eventually, called on, to listen carefully and respond thoughtfully to each questions.

Asking questions in the classroom can ensure students' alertness, concentration and participation in the classroom discourses. It helps in stimulating thinking, arousing interest and curiosity, recalling facts, exercising reasoning ability, using the power of recognition and discrimination and promoting learning. Asking question, as a teaching strategy, can be used in teaching all school subjects.

Asking Students to Memorize Information: Asking students to memorize information implies asking them to retain certain points that may be useful for them in understanding and applying their knowledge when they have to proceed from simple to complex situations. Though memorisation is not the focus of constructivist approach, yet there are certain concepts, formulae, facts and symbols that need to be remembered in learning new things. Memorization of important information is especially necessary for subjects like mathematics, science, social science and languages.

Asking Students to solve sums on the Board: One of the easiest ways of assessing students' understanding about the subjects like mathematics and science is asking students to solve sums on the board. It can be used in teaching languages for checking spellings and correct uses of grammar in making sentences.

Anchored Instruction: Anchored instruction is a strategy in which the teachers attempt to help students to become actively involved in learning by situating instruction around an interesting topic and may include real-like contexts such as real stories, adventures or devise problems that students can explore to find plausible answers. Anchored instruction is especially useful in teaching science subjects.

Brainstorming: Brainstorming is a creative technique where the teachers provide opportunities to groups of students in such a way that they are able to come up with conclusions and suggestions for certain problems or issues by incorporating the various ideas, suggestions and inputs that each group members have contributed.

Conducting brainstorming session as a teaching tactic is appropriate for all school subjects.

Collaborative Learning: Collaborative learning is a teaching strategy that involves groups of learners who work together on a common task or activity to solve a problem, complete a task, or create a product. Here learning has a social concept of active engagement among learners through face-to-face interaction, interdependence, cooperation, individual responsibility and accountability. Students can always collaborate and learn together and develop positive habits. This strategy is appropriate for all school subjects.

Citing Examples beyond the Textbooks: Citations of examples by the teachers help students in getting clarified about the concepts, principles, properties etc. Teachers need to cite examples from real-life situations so that students can relate their experiences and prior learning to new situations. Further, limited examples given in the textbooks may also not be sufficient to clarify the concepts. This strategy is suitable for teaching all subjects.

Concept Mapping: A concept map generally involves the use of a diagram that depicts relationships among different concepts, situations, problems, facts, symbols, words, formulae etc. In a concept map, each word or phrase connects to another, and links back to the original idea, word, or phrase. Concept mapping is a way to develop logical thinking and study skills by revealing connections and helping students see how individual ideas form a larger whole. Concept mapping as a teaching strategy can be especially useful in teaching subjects like science and languages.

Discussion: Discussion is one of the ways in which students can express their ideas and views on controversial issues encountered in the lessons being taught in the classrooms. It also involves sharing of ideas and experiences, solving problems and promoting tolerance with understanding. Discussion as a strategy can be used for teaching, languages, science and social science.

Demonstration: Demonstration is the process of teaching through examples or experiments. It involves showing by reason or proof, explaining or making clear by use of examples or experiments. Demonstration is useful especially for teaching science.

Encouraging Critical Thinking: Critical thinking is a self-directed, self-disciplined, self-monitored, and self-corrective thinking. It entails effective communication and problem-solving abilities. It is the responsibility of teachers to encourage critical thinking among the students. It is appropriate for teaching all subjects.

Elaboration: Elaboration strategy involves the creation of connections or bridges, analogies, phrases, sentences and relationships to information to be taught to students. The confidence that students have in already known connected information can support their learning of new information. It is appropriate for teaching all subjects.

Experimentation: Experimentation is an orderly procedure conducted for verifying, refuting, or establishing the validity of hypotheses. Experiments provide insight into cause-and-effect relationship between/ among factors. This strategy is very much appropriate for teaching science.

Explanation: Explaining is similar to lecturing. It is one of the most commonly used skills in teaching. Through explanation attempts are made to relate a set of facts with another set of facts in order to facilitate understanding. This skill can be followed for teaching all subjects.

Evaluation: Evaluation is an important skill done in the classrooms by teachers through quizzes, tests, class works, oral questions, etc., during/ at the end of delivery of lessons to ensure attainment of objectives and to monitor students' progress. It is appropriate to all subjects.

Inquiry Approach: Inquiry implies seeking for truth, information, or knowledge. Effective inquiry is more than just asking questions. Useful application of inquiry approach involves several factors: a context for questions, a framework for questions, a focus for questions, and different levels of questions. This strategy is suitable for teaching all subjects.

Oral Translation: Translation as a strategy of teaching is used for teaching a new language and making the learner understand the significance of a word or sentence. It has many positive effects as it can be used to aid learning, practise what has been learned, diagnose problems, and even test proficiency of the new language learnt.

Oral translation is generally done when teaching languages and in teaching English to students.

Problem-Based Learning: Problem-based learning (PBL) is a student-centred pedagogy in which students learn about a subject through engagement in a real problem. This approach poses challenges to students and keeps them in the active role of problem-solvers. This strategy is more suitable for teaching science.

Project Works: Assigning project works is a creative as well as productive method of involving students in carrying out worthwhile activities useful to their learning. Project works can be assigned from the textbooks and beyond while teaching and can be related to real life situations. This technique is appropriate to all subjects.

Pictures: In general people like to see pictures, not just hear a word. It is easier to remember pictures long after words have left us. Even in the classroom students tend to pay more attention if they are presented with pictures relevant for use in the topics being taught to them. According to 3M Corporation, pictures can accelerate understanding. Aristotle said it best: “the soul does not think without a picture”. Pictures can be used in teaching all the subjects.

Recitation: Recitation means reciting to oneself. In other words, it simply means checking up one’s own self by being one’s own inquisitor from time to time. It consists in reading the material once or twice and then tries to recall that without looking at the material. The student can, however, look promptly at the points which could not be recalled.

In brief, Recitation is the art of reproducing from memory, or a formal reading of verse or other writing before an audience. Recitation activities are useful in guiding the student’s language development, use of correct grammar, pronunciations and to have a good command over the language.

Singing Songs: Singing Songs is mainly used in teaching languages and social science. Singing Songs can improve the four basic abilities of language learning i.e. listening, speaking, reading, and writing. They can also be used to teach grammar.

Scientific Models: Very simple and easily available scientific models such as compass, thermometer, magnets, skeleton, test-tubes, should be used in teaching science subjects.

Telling stories: Stories can be told to contextualize and introduce new lessons, to associate daily life experiences with children's feelings and memories, to inculcate cultural and intercultural values, to enrich and expand classroom environment. Thus telling stories as a teaching tactic can be best suitable for teaching languages and social science.

Textbook Materials: Textbook materials would mean all the topics covered in the text, the contents mentioned, important key words, concepts, formulae, activities, exercises, questions and answers, etc. Text book materials should be used in all the subjects.

Use of Hardware and Software: The use of hardware and software would include the manipulation or application of projectors, audio-tapes, slides, filmstrips, educational films, T.V., CCTV, video cameras etc., relevant for use in the transaction of knowledge in the classrooms. Hardware and software can be used in teaching all school subjects.

Use of Pictures, Charts and Maps: The teachers can make use of pictures, charts and maps related to the topics being taught in the classrooms. Colourful pictures, charts and maps make the learning atmosphere more interesting and enjoyable and help in drawing students' attention to the topic being taught. Such types of aids are appropriate for all subjects.

In the observation schedule meant for observation of Mathematics teachers in their classrooms 11 criteria were included. Those are Asking Students to Memorise Information, Asking Students to Solve Sums on the Board, Brainstorming, Concept Mapping, Citing Examples beyond the Textbooks, Explanation, Elaboration, Evaluation, Inquiry Approach, Solving Textbook Sums, and Using Locally Available Resources.

English classrooms were observed by considering the criteria: Asking Questions, Brainstorming, Collaborative Learning, Discussion, Explanation, Evaluation, Inquiry Approach, Oral Translation, Recitation, Singing Songs and Use of Hardware/ Software which were 11 in numbers.

For the observation of Science teachers' classrooms the 17 criteria included in the observation schedules are Anchored Instruction, , Brainstorming, Collaborative Learning, Concept mapping, Demonstration, Discussion, Elaboration, Encouraging Critical Thinking, , Experimentation, Evaluation, Inquiry approach, Problem-Based Learning, Project Works, Scientific Models, Textbook Materials ,Use of Hardware/ Software, and Use of Pictures, Charts and Diagrams.

Similarly, for observation of Social science classroom teachings 13 criteria were used which include Asking Questions, Collaborative Learning, Concept Mapping, Discussion, Explanation, Elaboration, Evaluation, Inquiry Approach, Singing Songs, Telling Stories, Text Book Materials, Use of Hardware/Software ,and Use of Pictures, Charts and Maps.

While selecting the criteria for the observation schedules of specific subjects, experts (Professors and Associate Professors of education) were consulted. The four observation schedules are given in appendices A4 (i) to A4 (iv).

V. Checklist for Teachers

A checklist, in the form of questions, was prepared for teachers to reveal their constraints in adopting constructivist teaching-learning approach. The questions were framed keeping in mind the important factors that influence the teaching-learning environment in the school. The initial draft of the questionnaire had 15 items. After editing and getting the experts' view, finally, twelve questions were retained which were to be answered as 'Yes' or 'No' by putting tick marks. The checklist was common for all the four groups of teachers teaching different subjects. A copy of the check list is appended to Appendix A5.

3.05: Procedure of Data Collection

Data collection is essentially an important part of research process. For the present study, data were collected through personal visits to the selected schools and through personal approach to the different subject teachers. They were handed over with the questionnaires and were requested to return the same within two days. Though most of the teachers could return in time, few took more time i.e. three or four days.

For observation of class room teachings, the researcher used to enter into the class rooms of the teachers with due consent of the teachers and with permission of the headmasters. The researcher used to observe the whole period and at the time of observation entries were made in the observation schedule.

3.06: Organization of Data

Keeping the objectives of the study in view data collected through different sources were organized separately for the sixteen sub-groups on the three components – knowledge, attitude and practices.

The results of the classroom observations on practices of the teachers teaching in the four subjects were also organised subject wise and for various sub-groups.

3.07: Analysis of Data

The data were analyzed both qualitatively and quantitatively. For quantitative analysis, descriptive statistics like frequency and percentage, mean and standard deviation were used. Besides product moment correlation was computed for relationship analysis. Further, t- test was used for the purpose of comparison between different groups of teachers.

CHAPTER-IV

ANALYSIS AND INTERPRETATION

This chapter deals with analysis of data collected from different sources as described in the preceding chapter and their interpretation according to the first 12 objectives of the study stated in chapter-I. Suggestions for effective adoption of constructivist teaching-learning approach by the elementary school teachers in Mizoram, which was the thirteenth objective of the study, will be presented in chapter-V. For analysis and interpretation this chapter is divided into eight sections pertaining to the first eleven objectives. In section 4.01 the awareness of elementary school teachers relating to constructivism is presented (objective-1). In section 4.02 the attitude of elementary school teachers relating to constructivism is dealt (objective-2). In section 4.03 the extent to which elementary school teachers in Mizoram adopt constructivist teaching-learning approach is presented (objective-3). Differential analysis is made in sections 4.04 to assess the variations in the knowledge, attitude and adoption of constructivist teaching-learning approach by elementary school teachers teaching different subjects in Mizoram (objectives 4, 5 & 6). The gender differences in the knowledge, attitude and adoption of constructivist teaching-learning approach by elementary school teachers (objective-7, 8 & 9) are presented in section 4.05. The nature and extent of relationship between knowledge and attitude of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach (objective -10) is presented in section 4.06. Further, the differences in the relationship between the knowledge and attitude of elementary school teachers in Mizoram relating constructivism as a teaching-learning approach with reference to the subject they teach (objective -11) are presented in section 4.07. The constraints faced by elementary school teachers in Mizoram in adopting constructivist teaching-learning approach (objective-12) are presented in section 4.08.

4.01: Depth of Knowledge of Elementary School Teachers in Mizoram on Constructivism as a Teaching-Learning Approach

The first objective of the study was to reveal the depth of knowledge of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach with reference to the subjects they teach. The questionnaire meant for assessing the awareness of the teachers had twenty-five multiple type questions with four

alternatives. The maximum and minimum possible scores were 25 and 0 respectively. The mean and standard deviation for different groups of teachers on their awareness were computed to describe the data and are presented in table 4.01. Further, it was decided to classify the teachers on the basis of their scores on awareness about constructivism as a teaching-learning approach following the criteria mentioned below for meaningful interpretation. The results of classification of teachers in different subjects are given in table 4.02 and interpretations are made subject wise.

Criteria for Interpretation:

| Level | Range | Range of Scores |
|--------------|--------------------------|------------------------|
| High | Above Mean+ 1SD | 20.7 – 25.0 |
| Moderate | Mean – 1SD to mean + 1SD | 12.1 – 20.7 |
| Low | Below mean -1SD | 00 - 12.1 |

Mathematics

From table 4.01 it is revealed that the mean scores of various groups of mathematics teachers based on their gender and locale varied from 16.57 (rural male) to 17.70 (urban female) with the grand mean of 16.80. The S.D. of various groups varied from 3.54 (urban male) to 4.71 (urban female), and the S.D. of the whole group was 4.30. As the maximum and minimum possible scores were 25 and 00 (zero) respectively, the mean scores of all the groups indicate that the mathematics teachers, irrespective of their gender and locale, have moderate awareness (knowledge) about constructivism as a teaching-learning approach. The variations in the scores of different groups, as revealed from the standard deviations, are also not high.

From table 4.02 it is found that, among the mathematics teachers of various groups based on locale and gender, 13.3% of male teachers and 20% of female teachers belonging to the urban areas and, 16.7% of both male teachers and female teachers belonging to the rural areas have low level of awareness about constructivism as a teaching-learning approach. On the whole 15% of male teachers and 18.3% of female teachers teaching mathematics are found to have low level of awareness on constructivism as a teaching-learning approach. Similarly 70% of male teachers and 53.3% of female teachers belonging to the urban areas, and 66.6% of both male

teachers and female teachers belonging to the rural areas are found to have moderate level of awareness on constructivism as a teaching-learning approach. On the whole

Table 4.01 Mean and SD of Different Groups of Teachers on Knowledge

| Sl. No. | Subjects | Groups | N | Mean | SD |
|---------|----------------|--------------|-----|-------|------|
| 1. | Mathematics | Urban male | 30 | 16.80 | 3.54 |
| | | Rural male | 30 | 16.57 | 3.89 |
| | | Urban female | 30 | 17.70 | 4.71 |
| | | Rural female | 30 | 16.67 | 4.03 |
| | | Male | 60 | 16.68 | 3.69 |
| | | Female | 60 | 17.18 | 4.37 |
| | | Urban | 60 | 17.25 | 4.13 |
| | | Rural | 60 | 16.62 | 3.96 |
| | | Total | 120 | 16.80 | 4.30 |
| 2. | English | Urban male | 30 | 17.93 | 3.51 |
| | | Rural male | 30 | 16.80 | 4.04 |
| | | Urban female | 30 | 16.27 | 4.16 |
| | | Rural female | 30 | 16.23 | 3.55 |
| | | Male | 60 | 17.37 | 3.99 |
| | | Female | 60 | 16.25 | 3.83 |
| | | Urban | 60 | 17.10 | 3.84 |
| | | Rural | 60 | 16.51 | 3.79 |
| | | Total | 120 | 16.70 | 4.00 |
| 3. | Science | Urban male | 30 | 17.07 | 4.17 |
| | | Rural male | 30 | 15.67 | 4.33 |
| | | Urban female | 30 | 14.63 | 4.39 |
| | | Rural female | 30 | 17.20 | 3.53 |
| | | Male | 60 | 16.37 | 4.27 |
| | | Female | 60 | 15.92 | 4.16 |
| | | Urban | 60 | 15.85 | 4.28 |
| | | Rural | 60 | 16.44 | 3.93 |
| | | Total | 120 | 16.10 | 4.20 |
| 4. | Social science | Urban male | 30 | 17.27 | 4.48 |
| | | Rural male | 30 | 13.50 | 4.66 |
| | | Urban female | 30 | 16.03 | 4.15 |
| | | Rural female | 30 | 17.17 | 4.17 |
| | | Male | 60 | 15.38 | 4.91 |
| | | Female | 60 | 16.60 | 4.16 |
| | | Urban | 60 | 16.65 | 4.32 |
| | | Rural | 60 | 15.34 | 4.42 |
| | | Total | 120 | 16.10 | 4.50 |
| 5. | All subjects | Male | 120 | 16.45 | 4.22 |
| | | Female | 120 | 16.18 | 4.32 |
| | | Urban | 120 | 16.71 | 4.14 |

| | | | | | |
|--|--|-------------|-----|-------|------|
| | | Rural | 120 | 16.23 | 4.03 |
| | | Grand Total | 480 | 16.39 | 4.18 |

Table 4.02: Locality, Gender and Teaching Subject Wise Levels of knowledge of teachers on Constructivist Teaching - Learning Approach

| Sl.No | Subjects | Level of Awareness | Urban Male (n=30) | Urban Female (n=30) | Total (N=60) | Rural Male (n=30) | Rural Female (n=30) | Total (N=60) | Male (n=60) | Female (n=60) | Total (N=120) |
|-------|-------------|-----------------------|-------------------|---------------------|--------------|-------------------|---------------------|--------------|-------------|---------------|---------------|
| I | Mathematics | Low (0 -12.1) | 4 (13.3) | 6 (20.0) | 10 (16.7) | 5 (16.7) | 5 (16.7) | 10 (16.7) | 9 (15.0) | 11 (18.3) | 20 (16.6) |
| | | Moderate (12.1 -20.7) | 21 (70.0) | 16 (53.3) | 37 (61.6) | 20 (66.6) | 20 (66.6) | 40 (66.6) | 41 (68.3) | 36 (60.0) | 77 (64.2) |
| | | High (20.7 - 25) | 5 (16.7) | 8 (26.7) | 13 (21.7) | 5 (16.7) | 5 (16.7) | 10 (16.7) | 10 (16.7) | 13 (21.7) | 23 (19.2) |
| | | Total | 30 (100) | 30 (100) | 60 (100) | 30 (100) | 30 (100) | 60 (100) | 60 (100) | 60 (100) | 120 (100) |
| II | English | Low (0 -12.1) | 2 (6.7) | 6 (20.0) | 8 (13.3) | 6 (20.0) | 4 (13.3) | 10 (16.7) | 8 (13.3) | 10 (16.7) | 18 (15.0) |
| | | Moderate (12.1 -20.7) | 18 (60.0) | 19 (63.3) | 37 (61.7) | 17 (56.7) | 23 (76.7) | 40 (66.6) | 35 (58.3) | 42 (70.0) | 77 (64.2) |
| | | High (20.7 - 25) | 10 (33.3) | 5 (16.7) | 15 (25.0) | 7 (23.3) | 3 (10.0) | 10 (16.7) | 17 (28.4) | 8 (13.3) | 25 (21.0) |
| | | Total | 30 (100) | 30 (100) | 60 (100) | 30 (100) | 30 (100) | 60 (100) | 60 (100) | 60 (100) | 120 (100) |
| III | Science | Low (0 -12.1) | 4 (13.3) | 10 (33.4) | 14 (23.3) | 5 (16.7) | 4 (13.3) | 9 (15.0) | 10 (16.7) | 13 (21.7) | 23 (19.2) |
| | | Moderate (12.1 -20.7) | 18 (60.0) | 16 (53.3) | 35 (58.3) | 17 (56.6) | 20 (66.7) | 37 (61.7) | 35 (58.3) | 37 (61.7) | 72 (60.0) |

| | | | | | | | | | | | |
|----|----------------|--------------------------|--------------|--------------|---------------|--------------|--------------|---------------|---------------|---------------|---------------|
| | | High (20.7 - 25) | 8 (26.7) | 4 (13.3) | 11 (18.4) | 8 (26.7) | 6 (20.0) | 14 (23.3) | 15 (25.0) | 10 (16.6) | 25 (20.8) |
| | | Total | 30 (100) | 30 (100) | 60 (100) | 30 (100) | 30 (100) | 60 (100) | 60 (100) | 60 (100) | 120 (100) |
| IV | Social science | Low (0 -12.1) | 5 (16.7) | 7 (23.3) | 12 (20.0) | 13 (43.3) | 6 (20.0) | 19 (31.7) | 18 (30.0) | 13 (21.7) | 31 (25.8) |
| | | Moderate (12.1 -20.7) | 16 (53.3) | 17 (56.7) | 33 (55.0) | 15 (50.0) | 15 (50.0) | 30 (50.0) | 31 (51.7) | 32 (53.3) | 63 (52.5) |
| | | High (20.7 - 25) | 9 (30.0) | 6 (20.0) | 15 (25.0) | 2 (6.7) | 9 (30.0) | 11 (18.3) | 11 (18.3) | 15 (25.0) | 26 (21.7) |
| | | Total | 30 (100) | 30 (100) | 60 (100) | 30 (100) | 30 (100) | 60 (100) | 60 (100) | 60 (100) | 60 (100) |
| V | Total | Low (0 -12.1) | 15 (12.5) | 29 (24.2) | 44 (18.3) | 30 (25.2) | 17 (14.2) | 48 (20.0) | 45 (18.7) | 47 (19.6) | 92 (19.2) |
| | | Moderate (12.1 -20.7) | 73 (60.8) | 68 (56.6) | 142 (59.2) | 67 (56.3) | 80 (66.7) | 147 (61.3) | 142 (59.1) | 147 (61.3) | 289 (60.2) |
| | | High (20.7 - 25) | 32 (26.7) | 23 (19.2) | 54 (22.5) | 22 (18.5) | 23 (19.1) | 45 (18.7) | 53 (22.0) | 46 (19.1) | 99 (20.6) |
| | | Total | 120 (100) | 120 (100) | 240 (100) | 120 (100) | 120 (100) | 240 (100) | 240 (100) | 240 (100) | 240 (100) |

The figures in the parentheses indicate percentage

68.3% of male teachers and 60% of female teachers are found to have moderate level of awareness relating to constructivism as a teaching-learning approach. It was also found that 16.7% of male teachers and 26.7% of female teachers belonging to the urban areas, and 16.7% of both male teachers and female teachers belonging to the rural areas have high level of awareness on constructivism as a teaching-learning approach. On the whole, 16.7% of male teachers and 21.7% of female teachers teaching mathematics are found to have high level of awareness about constructivist approach to teaching-learning. On the whole, irrespective of locale and gender, it is found that 16.6%, 64.2% and 19.2% of mathematics teachers have low, moderate and high levels of awareness relating to constructivism as a teaching-learning approach respectively.

English

From table 4.01 it is revealed that the mean scores of English teachers based on their gender and locale varied from 16.23 of (rural female) to 17.93 of (urban male) with the grand mean of 16.70. The S.D. of various groups varied from 3.51 of (urban male) to 4.16 of (urban female), with the S.D. of the whole group of 4.00. As the maximum and minimum possible scores were 25 and 00 (zero) respectively, the mean scores of all the groups indicate that the mathematics teachers, irrespective of their gender and locale, have moderate awareness (knowledge) about constructivism as a teaching-learning approach. The variations in the scores of different groups, as revealed from the standard deviations, are also not high.

From table 4.02 it is found that, among the English teachers of various groups based on locale and gender, 6.7% of male teachers and 20% of female teachers belonging to the urban areas and 20% male teachers and 13.3% female teachers belonging to the rural areas have low level of awareness about constructivism as a teaching-learning approach. On the whole 13.3% of male teachers and 16.7% of female teachers have low level of awareness on constructivism as a teaching-learning approach. Similarly 60% male teachers and 63.3% female teachers belonging to the urban areas, and 56.7% male teachers and 76.7% female teachers belonging to the rural areas have moderate level of awareness on constructivism as a teaching-learning approach. On the whole 58.3% of male teachers and 70% of female teachers have moderate level of awareness relating to constructivism as a teaching-learning

approach. It is also found that 33.3% of male teachers and 16.7% of female teachers belonging to the urban areas and 23.3% male teachers and 10% female teachers belonging to the rural areas have high level of awareness on constructivism as a teaching-learning approach. On the whole 28.4% of male teachers and 13.3% of female teachers have high level of awareness about constructivist approach to teaching-learning. On the whole it is found that 15%, 64.2% and 21% of English teachers have low, moderate and high levels of awareness respectively relating to constructivism as a teaching-learning approach.

Science

From table 4.01 it is revealed that the mean scores of Science teachers based on their gender and locale varied from 15.67(rural male) to 17.20 of (rural female) with the grand mean of 16.10. The S.D. of various groups varied from 3.53 (rural female) to 4.39 (urban female), with the S.D. of the whole group of 4.20. As the maximum and minimum possible scores were 25 and 00 (zero) respectively, the mean scores of all the groups indicate that the mathematics teachers, irrespective of their gender and locale, have moderate awareness (knowledge) about constructivism as a teaching-learning approach. The variations in the scores of different groups, as revealed from the standard deviations, are also not high.

From table 4.02 it is found that, among the science teachers of various groups based on locale and gender, 13.3% of male teachers and 33.4% of female teachers belonging to the urban areas, and 16.7% male teachers and 13.3% female teachers belonging to the rural areas have low level of awareness about constructivism as a teaching-learning approach. On the whole 16.7% of male teachers and 21.7% of female teachers were found to have low level of awareness on constructivism as a teaching-learning approach. While 60% male teachers and 53.3% female teachers belonging to the urban areas, and 56.6% male teachers and 66.7% female teachers belonging to the rural areas have moderate level of awareness on constructivism as a teaching-learning approach. On the whole 58.3% of male teachers and 61.7% of female teachers were found to have moderate level of awareness relating to constructivism as a teaching-learning approach. It was also found that 26.7% of male teachers and 13.3% of female teachers belonging to the urban areas and 26.7% male teachers and 20% female teachers belonging to the rural areas were found to have

high level of awareness on constructivism as a teaching-learning approach. Only 25% of male teachers and 16.6% of female teachers were found to have high level of awareness about constructivist approach to teaching-learning. On the whole it was found that 19.2% and 20.8% of science teachers have low and high level of awareness relating to constructivism as a teaching-learning approach respectively. The study revealed that majority (60%) of science teachers have moderate level of awareness relating to constructivism as a teaching-learning approach.

Social science

From table 4.01 it is revealed that the mean scores of Social science teachers based on their gender and locale varied from 13.50 (rural male) to 17.27 (urban male) with the grand mean of 16.10. The S.D. of various groups varied from 4.15(urban female) to 4.66 (rural male), with the S.D. of the whole group of 4.50. As the maximum and minimum possible scores were 25 and 00 (zero) respectively, the mean scores of all the groups indicate that the mathematics teachers, irrespective of their gender and locale, have moderate awareness (knowledge) about constructivism as a teaching-learning approach. The variations in the scores of different groups, as revealed from the standard deviations, are also not high.

From table 4.02 it is found that, among the social science teachers of various groups based on locale and gender, 16.7% of male teachers and 23.3% of female teachers belonging to the urban areas, and 43.3% male teachers and 20% female teachers belonging to the rural areas have low level of awareness about constructivism as a teaching-learning approach. On the whole 30% of male teachers and 21.7% of female teachers were found to have low level of awareness on constructivism as a teaching-learning approach. Similarly 53.3% male teachers and 56.7% female teachers belonging to the urban areas, and 50% of both male teachers and female teachers belonging to the rural areas were found to have moderate level of awareness on constructivism as a teaching-learning approach. On the whole 51.7% of male teachers and 53.3% of female teachers have moderate level of awareness relating to constructivism as a teaching-learning approach. It was also found that 30% of male teachers and 20% of female teachers belonging to the urban areas and 6.7% of male teachers and 30% of female teachers have high level of awareness about constructivist approach to teaching-learning. On the whole 18.3% of male teachers and 25% of

female teachers were found to have high level of awareness about constructivist approach to teaching-learning. Overall it is found that social science teachers have moderate (52.5%) level of awareness relating to constructivism as a teaching-learning approach.

It is revealed from table 4.02 that out of the elementary school teachers under the study, irrespective of their gender, locale and teaching subjects, 19.2%, 60.2%, and 20.6% have low, moderate, and high level of awareness about constructivism as a teaching-learning approach respectively.

Hence, the research hypothesis no.1 stated in chapter 1 that elementary school teachers teaching different subjects in Mizoram have adequate knowledge about constructivism as a teaching-learning approach is found to be true to a large extent.

4.02: Attitude of Elementary School Teachers in Mizoram towards Constructivism as a Teaching-Learning Approach with reference to the Subjects they teach

The second objective of the study was to reveal the attitude of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach with reference to the subjects they teach. For assessing the attitude a questionnaire containing thirty-four statements having three options as agree, undecided and disagree was administered. The maximum and minimum possible scores were 34 and -34 indicating perfect favourable and perfect unfavourable attitude respectively. As such the mean and standard deviation for different groups of teachers were computed to describe the data and are presented in table 4.03 and interpretations are made subject wise.

Mathematics

From table 4.03 it is revealed that the mean scores of Mathematics teachers based on their gender and locale varied from 22.77 (rural male) to 26.23 (rural female) with the grand mean of 24.90. The S.D. of various groups varied from 3.98 (urban female) to 6.22 (rural male), with the S.D. of the whole group of 5.64. As the maximum possible score was 34, the mean scores of all groups indicate that the Mathematics teachers have favourable attitude towards constructivism as a teaching-learning approach. There are also not much variations in the scores of different groups, as revealed from the standard deviations of various groups.

English

From table 4.03 it is revealed that the mean scores of English teachers based on their gender and locale varied from 20.83 (rural male) to 24.83 (urban male) with the grand mean of 22.43. The S.D. of various groups varied from 2.77(urban male) to 3.25 (rural female), with the S.D. of the whole group of 3.39. As the maximum possible score was 34, the mean scores of all groups indicate that the English teachers have favourable attitude about constructivism as a teaching-learning approach. There are also not much variations in the scores of different groups, as revealed from the standard deviations of various groups.

Science

From table 4.03 it is revealed that the mean scores of Science teachers based on their gender and locale varied from 19.77 (rural male) to 23.10 (urban male) with the grand mean of 21.65. The S.D. of various groups varied from 2.59 (urban female) to 3.81 (rural female), with the S.D. of the whole group of 3.67. As the maximum possible score was 34, the mean scores of all groups indicate that the English teachers have favourable attitude about constructivism as a teaching-learning approach. There are also not much variations in the scores of different groups, as revealed from the standard deviations of various groups.

Social science

From table 4.03 it is revealed that the mean scores of Social science teachers based on their gender and locale varied from 21.83 (rural male) to 25.20 (urban male) with the grand mean of 23.69. The S.D. of various groups varied from 3.27 (urban male) to 4.29 (rural male), with the S.D. of the whole group of 4.00. As the maximum possible score was 34, the mean scores of all groups indicate that the social science teachers have favourable attitude about constructivism as a teaching-learning approach. There are also not many variations in the scores of different groups, as revealed from the standard deviations of various groups.

Table 4.03: Mean and SD of different groups of teachers on their Attitude towards Constructivist Teaching-Learning Approach

| Sl. no. | Subjects | Groups | N | Mean | SD |
|---------|----------------|-----------------------|-----|-------|------|
| 1. | Mathematics | Urban (male) | 30 | 25.03 | 5.54 |
| | | Rural (male) | 30 | 22.77 | 6.22 |
| | | Urban (female) | 30 | 25.57 | 3.98 |
| | | Rural (female) | 30 | 26.23 | 6.19 |
| | | Male (urban +rural) | 60 | 23.90 | 5.95 |
| | | Female (urban +rural) | 60 | 25.90 | 5.17 |
| | | Urban (male+ female) | 60 | 25.30 | 4.76 |
| | | Rural (male + female) | 60 | 24.50 | 6.21 |
| | | Total (male +female) | 120 | 24.90 | 5.64 |
| 2. | English | Urban (male) | 30 | 24.83 | 2.77 |
| | | Rural (male) | 30 | 20.83 | 3.22 |
| | | Urban (female) | 30 | 22.63 | 3.25 |
| | | Rural (female) | 30 | 21.43 | 2.97 |
| | | Male (urban +rural) | 60 | 22.83 | 3.60 |
| | | Female (urban +rural) | 60 | 22.03 | 3.15 |
| | | Urban (male+ female) | 60 | 23.73 | 3.01 |
| | | Rural (male + female) | 60 | 21.13 | 3.09 |
| | | Total (male +female) | 120 | 22.43 | 3.39 |
| 3. | Science | Urban(male) | 30 | 23.10 | 2.77 |
| | | Rural (male) | 30 | 19.77 | 3.41 |
| | | Urban (female) | 30 | 21.83 | 2.59 |
| | | Rural (female) | 30 | 21.90 | 3.81 |
| | | Male (urban+ rural) | 60 | 21.43 | 3.51 |
| | | Female (urban +rural) | 60 | 21.87 | 3.23 |
| | | Urban (male+ female) | 60 | 22.47 | 2.68 |
| | | Rural (male + female) | 60 | 20.84 | 3.61 |
| | | Total (male +female) | 120 | 21.65 | 3.67 |
| 4. | Social science | Urban (male) | 30 | 25.20 | 3.27 |
| | | Rural (male) | 30 | 21.83 | 4.29 |
| | | Urban (female) | 30 | 24.13 | 4.04 |
| | | Rural (female) | 30 | 23.60 | 3.73 |
| | | Male (urban+ rural) | 60 | 23.52 | 4.15 |
| | | Female (urban+ rural) | 60 | 23.87 | 3.87 |
| | | Urban (male+ female) | 60 | 24.67 | 3.66 |
| | | Rural (male + female) | 60 | 22.72 | 4.01 |
| | | Total (male +female) | 120 | 23.69 | 4.00 |
| 5. | All subjects | Male | 120 | 22.92 | 4.30 |
| | | Female | 120 | 23.42 | 3.85 |
| | | Urban | 120 | 24.04 | 3.53 |
| | | Rural | 120 | 22.29 | 4.23 |
| | | Grand Total | 480 | 23.17 | 3.98 |

Hence, the research hypothesis no.2 stated in chapter I that elementary school teachers teaching different subjects in Mizoram have positive attitude towards constructivism as a teaching-learning approach is found to be true to a large extent.

4.03: Practices of Elementary School Teachers teaching different subjects in Mizoram adopting Constructivist Teaching-Learning Approach

The third objective of the study was to assess the extent to which the elementary school teachers teaching different subjects in Mizoram adopt constructivist teaching-learning approach. The questionnaire meant for revealing the practices of the teachers in adopting constructivist teaching-learning approach had thirty multiple choice type questions with two alternatives each. The maximum and minimum possible scores were 30 and 0 (zero) respectively. The mean and standard deviation for different groups of teachers on their practices were computed to describe the data and are presented in table 4.04. It was decided to classify the teachers on the basis of their scores on adoption of constructivism as a teaching-learning approach following the criteria mentioned below for meaningful interpretation. The results of classification of teachers in different subjects are given in table 4.05.

Criteria for Classification:

| Level | Range | Range of Scores |
|--------------|--------------------------|------------------------|
| High | Above Mean+ 1SD | 26.90- 30.0 |
| Moderate | Mean – 1SD to mean + 1SD | 18.50-26.90 |
| Low | Below mean -1SD | 00-18.50 |

Further, it was decided to observe classroom practices of elementary school teachers teaching the four major subjects- mathematics, English, science and social science for which separate observation schedules were prepared for all the four teaching subjects included in the study and were used by the investigator as the observer. The data were analysed applying simple descriptive statistics like frequencies and percentages and are presented in tables 4.06,4.07 ,4.08 and 4.09 for mathematics, English, science and social science respectively. Interpretations relating to the practices of teachers are made subject wise with the data collected from the two sources i.e. questionnaire and observation.

Mathematics

From table 4.04 it is revealed that the mean scores of Mathematics teachers based on their gender and locale varied from 23.13 (urban male) to 24.63(urban female) with the grand mean of 23.74. The S.D. of various groups varied from 2.59 (rural female) to 3.97 (urban (female), with the S.D. of the whole group of 3.34. As the maximum possible score was 30, the mean scores of all groups indicate that Mathematics teachers practised constructivist teaching-learning approach moderately.

Table 4.05 reveals that none of the male teachers belonging to the urban areas and female teachers belonging to the rural areas practised constructivist teaching-learning approach. However, 6.7% of female teachers belonging to the urban areas and 10% of male teachers belonging to the rural areas minimally practised constructivist teaching-learning approach. Out of all teachers taken for the study, 5% of male teachers and 3.3% of female teachers minimally practised constructivist teaching-learning approach respectively. It is also found that 93.3% of male teachers and 43.3% of female teachers belonging to the urban areas, and 73.3% of male teachers and 70% of female teachers belonging to the rural areas practiced constructivist teaching-learning approach moderately. On the whole, 83.3% of male mathematics rarely, moderately and highly practiced constructivist teaching-learning approach in the classrooms respectively. It also reveals that on the whole only 5% of male teachers and 3.3% of female teachers rarely practiced, 83.3% of male teachers , and 56.7% of female teachers moderately practiced, and 11.7% of male teachers and 40% of female teachers highly practiced constructivist approach to teaching-learning for teaching mathematics. teachers and 56.7% of female teachers practiced constructivist teaching-learning approach moderately. Further Table 4.05 revealed that 6.7 % of male teachers and 50% of female teachers belonging to the urban areas, and 16.7% of male teachers and 30% of female teachers belonging to the rural areas practiced constructivist teaching-learning approach highly. On the whole, 11.7% of male teachers and 40% of female teachers highly practised constructivist teaching-learning approach. From Table 4.05 it is found that out of all the elementary school teachers 4.2 %, 70% and 25.8% of elementary school teachers teaching

4.04: Mean and SD of different groups of teachers adopting Constructivist Teaching-Learning Approach

| Sl. no. | Subjects | Groups | N | Mean | SD |
|---------|----------------|-----------------------|-----|-------|------|
| 1. | Mathematics | Urban (male) | 30 | 23.13 | 2.69 |
| | | Rural (male) | 30 | 22.87 | 3.69 |
| | | Urban (female) | 30 | 24.63 | 3.97 |
| | | Rural (female) | 30 | 24.33 | 2.59 |
| | | Male (urban +rural) | 60 | 23.00 | 3.20 |
| | | Female (urban +rural) | 60 | 24.48 | 3.33 |
| | | Urban (male+ female) | 60 | 23.88 | 3.33 |
| | | Rural (male + female) | 60 | 23.60 | 3.14 |
| | | Total (male +female) | 120 | 23.74 | 3.34 |
| 2. | English | Urban (male) | 30 | 23.67 | 3.16 |
| | | Rural (male) | 30 | 23.40 | 3.32 |
| | | Urban (female) | 30 | 23.67 | 3.59 |
| | | Rural (female) | 30 | 23.90 | 3.55 |
| | | Male (urban +rural) | 60 | 23.53 | 3.21 |
| | | Female (urban +rural) | 60 | 23.78 | 3.54 |
| | | Urban (male+ female) | 60 | 23.67 | 3.38 |
| | | Rural (male + female) | 60 | 23.65 | 3.44 |
| | | Total (male +female) | 120 | 23.66 | 3.37 |
| 3. | Science | Urban (male) | 30 | 23.33 | 3.51 |
| | | Rural (male) | 30 | 22.17 | 4.13 |
| | | Urban (female) | 30 | 22.40 | 3.27 |
| | | Rural (female) | 30 | 24.77 | 2.94 |
| | | Male (urban +rural) | 60 | 22.75 | 3.84 |
| | | Female (urban +rural) | 60 | 23.58 | 3.31 |
| | | Urban (male+ female) | 60 | 22.87 | 3.39 |
| | | Rural (male + female) | 60 | 23.47 | 3.54 |
| | | Total (male +female) | 120 | 23.17 | 3.59 |
| 4. | Social science | Urban (male) | 30 | 24.67 | 2.93 |
| | | Rural (male) | 30 | 22.03 | 4.44 |
| | | Urban (female) | 30 | 23.57 | 4.01 |
| | | Rural (female) | 30 | 24.20 | 3.04 |
| | | Male (urban +rural) | 60 | 23.35 | 3.96 |
| | | Female (urban +rural) | 60 | 23.88 | 3.55 |
| | | Urban (male+ female) | 60 | 24.12 | 3.47 |
| | | Rural (male + female) | 60 | 23.12 | 3.74 |
| | | Total (male +female) | 120 | 23.62 | 3.75 |
| 5. | All subjects | Male | 120 | 23.16 | 3.55 |
| | | Female | 120 | 23.91 | 3.43 |
| | | Urban | 120 | 23.64 | 3.39 |
| | | Rural | 120 | 23.21 | 3.49 |
| | | Grand Total | 480 | 23.48 | 3.47 |

Table 4.05: Locality, Gender, Subject Taught and Levels of Practice of Constructivist Approach Teaching - Learning

| Sl.No | Subject | Level of Practice | Urban Male (n=30) | Urban Female (n=30) | Total (N=60) | Rural Male (n=30) | Rural Female (n=30) | Total (N=60) | Male (n=60) | Female (n=60) | Total (N=120) |
|-------|-------------|------------------------|-------------------|---------------------|--------------|-------------------|---------------------|--------------|-------------|---------------|---------------|
| I | Mathematics | Low (0 -18.5) | 0 (0.0) | 2 (6.7) | 2 (3.4) | 3 (10.0) | 0 (0.0) | 3 (5.0) | 3 (5.0) | 2 (3.3) | 5 (4.2) |
| | | Moderate (18.5 - 26.9) | 28 (93.3) | 13 (43.3) | 41 (68.3) | 22 (73.3) | 21 (70.0) | 43 (71.7) | 50 (83.3) | 34 (56.7) | 84 (70.0) |
| | | High (26.9 - 30) | 2 (6.7) | 15 (50.0) | 17 (28.3) | 5 (16.7) | 9 (30.0) | 14 (23.3) | 7 (11.7) | 24 (40.0) | 31 (25.8) |
| | | Total | 30 (100) | 30 (100) | 60 (100) | 30 (100) | 30 (100) | 60 (100) | 60 (100) | 60 (100) | 60 (100) |
| II | English | Low (0 -18.5) | 1 (3.3) | 1 (3.3) | 2 (3.3) | 2 (6.7) | 1 (3.3) | 3 (5.0) | 3 (5.0) | 2 (3.3) | 5 (4.2) |
| | | Moderate (18.5 - 26.9) | 23 (76.7) | 22 (73.3) | 45 (75.0) | 20 (66.7) | 19 (63.3) | 39 (65.0) | 43 (71.7) | 41 (68.3) | 84 (70.0) |
| | | High (26.9 - 30) | 6 (20.0) | 7 (23.4) | 13 (21.7) | 8 (26.6) | 10 (33.4) | 18 (30.0) | 14 (23.3) | 17 (28.4) | 31 (25.8) |
| | | Total | 30 (100) | 30 (100) | 60 (100) | 30 (100) | 30 (100) | 60 (100) | 60 (100) | 60 (100) | 60 (100) |
| III | Science | Low (0 -18.5) | 3 (10.0) | 4 (13.3) | 7 (11.7) | 6 (20.0) | 2 (6.7) | 8 (11.7) | 9 (15.0) | 5 (8.3) | 14 (11.7) |

| | | | | | | | | | | | |
|----|-------------------|---------------------------|--------------|--------------|---------------|--------------|--------------|---------------|---------------|---------------|---------------|
| | | Moderate (18.5 - 26.9) | 21 (70.0) | 24 (80.0) | 45 (75.0) | 18 (60.0) | 18 (60.0) | 36 (61.7) | 39 (65.0) | 43 (71.7) | 82 (68.3) |
| | | High (26.9 - 30) | 6 (20.0) | 2 (6.7) | 8 (13.3) | 6 (20.0) | 10 (33.3) | 16 (26.7) | 12 (20.0) | 12 (20.0) | 24 (20.0) |
| | | Total | 30 (100) | 30 (100) | 60 (100) | 30 (100) | 30 (100) | 60 (100) | 60 (100) | 60 (100) | 120 (100) |
| IV | Social Science | Low (0 -18.5) | 0 (0.0) | 3 (10.0) | 3 (5.0) | 5 (16.7) | 0 (0.0) | 5 (8.3) | 5 (8.3) | 3 (5.0) | 8 (6.7) |
| | | Moderate (18.5 - 26.9) | 20 (66.7) | 17 (56.7) | 37 (61.7) | 19 (63.3) | 21 (70.0) | 40 (66.7) | 39 (65.0) | 38 (63.3) | 77 (64.1) |
| | | High (26.9 - 30) | 10 (33.3) | 10 (33.3) | 20 (33.3) | 6 (20.0) | 9 (30.0) | 15 (25.0) | 16 (26.7) | 19 (31.7) | 35 (29.2) |
| | | Total | 30 (100) | 30 (100) | 60 (100) | 30 (100) | 30 (100) | 60 (100) | 60 (100) | 60 (100) | 60 (100) |
| V | Total | Low (0 -18.5) | 4 (3.4) | 10 (8.3) | 14 (5.8) | 16 (13.4) | 3 (2.5) | 18 (7.5) | 20 (8.3) | 12 (5.0) | 32 (6.7) |
| | | Moderate (18.5 - 26.9) | 92 (76.6) | 76 (63.3) | 168 (70.0) | 79 (65.8) | 79 (65.8) | 159 (66.3) | 171 (71.2) | 156 (65.0) | 327 (68.1) |
| | | High (26.9 - 30) | 24 (20.0) | 34 (28.4) | 58 (24.2) | 25 (20.8) | 38 (31.7) | 63 (26.2) | 49 (20.4) | 72 (30.0) | 121 (25.2) |
| | | Total | 120 (100) | 120 (100) | 240 (100) | 120 (100) | 120 (100) | 240 (100) | 240 (100) | 240 (100) | 240 (100) |

The figures in the parentheses indicate percentage

The results of classroom observations of mathematics teachers as presented in Table 4.06 reveal that:

- Asking students to memorise information, explanation and solving text book sums were practiced by almost all the teachers belonging to different groups- male/female and urban/ rural.
- None of the mathematics teachers adopted concept mapping and inquiry approach to teaching.
- The tactics of asking students to solve sums on the board, using locally available resources and brainstorming were being adopted by only few teachers. The percentages of female teachers adopting these tactics in comparison to their male counterparts were more.
- A good number of teachers were found citing examples beyond the text books irrespective of their gender and place of work. However, male teachers were using this tactic more than their female counterparts irrespective of their place of work.
- Elaboration of mathematical concepts was not done by most of the teachers.
- None of the urban female teachers and rural male teachers was found evaluating their students' learning after the end of lessons. On the whole, only few teachers were found evaluating students' learning after the end of lessons.

The overall picture about the teachers teaching mathematics at elementary school level was that constructivist pedagogies were not followed appropriately.

English

From table 4.04 it is revealed that the mean scores of English teachers based on their gender and locale varied from 23.40 (rural male) to 23.90 (rural female) with the grand mean of 23.66. The S.D. of various groups varied from 3.16 (urban male) to 3.59 (urban female), with the S.D. of the whole group of 3.37. As the maximum possible score was 30 the mean scores of all groups indicate that the English teachers,

4.06: Classroom Practices of Mathematics Teachers

| Criteria | Urban males (N=30) | Urban females (N=30) | Rural males (N=30) | Rural females (N=30) | Urban (N=60) | Rural (N=60) | Males (N=60) | Females (N=60) | Total (N=120) |
|--|--------------------|----------------------|--------------------|----------------------|--------------|--------------|--------------|----------------|---------------|
| Asking students to memorize information | 30(100) | 30(100) | 30(100) | 28 (93.3) | 60(100) | 58(96.7) | 60 (100) | 58(96.7) | 118 (98.3) |
| Asking students to solve sums on the board | 8 (26.7) | 11(36.7) | 10 (33.3) | 12 (40.0) | 19(31.7) | 22(36.7) | 18(30.0) | 23(38.3) | 41(34.2) |
| Brainstorming | 3 (10.0) | 3 (10.0) | 00 (00) | 7(23.3) | 6 (10.0) | 7 (11.7) | 3 (5.0) | 10(16.7) | 14(10.8) |
| Concept mapping | 00 (00) | 00 (00) | 00 (00) | 00 (00) | 00 (00) | 00 (00) | 00 (00) | 00 (00) | 00 (00) |
| Citing examples beyond the text books | 13 (43.3) | 12 (40.0) | 18 (60.0) | 14 (46.7) | 25(41.7) | 32(53.3) | 31(51.7) | 26(43.4) | 58 (48.3) |
| Explanation | 30 (100) | 30 (100) | 30 (100) | 26 (86.7) | 60(100) | 56(93.3) | 60(100) | 56(93.3) | 11 (96.7) |
| Elaboration | 00 (00) | 00 (00) | 2 (6.7) | 00 (00) | 00 (00) | 2 (3.3) | 2 (3.3) | 00 (00) | 2 (1.7) |
| Evaluation | 5 (16.7) | 00 (00) | 00 (00) | 3 (10.0) | 5 (8.3) | 3 (5.0) | 5 (8.3) | 3 (5) | 8 (6.7) |
| Inquiry approach | 00 (00) | 00 (00) | 00 (00) | 00 (00) | 00 (00) | 00 (00) | 00 (00) | 00 (00) | 00 (00) |
| Solving text book sums | 30(100) | 30 (100) | 30 (100) | 26 (86.7) | 60(100) | 56(93.3) | 60(100) | 56(93.3) | 116(96.7) |
| Using locally available resources | 7(23.3) | 10 (33.3) | 10 (33.3) | 7 (23.3) | 17(28.3) | 17(28.3) | 17(28.3) | 17(28.3) | 34(28.3) |

The figures in the parentheses indicate percentage

irrespective of their gender and locale, moderately practised constructivism as a teaching-learning approach.

From Table 4.05 it is revealed that 3.3% of teachers (male and female) belonging to the urban areas minimally practiced constructivist approach to teaching-learning. It was found that 6.7% of male teachers and 3.3% of female teachers belonging to the rural areas minimally practiced constructivist approach to teaching-learning. About 76.7% of male teachers and 73.3% of female teachers belonging to the urban areas, and 66.7% of male teachers and 63.3% female teachers belonging to the rural areas were found to practise constructivist approach to teaching-learning moderately. On the whole, 71.7% of male teachers and 68.3% of female teachers moderately practised constructivist approach to teaching-learning. Further, it is found that 20.3% of male teachers and 23.4% of female teachers belonging to the urban areas, and 26.6% male teachers and 33.4% of female teachers belonging to the rural areas highly practised constructivist teaching-learning approach. On the whole, it was found that 23.3% of male teachers and 28.4% of female teachers highly practised constructivist approach to teaching-learning. On the whole, it is revealed that out of all the elementary school teachers; 4.2%, 70% and 25.8% of teachers teaching English adopted constructivist teaching-learning approach minimally, moderately and highly in their classrooms respectively.

The results of classroom observations of English teachers as presented in Table 4.07 reveal that:

- Almost all teachers belonging to the different groups practiced oral translation and asking questions to the students.
- The number of female teachers practicing discussion and recitation was higher than their male counterparts. However, their percentage was not encouraging.
- None of the teachers were neither making use of hardware / software, inquiry approach nor providing any opportunity for collaborative learning.
- None of the male teachers belonging to the different groups was found explaining but it was practiced by almost all the female teachers.
- Brainstorming was practiced by only few male teachers but the percentage was unsatisfactory.

4.07: Classroom Practices of English Teachers

| Criteria | Urban males (N=30) | Urban females (N=30) | Rural males (N=30) | Rural females (N=30) | Urban (N=60) | Rural (N=60) | Males (N=60) | Females (N=60) | Total (N=120) |
|---------------------------|-------------------------------|---------------------------------|-------------------------------|---------------------------------|-------------------------|-------------------------|-------------------------|---------------------------|--------------------------|
| Asking Questions | 30(100) | 30(100) | 30(100) | 29(96.7) | 60(100) | 59(98.3) | 60(100) | 59(98.3) | 119(99.2) |
| Brainstorming | 3(10.0) | 00(00) | 3(10.0) | 00(00) | 3(5.0) | 3(5.0) | 6(10.0) | 00(00) | 6(5.0) |
| Collaborative learning | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) |
| Discussion | 6(20.0) | 6(20.0) | 3(10.0) | 7(23.3) | 12(20.0) | 10(16.7) | 9(15.0) | 13(21.7) | 22(18.3) |
| Explanation | 00(00) | 29(96.7) | 00(00) | 30(100) | 29(48.3) | 30(50) | 00(00) | 59(98.3) | 89(74.2) |
| Evaluation | 3(10.0) | 5(16.7) | 4(13.3) | 2(6.7) | 8(13.3) | 6(10.0) | 7(11.7) | 7(11.7) | 14(11.7) |
| Inquiry approach | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) |
| Oral Translation | 26(86.7) | 30(100) | 30(100) | 30(100) | 56(93.3) | 60(100) | 56(93.3) | 60(100) | 116(96.7) |
| Recitation | 2(6.7) | 6(20.0) | 2(6.7) | 3(10.0) | 8(13.3) | 5(8.3) | 4(6.7) | 9(15.0) | 13(10.8) |
| Singing songs | 1(3.3) | 00(00) | 00(00) | 00(00) | 1(1.7) | 00(00) | 1(1.7) | 00(00) | 1(0.8) |
| Use of Hardware /Software | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) |

The figures in the parentheses indicate percentage

- While teaching, only one out of thirty urban male teacher was observed singing songs. It implies this simple tactic was not followed by the teachers teaching English.
- Evaluation of students' learning at the end of the lesson was done by very few teachers.

The overall picture about the teachers teaching English at elementary school level reflected that constructivist pedagogies were not followed appropriately.

Science

From table 4.04 it is revealed that the mean scores of science teachers based on their gender and locale varied from 22.17 (rural male) to 24.77 (rural female) with the grand mean of 23.17. The S.D. of various groups varied from 2.94 (rural female) to 4.13 (rural male) with the S.D. of the whole group of 3.59. As the maximum possible score was 30, the mean scores of all groups indicate that the science teachers, irrespective of their gender and locale, moderately practiced constructivism as a teaching-learning approach.

From Table 4.05 it is revealed that only 10% male teachers and 13.3% female teachers belonging to the urban areas and, 20% of male teachers and 6.7% of female teachers belonging to the rural areas minimally practiced constructivist approach to teaching-learning. On the whole, 15% of male teachers and 8.3% of female teachers were found practising constructivist approach to teaching-learning minimally. It was found that 70% of male teachers and 80% of female teachers belonging to the urban areas, and 60% of both male and female teachers belonging to the rural areas moderately practiced constructivist approach to teaching-learning. On the whole, 65% of male teachers and 71.7% of female teachers teaching science were found moderately practising constructivist approach to teaching-learning. From Table 4.05 it is also found that 20% of male teachers and 6.7% of female teachers belonging to the urban areas, and 20% of male teachers and 33.3% of female teachers belonging to the rural areas practiced constructivist teaching-learning approach in the classroom highly. On the whole, it was found that 11.7%, 68.3% and 20% of teachers minimally,

4.08: Classroom Practices of Science Teachers

| Criteria | Urban males (N=30) | Urban females (N=30) | Rural males (N=30) | Rural females (N=30) | Urban (N=60) | Rural (N=60) | Males (N=60) | Females (N=60) | Total (N=120) |
|-------------------------------|-----------------------|-------------------------|-----------------------|-------------------------|-----------------|-----------------|-----------------|-------------------|------------------|
| Anchored Instruction | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) |
| Brainstorming | 4(13.3) | 11(36.7) | 5(16.7) | 4(13.3) | 15(25.0) | 9(15.0) | 9(15.0) | 15(25.0) | 24(20.0) |
| Collaborative learning | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) |
| Concept mapping | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) |
| Demonstration | 00(00) | 00(00) | 1(3.3) | 00(00) | 00(00) | 1(1.70) | 1(1.70) | 00(00) | 1(0.8) |
| Discussion | 12(40.0) | 18(60.0) | 9(30.0) | 17(56.7) | 30(50.0) | 26(43.3) | 22(36.7) | 35(58.3) | 57(47.5) |
| Elaboration | 4(13.3) | 00(00) | 14(46.7) | 00(00) | 4(6.7) | 14(23.3) | 18(30.0) | 00(00) | 18(15.0) |
| Encouraging critical thinking | 18(60.0) | 21(70.0) | 4(13.3) | 19(63.3) | 39(65) | 23(38.3) | 22(36.7) | 40(66.7) | 62(51.7) |
| Experimentation | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) |
| Evaluation | 3(10.0) | 5(16.7) | 6(20.0) | 5(16.7) | 8(26.7) | 11(18.3) | 9(15.0) | 10(16.7) | 19(15.8) |
| Inquiry approach | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) |
| Problem-based learning | 3(10.0) | 00(00) | 4(13.3) | 5(16.7) | 3(5.0) | 9(15.0) | 7(11.70) | 5(8.3) | 12(10.0) |
| Project works | 30(100) | 28(93.3) | 26(86.7) | 29(96.7) | 58(96.7) | 55(91.7) | 56(95.0) | 57(95.0) | 113(94.2) |

| | | | | | | | | | |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Scientific models | 00(00) | 00(00) | 2(6.7) | 3(10.0) | 00(00) | 5(8.3) | 2(3.3) | 3(5.0) | 5(4.20) |
| Text book materials | 30(100) | 30(100) | 30(100) | 30(10.0) | 60(100) | 60(100) | 60(100) | 60(100) | 120(100) |
| Use of Hardware /Software | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) |
| Use of Pictures , Charts and Diagrams | 20(66.7) | 22(73.3) | 26(86.7) | 23(76.7) | 42(75.0) | 49(81.7) | 46(76.7) | 45(75.0) | 91(75.8) |

The figures in the parentheses indicate percentage

moderately and highly practiced constructivist teaching-learning approach in the classroom respectively.

The results of classroom observations of science teachers as presented in Table 4.08 reveal that:

- Anchored instruction, use of hardware / software, collaborative learning, concept mapping, experimentation, and inquiry approach were not adopted by any of the teachers belonging to the different groups.
- Brainstorming, elaboration and problem-based learning were followed only by few teachers.
- Very few teachers were found evaluating their students' learning after the end of lessons.
- Demonstration and use of scientific models by the science teachers were hardly practiced.
- The use of pictures, charts and diagrams, and giving project works were very common practices among all the teachers.
- Discussion and encouraging critical thinking as teaching tactics were practiced more by female teachers as compared to male teachers.
- All the teachers belonging to different groups were making use of text book materials.

The overall picture about the teachers teaching science at elementary school level was that constructivist pedagogies were not followed appropriately.

Social science

From table 4.04 it is revealed that the mean scores of social science teachers based on their gender and locale varied from 22.03 (rural male) to 24.67 (urban male) with the grand mean of 23.62. The S.D. of various groups varied from 2.93 (urban male) to 4.44 (rural male) with the S.D. of the whole group of 3.75. As the maximum possible score was 30, the mean scores of all groups indicate that social science teachers, irrespective of their gender and locale, moderately practised constructivist teaching-learning approach.

From Table 4.05 it is revealed that only 10 % of female teachers teaching social science belonging to the urban areas and 16.7 % of male teachers belonging to the rural areas minimally practiced constructivist approach to teaching-learning. On the whole, 8.3% of male teachers and 5% of female teachers practised constructivist approach to teaching-learning minimally. About 66.7% of male teachers and 56.7% of female teachers belonging to the urban areas, and 63.3% of male teachers and 70% of female teachers belonging to the rural areas moderately practised constructivist approach to teaching-learning. On the whole, 65% of male teachers and 63.3% of female teachers practised constructivist approach to teaching-learning moderately. From Table 4.05 it is also found that 33.3% of both male and female teachers teaching social science and belonging to the urban areas highly practised constructivist teaching-learning approach. Similarly, 20% of male teachers and 30% of female teachers belonging to the rural areas highly practised constructivist teaching-learning approach. On the whole, 26.7% of male teachers and 31.7% of female teachers highly practised constructivist teaching-learning approach. On the whole, 6.7%, 64.1% and 29.2% of social science teachers minimally, moderately and highly practiced constructivist teaching-learning approach respectively. Further, Table 4.05 also revealed that out of all the elementary school teachers teaching social science taken for the study 6.7%, 68.1% and 25.2% minimally, moderately and highly practised constructivist teaching-learning approach respectively.

The results of classroom observations of social science teachers as presented in Table 4.09 reveal that:

- Asking questions, explanation, use of pictures, charts and maps, and text book materials were practiced by majority of the teachers belonging to the different groups.
- Except for one rural female teacher, none was found using hardware / software technologies.
- Concept mapping was followed only by few urban female teachers but the percentage was unsatisfactory.
- Discussion approach was practiced more by female teachers belonging to the different groups irrespective of their place of work.

4.09: Classroom Practices of Social Science Teachers

| Criteria | Urban males (N=30) | Urban females (N=30) | Rural males (N=30) | Rural females (N=30) | Urban (N=60) | Rural (N=60) | Males (N=60) | Females (N=60) | Total (N=120) |
|------------------------|-----------------------|-------------------------|-----------------------|-------------------------|-----------------|-----------------|-----------------|-------------------|------------------|
| Asking Questions | 30(100) | 30(100) | 30(100) | 29(96.7) | 60(100) | 59(98.3) | 60(100) | 59(98.3) | 119(99.2) |
| Collaborative learning | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) |
| Concept mapping | 00(00) | 6(20) | 00(00) | 00(00) | 6(10) | 00(00) | 00(00) | 6(10) | 6(5) |
| Discussion | 5(16.7) | 23(76.7) | 5(16.7) | 11(36.7) | 28(45.7) | 16(26.7) | 10(16.7) | 34(56.7) | 44(36.7) |
| Explanation | 30(100) | 30(100) | 30(100) | 30(100) | 60(100) | 60(100) | 60(100) | 60(100) | 120(100) |
| Elaboration | 00(00) | 6(20) | 7(23.3) | 8(26.7) | 6(10) | 15(25) | 7(11.7) | 14(46.7) | 21(17.5) |
| Evaluation | 1(3.3) | 3(10) | 2(6.7) | 4(13.3) | 4(6.7) | 6(10) | 3(5) | 7(11.7) | 10(8.3) |
| Inquiry approach | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) | 00(00) |
| Singing Songs | 00(00) | 2(6.7) | 00(00) | 00(00) | 2(3.3) | 00(00) | 00(00) | 2(3.3) | 2(1.7) |
| Telling Stories | 7(23.3) | 9(30) | 8(26.7) | 18(60) | 16(26.7) | 26(43.3) | 15(25) | 27(45) | 42(35) |
| Text book materials | 30(100) | 30(100) | 30(100) | 30(100) | 60(100) | 60(100) | 60(100) | 60(100) | 120(100) |

| | | | | | | | | | |
|----------------------------------|--------|--------|----------|--------|--------|----------|----------|--------|----------|
| Use of Hardware / Software | 00(00) | 00(00) | 00(00) | 1(3.3) | 00(00) | 1(1.7) | 00(00) | 1(1.7) | 1(0.8) |
| Use of Pictures, Charts and Maps | 24(80) | 27(90) | 19(63.3) | 24(80) | 51(85) | 43(71.7) | 43(71.7) | 51(85) | 94(78.3) |

The figures in the parentheses indicate percentage

- Only two female teachers working in urban schools were found singing songs as a teaching tactic.
- Collaborative learning and inquiry approach as teaching tactics were not adopted by any of the teachers teaching social science.
- Female teachers practiced telling stories to the students more than their male counterparts.
- The percentage of teachers using elaboration as a teaching tactic was not encouraging.
- Majority of the teachers did not evaluate their students' learning after the lessons.
- The overall picture about the teachers teaching social science at elementary school level was that constructivist pedagogies were not followed appropriately.

From the classroom observations of teachers teaching the four major subjects-mathematics, English, science and social science, it was found that on the whole, most of the teachers adhered to the behaviouristic approach to teaching. Hardly constructivist pedagogical approach is traced. Though tactics like brainstorming, discussion, and use of pictures, charts and maps were practiced by some of the teachers, their percentage was not encouraging and in some subjects they were not adopted at all.

Hence, the research hypothesis no.3 stated in chapter I that elementary school teachers teaching different subjects in Mizoram adopt constructivist teaching-learning approach is not found to be true in case of majority of the teachers.

4.04: Comparison of Knowledge, Attitude and Practices of Elementary School Teachers teaching different subjects in Mizoram relating to Constructivist Teaching-Learning Approach

The fourth, fifth and sixth objectives of the study were to reveal the variations if any in the knowledge, attitude and practices of elementary school teachers teaching different subjects in Mizoram relating to constructivist teaching-learning approach respectively. For this purpose the significance of difference between means of the

four groups based on teaching subjects on knowledge, attitude and practices were compared applying t-test and the results are given in table 4.10 and have been interpreted on the basis of components.

Table 4.10: t-Values for Teachers Teaching Different Subjects Compared on three Components of Constructivist Approach to Teaching-Learning

| Sl. no. | Groups Compared | Components | | |
|---------|---|------------|----------|-----------|
| | | Knowledge | Attitude | Practices |
| 1. | Mathematics teachers Vs English teachers | 0.18 | 1.22 | 00 |
| 2. | Mathematics teachers Vs Science teachers | 1.27 | 2.58** | 1.59 |
| 3. | Mathematics teachers Vs Social Science teachers | 1.23 | 0.98 | 0.46 |
| 4. | English teachers Vs Science teachers | 1.13 | 1.86 | 1.59 |
| 5. | English teachers Vs Social Science teachers | 1.09 | 2.63** | 0.46 |

*** Significant at 0.01 level*

Knowledge

In order to test the differences among the four groups in their knowledge on constructivist teaching-learning approach the following null hypothesis was formulated:

H_0 = There are no significant differences among the elementary school teachers teaching mathematics, English, science and social science in their knowledge on constructivist teaching-learning approach.

Table 4.10 reveals that all the six t-values for the four groups of the teachers based on their teaching subjects compared on the knowledge component of constructivist approach to teaching-learning not to be significant. Hence, the null hypothesis in

respect of knowledge cannot be rejected. It implies that the four groups of teachers based on teaching subjects do not differ significantly in their knowledge on constructivist approach to teaching-learning in their concern subjects. It can be inferred that all the teachers teaching the four subjects are having more or less similar knowledge about constructivist teaching-learning approach.

Thus, the research hypothesis no.4 stated in chapter I that there are significant differences in the knowledge of elementary school teachers teaching different subjects in Mizoram relating to constructivist teaching-learning approach is not found true.

Attitude

In order to test the differences among the four groups in their attitude on constructivist teaching-learning approach the following null hypothesis was formulated:

H_0 = There are no significant differences among the elementary school teachers teaching mathematics, English, science and social science in their attitude on constructivist teaching-learning approach.

Table 4.10 reveals that out of six t-values, four are not significant, but, two are significant at 0.01 level. Significant difference is found between mathematics teachers and science teachers and again between English teachers and social science teachers. Hence, the null hypothesis stated above can be rejected in the above two cases. It is revealed from table 4.03 that mathematics teachers have a better positive attitude towards constructivist teaching-learning approach in comparison to science teachers and social science teachers have a better positive attitude towards constructivist teaching-learning approach in comparison to English teachers. The other groups have more or less similar attitude about constructivist teaching-learning approach.

Hence, the research hypothesis no.5 stated in chapter I that there are significant differences in the attitude of elementary school teachers teaching different subjects in Mizoram relating to constructivist teaching-learning approach is not found true in cases of mathematics teachers vs. science teachers, and English teachers vs. social science teachers. However, it is found true for the other compared groups.

Practices

In order to test the differences among the four groups in their adoption of constructivist teaching-learning approach the following null hypothesis was formulated:

H_0 = There are no significant differences among the elementary school teachers teaching mathematics, English, science and social science in their adoption of constructivist teaching-learning approach.

Table 4.10 reveals that all the six t-values for the four groups of the teachers based on their teaching subjects compared on the practice component of constructivist approach to teaching-learning not to be significant. Hence, the null hypothesis in respect of practice cannot be rejected. It implies that the four groups of teachers based on teaching subjects do not differ significantly in their practices on constructivist approach to teaching-learning in their concern subjects. It can be inferred that all the teachers teaching the four subjects are having more or less similar practices about constructivist teaching-learning approach in their classrooms.

Hence, research hypothesis no.6 stated in chapter I that there are significant differences in the adoption of constructivist teaching-learning approach by elementary school teachers in Mizoram teaching different subjects is not found true.

4.05: Differences in the Knowledge, Attitude and Practices of Elementary School Teachers in Mizoram relating to Constructivist Teaching-Learning Approach with reference to their Locale; and Gender

The seventh, eighth and ninth objectives of the study were to compare the knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivist teaching-learning approach with reference to their locale; and gender. For this purpose the means of urban teachers were compared with that of rural teachers and the means of male teachers were compared with that of female teachers on the three components- knowledge, attitude and practices by applying t-test and the results are given in table 4.11

Table 4.11: t-Values for Teachers based on Locale and Gender Compared on Three Components of Constructivist Approach to Teaching-Learning

| Sl.no. | Groups Compared | Components | | |
|--------|---|------------|----------|-----------|
| | | Knowledge | Attitude | Practices |
| 1. | Urban teachers vs. Rural teachers | 0.91 | 3.5** | 0.39 |
| 2. | Male teachers vs. Female teachers | 0.39 | 0.94 | 1.71 |

*** significant at 0.01 level*

Knowledge

In order to test the significance of differences in knowledge among the groups based on gender; and locale the following two null hypotheses were formulated:

H_0 = There is no significant difference in the knowledge of urban and rural elementary school teachers in Mizoram relating to constructivist teaching- learning approach.

H_0 = There is no significant difference in the knowledge of male and female elementary school teachers in Mizoram relating to constructivist teaching- learning approach.

Table 4.11 reveals that the t-value for urban teachers vs. rural teachers not to be significant. Hence, the null hypothesis stated above in respect of locality of teachers is not rejected. Similarly, the t-value for male teachers vs. female teachers is not found to be significant. Hence, the null hypothesis stated above in respect of gender of teachers is not rejected. It implies that both urban and rural teachers as well as both male and female elementary school teachers in Mizoram have more or less similar knowledge on constructivist approach to teaching-learning.

Hence, the research hypothesis no.7 stated in chapter I that there are significant differences in the knowledge of elementary school teachers in Mizoram relating to constructivist teaching- learning approach with reference to their locale; and gender is not found true.

Attitude

In order to test the significance of differences in attitude among the groups based on gender; and locale the following two null hypotheses were formulated:

H_0 = There is no significant difference in the attitude of urban and rural elementary school teachers in Mizoram relating to constructivist teaching- learning approach.

H_0 = There is no significant difference in the attitude of male and female elementary school teachers in Mizoram relating to constructivist teaching- learning approach.

Table 4.11 reveals that the t-value for urban teachers vs. rural teachers to be significant. Hence, the null hypothesis stated above in respect of locality of teachers is rejected. But, the t-value for male teachers vs. female teachers is not found to be significant. Hence, the null hypothesis stated above in respect of gender of teachers is not rejected. Looking at table 4.03, it is found that urban teachers have better positive attitude than rural teachers toward constructivist teaching- learning approach. However, both male and female elementary school teachers in Mizoram are found to have more or less similar positive attitude toward constructivist approach to teaching-learning.

Therefore, research hypothesis no.8, stated in chapter I that there are significant differences in the attitude of elementary school teachers in Mizoram relating to constructivist teaching- learning approach with reference to locale and gender, is found true in case of locale of the teachers; but it is not found to be true in case of gender of the teachers.

Practices

In order to test the significance of differences in practices among the groups based on gender; and locale the following two null hypotheses were formulated:

H_0 = There is no significant difference in the practices of urban and rural elementary school teachers in Mizoram relating to constructivist teaching- learning approach.

H_0 = There is no significant difference in the practices of male and female elementary school teachers in Mizoram relating to constructivist teaching- learning approach.

Table 4.11 reveals that the t-value for urban teachers vs. rural teachers not to be significant. Hence, the null hypothesis stated above in respect of locality of teachers is not rejected. Similarly, the t-value for male teachers vs. female teachers is not found to be significant. Hence, the null hypothesis stated above in respect of gender of teachers is not rejected. It implies that both urban and rural teachers as well as both male and female elementary school teachers in Mizoram have more or less similar practices on constructivist approach to teaching-learning.

Hence, the research hypothesis no.9 stated in chapter I that there are significant differences in the practices of elementary school teachers in Mizoram relating to constructivist teaching- learning approach with reference to their locale; and gender is not found true.

4.06: Nature and Extent of Relationship among Knowledge, Attitude and Practices of Elementary School Teachers in Mizoram relating to Constructivism as a Teaching-Learning Approach

The tenth objective of the study was to find out the nature and extent of relationship among knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach. The co-relation coefficients for the three components- knowledge, attitude and practices were computed on the scores of the whole sample, irrespective of gender, locale and teaching subjects, by product moment method. The results are presented in table 4.12.

4.12: Correlation Coefficients among Knowledge, Attitude and Practices of Teachers on Constructivist Teaching-Learning Approach (N=480)

| Components | Knowledge | Attitude | Practices |
|-------------------|------------------|-----------------|------------------|
| Knowledge | 1.000 | 0.258** | 0.377** |
| Attitude | 0.258** | 1.000 | 0.240** |
| Practices | 0.377** | 0.240** | 1.000 |

**significant at 0.01 level

Table 4.13 reveals that there is positive and significant relationship between knowledge and attitude, knowledge and practices, and attitude and practices of elementary school teachers in Mizoram.

Hence, the research hypothesis no. 10 stated in chapter I that there are significant relationships among knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach is found true.

4.07: Differences in the Relationship between Knowledge and Attitude of Elementary School Teachers teaching different subjects in Mizoram relating to Constructivism as a Teaching-Learning Approach

The eleventh objective of the study was to find out the differences in the relationship between the knowledge and attitude of elementary school teachers in Mizoram relating constructivism as a teaching-learning approach with reference to the subjects they teach. There were four broad subjects taken for the study- mathematics, English, science and social science. In every subject there were 120 teachers irrespective of their gender and locality. The correlation coefficients between awareness and attitude scores of each of the four groups were computed following Pearson's product moment method. Further, significance of difference between the correlation coefficients in the four subjects was tested converting the coefficients of correlation into Fisher's Z value as explained by Garrett (1966, 241-243). The results are given in tables 4.13 and 4.14.

The following null hypothesis was formulated for testing the significance of difference in the correlation coefficients between awareness and attitude about constructivism as an approach to teaching-learning of elementary school teachers teaching various subjects:

H₀- There are no significant differences among various groups of elementary school teachers teaching different subjects in the relationship between their knowledge and attitude relating to constructivism as a teaching-learning approach

Table 4.13: Correlation Coefficients between Knowledge and Attitude of Teachers teaching different subjects on Constructivist Teaching-Learning Approach and the corresponding Z values

| Group of Teachers | Correlation Coefficient | Fisher's Z Value |
|--------------------------|--------------------------------|-------------------------|
| Mathematics | 0.43 | 0.46 |
| English | 0.42 | 0.45 |
| Science | 0.37 | 0.39 |
| Social science | 0.41 | 0.44 |

Table 4.14: Comparison of Z Scores of Various Groups

| Groups compared | Difference in Fisher's z scores | Standard error of z | t values | Significance |
|-------------------------------|--|----------------------------|-----------------|---------------------|
| Mathematics Vs English | 0.01 | 0.13 | 0.08 | Not significant |
| Mathematics Vs Science | 0.09 | 0.13 | 0.69 | Not significant |
| Mathematics Vs Social science | 0.02 | 0.13 | 0.15 | Not significant |
| English Vs Science | 0.06 | 0.13 | 0.46 | Not significant |
| English Vs Social science | 0.01 | 0.13 | 0.08 | Not significant |
| Science Vs Social science | 0.05 | 0.13 | 0.38 | Not significant |

As revealed from table 4.14 the t values in respect of all the six possible compared groups are not found to be significant. Hence, the null hypothesis is not rejected. It implies that there is no significant difference between the correlation coefficients on knowledge and attitude of different groups of elementary school teachers teaching different subjects about constructivism as an approach to teaching-learning. The correlation coefficients between knowledge and attitude of different groups of teachers teaching different subjects are more or less similar.

Hence the research hypothesis no.11 stated in chapter I that there are significant differences among various groups of elementary school teachers teaching different subjects in the relationship between their knowledge and attitude relating to constructivism as a teaching-learning approach is not found true.

4.8: Constraints of Elementary School Teachers in Mizoram in adopting Constructivist Teaching-Learning Approach

The twelfth objective of the study was to reveal the constraints of elementary school teachers in Mizoram in adopting constructivist teaching-learning approach. As such a checklist for teachers was prepared by the investigator which included twelve (12) questions of alternative response type. The respondents had to read the statements carefully and put a tick mark in the response of their choice i.e. 'Yes' or 'No'. The items of the checklist were same for all the four groups of teachers based on their teaching subjects- mathematics, English, science and social science. The responses of all the four groups of teachers were tabulated into frequency distributions and their percentages were computed. The results are presented in table 4.15 and interpretations have been made question wise.

Table 4.15: Responses of Teachers on Constraints of adopting Constructivist Teaching- Learning Approach

| Teaching Subjects | | | | | | | | | | |
|-------------------|------------------------|---------------|--------------------|---------------|--------------------|---------------|---------------------------|---------------|------------------|---------------|
| Q. no. | Mathematics (n=120) | | English (n=120) | | Science (n=120) | | Social Science (n=120) | | Total (N=480) | |
| | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| 1. | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (100) | 480 (100) | 00 (00) |
| 2. | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 480 (100) | 00 (00) |
| 3. | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 480 (100) | 00 (00) |
| 4. | 92 (76.7) | 28 (23.3) | 100 (83.3) | 20 (16.7) | 108 (90) | 12 (10) | 105 (87.5) | 15 (12.5) | 405 (84.4) | 75 (15.6) |
| 5. | 3 (2.5) | 117 (97.5) | 19 (15.8) | 101 (84.2) | 3 (2.5) | 117 (97.5) | 3 (2.5) | 117 (97.5) | 28 (5.8) | 452 (94.2) |
| 6. | 62 (51.7) | 58 (48.3) | 119 (99.2) | 1 (0.8) | 87 (72.5) | 33 (27.5) | 114 (95) | 6 (5) | 382 (79.6) | 98 (20.4) |
| 7. | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (00) | 00 (00) | 120 (100) | 00 (00) | 480 (100) | 00 (00) |
| 8. | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 480 (100) | 00 (00) |
| 9. | 112 (93.3) | 8 (6.7) | 114 (95) | 6 (5) | 115 (95.8) | 5 (4.2) | 117 (97.5) | 3 (2.5) | 458 (95.4) | 22 (4.6) |
| 10. | 17 (14.2) | 103 (85.8) | 20 (16.7) | 100 (83.3) | 13 (10.8) | 107 (89.2) | 5 (4.2) | 115 (95.8) | 55 (11.5) | 425 (88.5) |
| 11. | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 480 (100) | 00 (00) |
| 12. | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 120 (100) | 00 (00) | 480 (100) | 00 (00) |

Figures in parentheses indicate percentages

As revealed from table 4.15 all the teachers (100%) teaching the four subjects- mathematics, English, science and social science responded positively to questions nos.1,2,3,7,8,11 and 12. It implies that the headmasters used to give the teachers freedom to practice their own teaching strategies while teaching; allow them to use audio-visual aids to supplement their teaching; headmasters made proper use of funds meant for buying teaching aids and necessary instructional tools; teachers used to assign project works to their students; teachers used to appreciate when their students ask questions in the classrooms; teachers would like to know more about

constructivism, and they realised that constructivism would influence better teaching-learning among students.

Hence, permission of the headmasters to teachers to practice their own teaching strategies while teaching, allowing teachers to use audio-visual aids to supplement their teaching, headmasters making proper use of funds meant for buying teaching aids and necessary instructional tools, teachers assigning project works to students, students' asking questions in the classrooms, teachers wanting to know more about constructivism and realising that it will influence better teaching-learning among students are not found to be constraints in adopting constructivist approach to teaching-learning.

The fourth question was 'Are you given the freedom to take your students to visit museums, zoos, etc., as part of the teaching-learning process?' it is found that 76.7%, 83.3%, 90% and 87.5% of mathematics, English, science, and social science teachers responded that they were given the freedom to take their students to visit museums, zoos, etc., as part of the teaching-learning process respectively. On the whole, 84.4% of all the teachers teaching the different subjects responded that they were given the freedom to take their students to visit museums, zoos, etc., as part of the teaching-learning process. However, 15.6% of the teachers responded that they were never given the freedom to take their students to visit museums, zoos, etc., as part of the teaching-learning process.

The fifth question was 'Do you have projectors in the school?' it was revealed from table 4.15 that 97.5% of mathematics, science and social science teachers, and 84.2% English teachers, responded that there were no projectors in the school. On the whole, 94.2% of teachers responded that there were no projectors in the school. Hence, the absence of projectors in the school is found to be a constraint in adopting constructivist approach to teaching-learning.

'Do you make use of maps, globes, flashcards, pictures and models in your classroom teaching?' was the sixth question and according to 51.7%, 99.2%, 72.5% and 95% of mathematics, English, science and social science teachers responded that they made use of maps, globes, flashcards, pictures and models in their classroom teaching respectively. On the whole, it was found that 79.6% of teachers made use of maps, globes, flashcards, pictures and models in their classroom teaching. However,

20.4% of the teachers did not make use of these teaching aids. Since majority of teachers are found using teaching aids it is not found to be a constraint in adopting constructivist approach to teaching-learning.

‘Are you a trained teacher?’ was the ninth question and it was revealed that 93.3% of mathematics teachers, 95% of English teachers, 95.8% of science teachers and 97.5% of social science teachers were trained teachers. On the whole, 95.4% of the teachers teaching the different subjects were trained teachers but 6.7% of mathematics teachers, 5% of English teachers, 4.2% of science teachers, and 2.5% of social science teachers were not trained teachers. On the whole, 95.4 % of teachers were trained. Hence, it is not found to be a constraint in adopting constructivist approach to teaching-learning.

The tenth question was ‘Have you ever heard of, read about or have been told about constructivism?’ it is revealed that 85.8% of mathematics teachers, 83.3% of English teachers, 89.2% of science teachers, and 95.5% of social science teachers responded that they have never heard of, read about or were told about “constructivism”. On the whole, only 11.5% of the teachers responded that they have heard of, read about or were told about “constructivism”. Since majority of teachers (88.5%) teaching the different subjects responded that they had no idea about constructivism. Hence, the absence of knowledge about constructivism is found to be a constraint in adopting constructivist approach to teaching-learning.

From table 4.15 as already discussed above that 94.2% of teachers responded that there were no projectors in the schools reveals that too a large extent majority of the schools included in the study did not have any projectors. Projectors are an important teaching aid that can facilitate teaching-learning in many ways. The absence of projectors only goes to show that constructivist teaching-learning approach is not followed by teachers adequately.

Further, as revealed from the responses of the teachers teaching different subjects that majority (88.5%) had no idea about constructivism. Lack of knowledge about constructivist approach to teaching-learning is found to be a constraint in adopting constructivist teaching-learning.

Hence the research hypothesis no.12 stated in chapter I that there are constraints faced by elementary school teachers in Mizoram in adopting constructivist teaching-learning approach is found true.

CHAPTER-V

RESULTS AND DISCUSSION

This chapter is divided into seven sections. Results of the study have been presented in section 5.01 and discussed in section 5.02. Suggestions relating to measures for effective adoption of constructivist teaching-learning approach in different subjects in elementary schools in Mizoram are offered in section 5.03. Sections 5.04, 5.05, 5.06 pertain to the discussions on educational implications of the study, limitations of the study and suggestions for further research. Lastly a brief epilogue on the study is presented in section 5.07.

5.01: Findings of the Study

Main findings of the study on the first twelve objectives as analysed and presented in the eight sub-sections 4.01 to 4.08 of chapter IV are presented in the similar way.

A. Depth of Knowledge of Elementary School Teachers in Mizoram on Constructivism as a Teaching-Learning Approach

- Majority of elementary school teachers teaching the four subjects- mathematics, English, science and social science, irrespective of their gender and locale, were found to have moderate knowledge about constructivist teaching-learning approach.
- Among the mathematics teachers, irrespective of their gender and locale, 16.6% and 19.2% were found to have low and high level of knowledge about constructivist teaching-learning approach respectively.
- Among the English teachers, irrespective of their gender and locale, 15% and 21% were found to have low and high level of knowledge about constructivist teaching-learning approach respectively.
- Among the science teachers, irrespective of their gender and locale, 19.2% and 20.8% were found to have low and high level of knowledge about constructivist teaching-learning approach respectively.
- Among the social science teachers, irrespective of their gender and locale, 25.8% and 21.7% were found to have low and high level of knowledge about constructivist teaching-learning approach respectively.

B. Attitude of Elementary School Teachers in Mizoram towards Constructivism as a Teaching-Learning Approach with reference to the Subjects they Teach

- All of the elementary school teachers teaching the four subjects- mathematics, English, science and social science, irrespective of their gender and locale, were found to have positive attitude towards constructivism as a teaching-learning approach.

C. Practices of Elementary School Teachers teaching different subjects in Mizoram adopting Constructivist Teaching-Learning Approach

From the report of the teachers (through the questionnaire) about their classroom practices it was found that:

- Majority of elementary school teachers teaching the four subjects- mathematics, English, science and social science; irrespective of their gender and locale; were found to practice constructivist teaching-learning approach moderately.
- Among the mathematics teachers, irrespective of their gender and locale, 4.2% and 25.8% were found to have low and high level of practice of constructivist teaching-learning approach respectively.
- None of the male mathematics teachers belonging to the urban areas and female mathematics teachers belonging to the rural areas was found practicing constructivist teaching-learning approach. But, few male mathematics teachers belonging to the rural areas and female mathematics teachers belonging to the urban areas were found practicing constructivist teaching-learning approach.
- Among the English teachers, irrespective of their gender and locale, 4.2% and 25.8% were found to have low and high level of practice of constructivist teaching-learning approach respectively.
- Among the science teachers, irrespective of their gender and locale, 11.7% and 20% were found to have low and high level of practice of constructivist teaching-learning approach respectively.

- Among the social science teachers, irrespective of their gender and locale, 6.7% and 29.2% were found to have low and high level of practice of constructivist teaching-learning approach respectively.
- On the whole, it was found that out of all the elementary school teachers teaching different subjects, maximum number of science and social science teachers rarely practiced constructivist teaching-learning approach.
- On the whole, it was found that out of all the elementary school teachers teaching different subjects, the maximum number of mathematics and English teachers moderately practiced constructivist teaching-learning approach.

From the observation of the classroom practices of the teachers it was found that:

- Concept mapping and inquiry approach to teaching were not found to be practiced by any mathematics teacher.
- Asking students to memorise information, explanation and solving text book sums were found practicing by all the mathematics teachers.
- Among the mathematics teachers, more female teachers were found asking students to solve sums on the board than their male counterparts.
- Very few mathematics teachers were found encouraging brainstorming; female teachers were found practicing this method more than male teachers.
- Majority of the mathematics teachers were found giving examples outside the text book. Further, more male teachers were found giving examples outside the text book than their female counterparts.
- The number of mathematics teachers evaluating the students at the end of the lesson was very low.
- English teachers were found asking questions to the students.
- Female teachers teaching English were found discussing and using oral translation more than the male teachers.
- None of the English teachers were found using audio-visual aids, collaborative learning and inquiry approach.
- None of the male English teachers were found practicing explanation in their classroom. Recitation was practiced more by female teachers.

- None of the science teachers was found using anchored instruction, audio-visual aids, collaborative learning, concept mapping, experimentation, and inquiry approach while teaching in the class rooms.
- Brainstorming was not practiced by rural male science teachers at all. Some rural female science teachers were found practicing brainstorming.
- Majority of science teachers were found practicing explanation as a tactic of teaching.
- Elaboration on the topics was hardly followed by the science teachers.
- None of the science teachers were found evaluating after delivering the lesson.
- Majority of the science teachers were found giving examples outside the text book.
- Majority of the science teachers were found using locally available resources for their teaching.
- All the science teachers were found solving text book sums.
- The tactics of asking questions, explanation, use of pictures, charts and maps, and text book materials were found to be adopted by majority of the social science teachers.
- The use of concept mapping was hardly practiced by social science teachers.
- Discussion as a tactic of teaching was practiced by majority of social science female teachers.
- It was found that collaborative learning and inquiry approach were not adopted by any of the teachers teaching social science. However, textbook materials were used by all the teachers.

D. Comparison of Knowledge, Attitude and Practices of Elementary School Teachers teaching different subjects in Mizoram relating to Constructivist Teaching-Learning Approach

- It was found that all the teachers teaching the four subjects were having more or less similar knowledge about constructivist teaching-learning approach.
- Mathematics teachers were found to have better positive attitude towards constructivist teaching-learning approach in comparison to science teachers. Similarly, social science teachers were found to have better positive attitude towards constructivist teaching-learning approach in comparison to English

teachers. The other groups were found to have more or less similar attitude about constructivist teaching-learning approach.

- From the responses of the teachers, it was found that all the teachers teaching the four subjects were having more or less similar practices about constructivist teaching-learning approach in their classrooms. However, variations were observed during observations.

E. Differences in the Knowledge, Attitude and Practices of Elementary School Teachers in Mizoram relating to Constructivist Teaching-Learning Approach with reference to their Locale; and Gender

- Both urban and rural elementary school teachers in Mizoram were found to have more or less similar knowledge on constructivist approach to teaching-learning.
- Both male and female elementary school teachers in Mizoram were found to have more or less similar knowledge on constructivist approach to teaching-learning.
- Urban teachers were found to have better positive attitude than rural teachers toward constructivist teaching- learning approach.
- Both male and female elementary school teachers in Mizoram were found to have more or less similar positive attitude toward constructivist approach to teaching-learning.
- Both urban and rural elementary school teachers in Mizoram were found to have more or less similar practices on constructivist approach to teaching-learning.
- Both male and female elementary school teachers in Mizoram were found to have more or less similar practices on constructivist approach to teaching-learning.

F. Nature and Extent of Relationship among Knowledge, Attitude and Practices of Elementary School Teachers in Mizoram relating to Constructivism as a Teaching-Learning Approach

- Positive and significant relationship was found between knowledge on constructivist approach to teaching and attitude of elementary school teachers

to adopt it in class room practices among the elementary school teachers in Mizoram.

- Positive and significant relationship was found between knowledge of the elementary school teachers on constructivist approach to teaching and their practices in the class rooms.
- Positive and significant relationship was found between attitude of the elementary school teachers towards constructivist approach to teaching and their practices in the class rooms.

G. Differences in the Relationship between Knowledge and Attitude of Elementary School Teachers teaching different subjects in Mizoram relating to Constructivism as a Teaching-Learning Approach

- It was found that there was no significant difference in the correlation coefficients between Knowledge on constructivism as an approach to teaching-learning and the attitude of the four groups of elementary school teachers teaching different subjects to adopt it in the class room practices. The correlation coefficients between knowledge and attitude of different groups of teachers teaching different subjects were found to be more or less similar.

H. Constraints of Elementary School Teachers in Mizoram in adopting Constructivist Teaching-Learning Approach

- All the teachers teaching the four subjects- mathematics, English, science and social science viewed that the headmasters used to give the teachers freedom to practice their own teaching strategies while teaching; allow them to use audio-visual aids to supplement their teaching; headmasters made proper use of funds meant for buying teaching aids and necessary instructional tools; teachers used to assign project works to their students; teachers used to appreciate when their students ask questions in the classrooms; teachers would like to know more about constructivism, and they realized that constructivism would influence better teaching-learning among students.
- Majority of the teachers teaching the different subjects viewed that they were given the freedom to take their students to visit museums, zoos, etc. as part of the teaching-learning process. However, a considerable number of teachers

were of the view that they were never given the freedom to take their students to visit museums, zoos, etc, as part of the teaching-learning process.

- Majority of the teachers were found to make use of maps, globes, flashcards, pictures and models in their classroom teaching.
- Majority of the teachers were trained.
- Majority of the teachers revealed that there were no projectors in the school.
- Majority of the teachers teaching the different subjects were found to have no idea about constructivism.

Hence, major constraints for the teachers in adopting constructivist approach to teaching were found to be their ignorance about constructivist approach, and non availability of projectors in their schools. Besides, some teachers reported that they were not able to give exposure to their students.

5.02: Discussion of the Results

The study revealed that all the teachers teaching the four major subjects - mathematics, English, science and social science, irrespective of their gender and locale, have moderate awareness relating to constructivism as a teaching-learning approach. Further, majority of the teachers, who were trained teachers, also reported that they had never heard or read about constructivism. Training or workshop sessions also never included topics on constructivism. This may be due to the fact that constructivism is a new theory of learning that emerged only recently. Therefore, it was difficult for teachers to have any idea about this theory of pedagogy. Unfortunately most of the teachers are also laidback and unconcerned about updating themselves. It is generally found that teachers are satisfied with covering the syllabus and sticking to it instead of moving beyond the syllabus. Rarely, teachers at elementary level make effort to read more and move beyond the lessons to supplement their teaching. Apart from these, half of the teachers under the study belonged to the rural areas of Mizoram. The location and geography of the state also makes it disadvantageous for teachers to access various sources of information. There are many areas without motor able roads. During the study and classroom observations it was found that both teachers and students alike had language difficulty. While some of their books were written in English some were in the native language Mizo. Even subjects like social sciences were in the Mizo language. The

syllabus being heavy with 20 chapters in some subjects made it difficult for teachers to take out extra time to read up something else. With the recent adoption of the CCE (continuous and comprehensive evaluation) system in the state, there is a lot of confusion among the teachers who have to prepare themselves to meet the requirements of the new evaluation system which has also made it mandatory for regular class tests and evaluation of students' performance on day-to-day basis. The sudden change in the school evaluation system is a major excuse for most teachers for having no time for extra study and reading and especially for being completely absorbed in their routine work which they blame for the most part.

The study also revealed that elementary school teachers teaching the four major subjects - mathematics, English, science and social science irrespective of their gender and locale had favourable attitude towards constructivist approach to teaching-learning. Introduction and exposure to the constructivist approach during the study had too a large extent shown the way to elementary school teachers that their classrooms can be more creative, energised and activity-centred by following very simple principles and having the right attitude. Although the teachers expressed that they were totally ignorant about constructivism, it was interesting to find that they had favourable attitude about constructivism which was revealed from the responses that they made in the questionnaire relating to their attitude towards constructivism. Teachers believe that constructivist approaches would not only enhance students' learning but also provide platform for better teacher-student relationships and congenial classroom environments.

The study further revealed that elementary school teachers teaching the four major subjects - mathematics, English, Science and social science irrespective of their gender and locale moderately adopted constructivist approach to teaching-learning in their classrooms. It is interesting to note here that as already discussed that elementary school teachers had no idea about what could possibly be 'constructivism', they seemed to practice some of the tactics and strategies in the classrooms which are advocated by constructivism. Some of the teachers in the rural areas were very industrious and deserves applaud. Subjects like mathematics were taught by using locally available resources like pebbles, sticks, electrical posts, benches etc for teaching simple arithmetic. Some went as far as sending students to local shops to

find out prices of commodities for understanding concepts on profit and loss. Although these teachers reported that they had no idea about constructivism their classroom practices revealed construction of authentic knowledge by relating their teachings to real life contexts.

From the observation of the classroom practices of teachers it was revealed that mathematics teachers practiced the tactics like asking students to memorise information, explanation and solving text book sums. These strategies are basic to any teaching-learning situation and were followed by all the teachers. Although constructivism has a disregard for rote memorisation, however, for mathematics and other subjects as well, there are basics which have to be remembered such as formulae, signs, symbols, rules, directions etc.

Concept mapping and inquiry approach to teaching were not practiced by any mathematics teacher irrespective of their gender (male and female) and locality (urban and rural). This could be due to limited knowledge and exposure of teachers to the different approaches that could be used in the classrooms. Some of the teachers reported that it was not possible to follow all the tactics which may be useful to the students as the duration of one period being 35 to 40 minutes which was too short. The need to cover the syllabus is a major issue with most teachers especially with many assignments, tests and project works that have to be completed and graded.

It was found that majority of the mathematics teachers were giving examples outside the text books irrespective of their gender and locality. This could be due to the fact that examples in the text books were often very limited and sometimes beyond the grasp of all the students. In the classroom there are bright as well as dull students. So, to make all the students comprehend the lesson examples outside the text books were often used by teachers. This particular tactic is a constructive one and it is laudable that mathematics teachers are using this method in their classrooms.

None of the urban female mathematics teachers and rural male mathematics teachers was found evaluating their students' learning after the end of lesson. Further, the percentage of teachers evaluating after delivery of the lesson was very low irrespective of their gender and locality. The reason for this could be the fact that

teachers feel students are given home assignments which will take care of the evaluation.

Observation of classroom practices also revealed that science teachers were found not using the tactics of anchored instruction, audio-visual aids, collaborative learning, concept mapping, experimentation, and inquiry approach. While these are some of the strategies which are expected to be followed in a constructive science classroom, it is unfortunate that our teachers fail to see their utility. The main reason could be lack of thorough knowledge on the part of the teachers, lack of interests, lack of training and not being science teachers at all. Shortage of teaching staff in some schools compels teachers to teach different subjects even if they are not qualified. Another major problem is the lack of resources and infrastructure.

Brainstorming was not practiced by rural male science teachers at all. It was found that highest number rural female teachers were practicing brainstorming sessions while teaching science. This may be due to the fact that female teachers are more inquisitive and hardworking.

The majority of science teachers practiced explanation as a strategy of teaching irrespective of their gender and locality. Only two rural male teachers were found elaborating the topics that they were teaching. Explanation as a teaching tactic was common for all the subjects. It was sad that most of the teachers were not elaborating the topics. It may be due to their thinking that elaboration is time consuming or they do not see the need for adopting it. It is also possible that they are not well versed with the subject and fail to elaborate on the topic. However, majority of science teachers were found giving examples outside the text book, solving text book sums and also making use of locally available resources.

The classroom practices of English teachers revealed that majority of them were found practicing asking questions to the students. It is a common practice in almost all classrooms and basic to any teaching-learning process. The strategies of explanation, discussion, recitation and oral translation were found to be adopted by mostly female teachers. In fact most of the teachers qualified to teach English were female teachers and, in most of the schools of Mizoram there were more female

teachers than male teachers teaching English. This may be because women are more fluent and have a flair for teaching language papers than their male counterparts.

None of the English teachers were found using audio-visual aids, and inquiry approach and did not provide any opportunity for collaborative learning. Only one urban male teacher was found making use of songs to teach his students. As already mentioned, shortage of teachers in most of the schools necessitates teachers to take up subjects that they are not qualified to teach and sometimes more than one subject. Although care was taken to include only trained teachers in the study it cannot be ascertained that teachers were trained especially for the subjects they were teaching. This may be one of the possible reasons that teachers were not very innovative and enthusiastic towards adopting different techniques that may not only aid their teaching but facilitate students to become better learners.

Observation of classroom practices of Social Science teachers revealed that almost all of them were found practicing the tactics of asking questions, explanation, use of pictures, charts and maps; and text book materials. Discussion as a method of teaching was practiced by majority of social science female teachers. The use of concept mapping was practiced by urban female teachers but the percentage was nominal. Female teachers seemed to be more at home in the teaching profession. It might be due to the fact that most teachers failed to understand the advantages of different teaching styles to make their teaching more creative and in harmony with the changing times.

During the entire observation of classroom teaching practices it was found that only one rural social science female teacher was making use of audio-visual aids. One of the reasons might be due to the failure of the government in providing audio-visual aids to most of the schools. Secondly, the teachers were not trained and equipped to make use of such teaching aids. Thirdly, even when there are audio-visual aids in the schools, those were never used or were damaged and never replaced.

Collaborative learning and inquiry approach were not adopted by any of the teachers teaching social science. In fact most of the teachers teaching the different subjects: mathematics, English, science and social science did not practice these tactics in their classrooms. It was also revealed that none of the teachers evaluated

their students' performance immediately after the lessons. Audio-visual aids were never used by most of the teachers. Even concept mapping was hardly adopted by the teachers. Concept mapping is one of the innovative teaching tools that can clarify and deepen students understanding of the content. Concept mapping skill is an enabling skill to enhance the development of students' thinking skills through more meaningful learning activities. Concept mapping skill once learned can help students to recognise what they know and think once learned in more systematic and complex ways. It is depressing that our teachers do not make use of such a strategy in their classroom discourses. The reasons might be lack of proper training, interest and workload.

On comparison of knowledge, attitude and practices of elementary school teachers teaching different subjects in Mizoram relating to constructivist teaching-learning approach, it was found that all the teachers teaching the four subjects were having more or less similar knowledge about constructivist teaching-learning approach. Steps have to be taken to improve teachers' knowledge about constructivism so that they may be able to use it highly in their teaching practices.

Mathematics teachers were found to have better positive attitude towards constructivist teaching-learning approach in comparison to science teachers. Similarly, social science teachers were found to have better positive attitude towards constructivist teaching-learning approach in comparison to English teachers. The other groups were found to have more or less similar attitude about constructivist teaching-learning approach. It is very encouraging to find that all the teachers have positive attitude towards constructivist teaching learning approach as it will promote the popularity and implementation of constructivist approach in the classrooms.

It was also found that all the teachers teaching the four subjects were having more or less similar practices about constructivist teaching-learning approach in their classrooms. However, variations were observed during classroom observations as already discussed above. Different subjects have different technicalities and tactics of teaching for better understanding of students and as such, different strategies advocated by constructivist theory should be applied accordingly.

Differences in the knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivist teaching-learning approach with

reference to their locale; and gender revealed that elementary school teachers had more or less similar knowledge on constructivist approach to teaching-learning. Urban teachers were found to have better positive attitude than rural teachers toward constructivist teaching- learning approach. This may be because urban teachers have better access and exposure to new developments around them. Rural teachers face several disadvantages as compared to urban teachers.

Both male and female elementary school teachers in Mizoram were found to have more or less similar positive attitude toward constructivist approach to teaching-learning. It is very encouraging to have positive attitude which gives one the impetus to adopt a better and more innovative teaching approach that will not only facilitate better teaching-learning but also motivate teachers and students alike.

Elementary school teachers in Mizoram were found to have more or less similar practices on constructivist approach to teaching-learning. There are many tactics and strategies that can be employed in the classrooms and new and innovative approaches advocated by constructivism. The conventional methods of teaching are widely practised by teachers but other methods have been neglected. Therefore, innovative practices should be encouraged among teachers which will not only help them in transacting their lessons better but also motivate them and increase their enthusiasm.

The nature and extent of relationship among knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach revealed that there was positive and significant relationship between knowledge on constructivist approach to teaching and attitude of elementary school teachers to adopt it in class room practices among the elementary school teachers in Mizoram. There was also positive and significant relationship between knowledge of the elementary school teachers on constructivist approach to teaching and their practices in the class rooms. Further, there was positive and significant relationship between attitude of the elementary school teachers towards constructivist approach to teaching and their practices in the class rooms. Hence, knowledge, attitude and practices of elementary school teachers are related and it is essential for teacher educators to know that if teachers have adequate knowledge about constructivism, they will develop better attitude towards it which is likely to be followed by efficient use of different tactics and strategies in their classrooms.

The differences in the relationship between knowledge and attitude of elementary school teachers teaching different subjects in Mizoram relating to constructivism as a teaching-learning approach revealed that there was no significant difference in the correlation coefficients between knowledge on constructivism as an approach to teaching-learning and the attitude of the four groups of elementary school teachers teaching different subjects to adopt it in the class room practices. The correlation coefficients between knowledge and attitude of different groups of teachers teaching different subjects were found to be more or less similar.

From the checklist prepared by the investigator to reveal the constraints of elementary school teachers in Mizoram in adopting constructivist teaching-learning approach it was found that majority of the teachers had responded positively that they were given the freedom to use audio-visual aids by their headmasters, but, observation of classrooms teaching practices revealed that only one rural female social science teacher was making use of it in her classroom teaching as already discussed above. This may be attributed to the absence of projectors in majority of the schools which are supposed to be supplied by the concern government department. Sometimes, it was also found that audio-visual aids were kept under lock and key, or they were not in usable condition and never replaced by new ones. Inadequate knowledge on the part of the teachers to handle these aids might also be another reason for why most of the teachers did not make use of it.

A considerable number of teachers were of the view that they were never given the freedom to take their students to visit museums, zoos, etc, as part of the teaching-learning process. One of the main reasons for this could be that there is only one zoo in Mizoram which is having very few animals to see and it is located near to Aizawl. At other areas such scope is not available.

Majority of the teachers teaching the different subjects were found to have no idea about constructivism. The lack of knowledge about constructivism might be due to the reason that it is a recent theory of learning which has only started becoming popular.

5.03: Suggestions for Effective Adoption of Constructivist Teaching-Learning Approach by the Elementary School Teachers

Based on the findings from the study, ingenuity of the researcher and from literature on constructivism the following suggestions are offered for development of proper knowledge and attitude of elementary school teachers so that they can effectively adopt constructivist teaching-learning approach both in and out of the classrooms.

- Emphasis should be given both in pre-service and in-service training of teachers on constructivist approach to teaching-learning.
- Teacher education programmes, particularly syllabus, need to be redesigned focusing on child centered pedagogy.
- During training teacher trainees should be taught in a way that reflects constructivist approach to teaching-learning.
- During training emphasis should be given to use interdisciplinary approach so that they can see the interrelationships that occur naturally in a real world.
- During training emphasis should be given to use instructional strategies/tactics like collaborative learning, discussion techniques, inquiry approach, problem-solving, assessment etc so that teachers witness for themselves how these strategies/tactics serve as important vehicles for teaching different subjects.
- In-service training should focus on teachers' thinking on traditional approach to teaching-learning and constructivist approach to teaching-learning and bringing change in their thought, attitude and practice.
- Teachers should be trained how to;
 - Prompt students to formulate their own questions;
 - Allow the students to have multiple interpretations and expressions of learning;
 - Relate new information to prior knowledge;
 - Encourage learners' autonomy and initiatives;
 - Make use of primary sources and physical materials;
 - Encourage group work;

- Use their peers as resources (collaborative learning);
 - Allow student responses to drive lessons;
 - Inquire about students' understandings of concepts before sharing their own understandings of those concepts;
 - Encourage students to engage in dialogue both with the teacher and one another;
 - Encourage students inquiry ability by asking thoughtful and open-ended questions and encouraging them to ask questions to each other;
 - Nurture students' natural curiosity;
 - Help students in restructuring prior knowledge;
 - Help students learn to transfer their learning in different situations;
 - Help students to aim towards understanding rather than memorization;
 - Help learners to engage in self-regulation and being reflective;
 - Help students to set their own learning goals;
 - Help students to know how to correct errors etc.
- An important aim of education is to link the school to the community. In this regard, teachers should give opportunities to students for social participation.
 - People learn best when they participate in activities that are perceived to be useful in real life and are culturally relevant. Hence, teachers should give opportunities to students to participate in cultural events.
 - Research findings show that children learn best when their individual differences are taken into consideration. As such, teachers should create motivation with the learners by keeping in mind their developmental characteristics and individual differences.
 - In the schools, groupings students according to their ability should be avoided as it gives the wrong message that ability is valued more than effort.
 - In the school, cooperation among the students should be encouraged rather than competition because competition encourages students to

work alone to achieve high grades but tend to give the message that ability is more valued. It may kill the intrinsic motivation of other weak students.

- Teachers should assign innovative and interesting tasks to the students at the appropriate level of difficulty taking note of individual differences that challenge their curiosity and higher order thinking skills.
- Teachers in a school should share their ideas in planning, and implementing their day to day academic activities in collaborative manner.
- Freedom and opportunities for teachers should be given to participate in decision making relating how effectively they can transact their lessons to attain both immediate and ultimate objectives.
- Teachers should try out various innovative tactics in developing concepts among the students in their classrooms.
- Schools should be provided with computers and projectors and training should be given to teachers on how to use them

Thus, it is imperative that teachers must be provided with pre-service as well as in-service education to equip them to have the necessary knowledge on constructivism and the right attitudes to adopt the different strategies advocated by constructivism for effective teaching-learning practices.

5.04: Educational Implications

The present study has important implications for teachers, administrators, and educational planners.

Teacher and student engagement is significant in the classroom because it has the power to define whose knowledge will become a part of school-related knowledge and whose voices will shape it. According to NCF 2005, the role of teachers is to provide a safe space for children to express themselves, and simultaneously to build in certain forms of interactions.

There are many approaches to teaching from constructivist perspective, but very few are adopted in the classrooms. There is a need to overcome this

backwardness by improving teacher education programme. NCF 2005 advocates learning for construction of knowledge and has suggested the teaching of different subjects accordingly. The teaching of Mathematics should be based on mathematisation (ability to think logically, formulate and handle abstractions) rather than ‘knowledge’ of mathematics (formal and mechanical procedures). It should enhance children’s ability to think and reason, to visualise and handle abstractions, to formulate and solve problems. In the teaching of Science, the content, process and language of science teaching must commensurate with the learner’s age-range and cognitive reach. Teaching should engage the learners in acquiring methods and processes that will nurture their curiosity and creativity, particularly in relation to the environment. Science teaching should be placed in the wider context of children’s environment to equip them with the requisite knowledge and skills to enter the world of work. The teaching of English should ensure language skills- speech and listening, reading and writing- cut across school subjects and disciplines. Their foundational role in children’s construction of knowledge right from elementary classes through senior secondary classes needs to be recognised. Similarly, Social science teaching content needs to focus on conceptual understanding rather than lining up facts to be memorised for examination, and should equip children with the ability to think independently and reflect critically on social issues.

Educational planners are required to take cognizance of the scenario and plan the educational system of the country so that the teacher educators and teachers are thoroughly trained to impart proper learning that leads to the construction of knowledge. For effective learning to take place, it requires the active and constructive involvement of the learner. So it is a challenge for educators to generate creative, challenging and interesting environments that will promote the active involvement of students. This can be achieved by presenting students with hands-on activities, such as experiments, observations, projects, etc. It is essential for the teachers to ensure that classrooms are devoid of situations where the students are inactive, unreceptive and passive listeners for long periods of time. Therefore, the syllabi/curriculum of different levels of education should be planned and designed keeping in mind the age and ability level of students. Administrators have to see that the designed schemes are properly implemented to achieve the ends.

When we talk of teachers' knowledge, attitude and practices in the present research, it implies that sufficient knowledge or awareness about constructivism is likely to garner correct and positive attitude towards it, which is likely to foster the effective utilization of different tactics and approaches by the teachers in their classrooms. If teachers would lack the knowledge of constructivism they cannot be expected to develop positive attitudes towards it nor have the ability to practice it. Hence, it is important to develop proper awareness among the teachers about constructivism.

The current model of teacher education should be revamped to meet the needs of the changing times. Teacher education should be learner- centric, flexible, recognise learners' autonomy, provide scope for multidisciplinary with multiple and divergent exposure, multifarious and continuous lifelong learning. Both pre-service and in-service teacher education programmes should be organized for creating necessary awareness and developing skills required by the teachers.

Constructivist teachers are considered to be facilitators and guides who provide ample opportunity to the learners to control their own learning. In this context, Sri Aurobindo has recorded "*the first principle is that nothing can be taught. The teacher is not an instructor or task master; he is a helper and guide. His business is to suggest and not to impose. He does not actually train the pupil's mind, he only shows him to perfect his instruments of knowledge and helps and encourages him in the process. He does not impart knowledge to him; he shows him how to acquire knowledge for himself. ...*". These ideals imply that the task of teachers is to build circumstances for students to assume important roles in their learning, to interact and relate with each other, to communicate their opinions and to appraise other students' arguments. Similarly, students have to be active, critical and industrious learners, respect their teachers and fellow students, perform their duties and co-operate with one another and learn to work in groups for the greater good of all.

5.05: Limitations of the Study

The investigator had tried to be scientific and objective in the process of investigation. However the study contains the following limitations:

- The sample of the study was limited 480 teachers, 120 teaching each of the four key subjects: mathematics, English, science and social science. Out of the 120 teachers teaching specific subjects, as mentioned, 60 were males and 60 were females and among them, 30 were from urban schools and 30 were from rural schools.
- The samples were selected from Mizoram state only.
- For the collection of data no standardized tool was used. All the tools were developed by the investigator which might have some defects.
- All the tools were self-reporting ones. Administration of self-reporting tools assume that while taking the tools the respondents will be honest, sincere and will interpret the same meaning of the items as the authors of the tools do. This could not be judged objectively.
- Due to lack of resources the investigator might not have gone through all relevant literature and research studies on this broad concept.

5.06: Suggestions for Further Research

Further researches may be undertaken in the following lines.

- Similar studies may be conducted with larger samples to validate the present findings.
- Similar studies may be conducted on higher secondary school teachers and teachers of higher education.
- Similar studies may be conducted for comparison of the present findings on Mizoram state with that of any other states.

5.07: Epilogue

For any educational system to be successful the relationship between the teacher and taught has to be cordial and pleasant. Since education plays a major role in promoting national development in all its ramifications, every country develops its system of education to express its unique socio-cultural identity and also to meet the challenges of the times. As such, teachers remain important and indispensable, and are undoubtedly responsible for the progress of the nation as a whole. Given that educational institutions are fundamental to any society, the teachers are the pivots to

any such institutions- school, college or university. Hence, the choice of teaching approaches, tactics and strategies adopted by the teachers will determine the kind of learners that are being prepared for the future.

Adopting a constructivist perspective, teaching becomes a vigorous, vibrant and social process of making sense of experiences, by involving enjoyable activities and opportunities to examine problems from a multiplicity of perspectives, and also by cooperating with each other. Contrary to criticisms by traditional educators, the role of the teacher is very demanding. Constructivism modifies that role so that teachers can help students to construct knowledge rather than reproduce a series of facts. It is desirable to create life-long authentic learners who can make use of their prior experiences and knowledge for the construction of new ones. As such, constructivist teachers are expected to have such skills in assisting learners.

John Dewey has enumerated “ *the more a teacher is aware of the past experiences of students, of their hopes, desires, chief interests, the better will he understand the forces at work that need to be directed and utilized for the formation of reflective habits*”. Dewey elaborated further by writing, “*The teacher is a guide and director, he steers the boat but the energy that propels it must come from those who are learning.*”

According to Montaigne, a French philosopher “ *a tutor should not be continually thundering instruction into the ears of his pupil, as if he was pouring it through a funnel, but, after having, put the lid, like a young horse, on a trot before him, to observe his paces, and see what he is able to perform, should according to the extent of his capacity, induce him to taste, to distinguish, and to find out things for himself, sometimes opening the way, at other times leaving it for him to open*”.

Constructivist teachers serve as facilitators rather than experts by creating atmosphere where students invent their own constructs or solutions by thinking critically, become actively involved in defining questions in their own language and work out answers competently instead of mechanically receiving and reproducing materials presented by the teacher or the textbook.

Our schools today need more teachers who can engage students in activities that bring tremendous richness to the classroom processes. Without doubt, this will

require teachers to engage in planning, organising, preparing and administering activities. Teachers will have to make efforts to set up the classroom culture for activities and to institute the rules that will direct the space and use of resources. As teachers have to be trained how to teach from a constructivist point of view, similarly enlightening students to be successful learners is an essential concern in establishing environments favourable to useful scholarship. We can achieve these by reflecting on one of the important quotes of Piaget which reads: *“The principle goal of education is to create men who are capable of doing new things, not simply of repeating what other generations have done - men who are creative, inventive and discoverers”*.

Students are the future of our society. At present there is tough competition every where to find a place in the job market and to get a scope to earn livelihood. Mizoram, being a small state and predominantly inhabited by tribal people, should not deprive a single child from getting quality education. All maladies should be addressed by appropriate organisations and all concern should extend cooperation for this purpose. If right steps are not taken at right time, Mizoram may lose its present status of one of the first developing states of the country.

SUMMARY

The importance of teaching and the central role that teachers play in determining the quality of learning in classrooms cannot be undermined. As learners, nearly every one of us have been a product of teacher centered instructions characterized by fact based subject matter, home works and rote memorization. Learning in most classrooms is conceived of as a process in which students passively absorb information and store it in easily retrievable fragments as a result of repeated practice and reinforcement. But researchers have established that teachers can make a difference in how much students learn, and the difference depends on the approaches they follow to teach, mainly behaviourist or constructivist.

Behaviourists' views of learning predominated in teaching-learning process for a long time. The importance of observable, external events on learning and the role of reinforcers in influencing those events were emphasised. It was the goal of behaviourists' to determine how external instructional manipulations brought about changes in students' behaviour. However, in the late 1950s a paradigm shift took place in learning psychology. Developments in cognitive psychology focused attention on teachers, researchers and educationists and the central role that learners play in creating or constructing new knowledge. The works of Jean Piaget and Lev Vygotsky, as well as many linguistics and anthropologists have greatly influenced the way in which teaching and learning is viewed today.

Changing the status accorded to the teacher and their influence and shifting the trend from teacher centered to that of learner centered will necessitate effort, persistence, faith and determination. Classroom teaching practice becomes more effective, when it is directed by an understanding of how students' learn and if students are given the opportunity to explain or clarify their ideas learning will be more successful. Therefore, in terms of pedagogy, the improvement in education and our educational system would require teaching strategies that emphasize students' involvement in their learning, where the focus on learning should be geared towards knowledge construction rather than knowledge transformation.

Teaching is a highly complex activity requiring the use of various skill based components like methods, strategy and tactics of teaching. A monotonous, routine and fixed way of teaching will never succeed in achieving a wide range of

instructional objectives. It is essential that a teacher makes use of different styles, methods and a variety of tactics and strategies of teaching to match and fulfill the objectives of teaching. It is necessary to keep in mind that students have a multi-dimensional personality and each of them is unique with their own unique learning styles. The strength of teaching resides in the intelligent application of productive, innovative and a powerful variety of teaching strategies and approaches corresponding to a set of different goals and mixture of students' characteristics and personality. Therefore, teachers should be able to identify and use the teaching approaches that will lead to effective learning. Approaches to teaching-learning are concerned mainly with the *modus operandi*, procedure, style or techniques of learning. Learning theories that emerged during the twentieth century have been supported by extensive experimentation. These theories may be classified into four major approaches/ faculties of learning or the schools of thought namely behaviouristic, humanistic, cognitive, and constructivist approaches.

Behaviourism is the school of psychology which was founded by John B. Watson based on the belief that behaviours can be measured, trained, and changed. Behaviourists believe that our responses to environmental stimuli shape our actions. Any person, regardless of his or her background, could be trained to act in a particular manner given the right conditioning. According to this school of thought, behaviour can be studied in a systematic and observable manner with no consideration of internal mental states. It suggests that only observable behaviours should be considered since internal states such as cognition, emotions, and moods are too subjective.

Humanists think of learning as the way in which the individual develops his unique way of controlling his environment and attaining his best potential. It emerged during the 1950s as a reaction to the psychoanalysis and behaviourism that dominated psychology at that time. Humanistic approach recommends educational reforms like open schools, upgraded classes, free schools, etc. The main implications of the humanistic approach to the learning process are that it believes in 'child-centred-education'. Therefore it emphasizes on reach, touch and teach the child according to his nature, interests and aptitudes. Teachers have to know their students: their personality, interests, capabilities and their backgrounds so that they can use teaching methods and contents accordingly. This approach emphasises on

individuality, learner's readiness, mental set and motivation, and encourages self-discipline and self-control. It also recognises the teacher as a guide, friend and helper of the students in their learning. It is a democratic approach which recognises the 'child', and advocates the importance of providing a rich environment with a view to aid in the all round development. The teacher is therefore considered as the milestone in the journey of total development of the child.

Cognitive theories discuss how people gain an understanding of themselves and their environment and how, in using this, they act in relation to their environment. It was initiated in the late 1950s, and contributed to the shift from behaviourism. It studies the mental processes including how people think, perceive, remember, and learn. Cognitive approach emphasizes and gives importance to cognition (perception) in learning. According to this approach, learning is a complex process and it is viewed as acquiring changes in the cognitive structure. These changes (learning) take place generally in basically three ways: Differentiation, Generalisation, and Restructurisation.

Constructivism emerged in the 1970s and 1980s, popularising the idea that people actively construct knowledge when interacting with their environment by reorganisation of their mental structures, and not just passive recipients of knowledge and information. In fact formalization of the theory of constructivism is generally attributed to Jean Piaget (1896-1980), who suggested that through processes of accommodation and assimilation, individuals construct new knowledge from their experiences. Learners are, therefore, considered to make their own senses and interpretations of the world around them. Constructivist view of learning has led to a shift from the conventional "*knowledge-acquisition*" to "*knowledge-construction*" metaphor. It advocates learner-centred approach to teaching-learning which is evident from the works of influential theorists like Jean Piaget and Jerome Bruner.

Based on the different theories of learning and schools of thought many models of teachings have emerged. The emergence of Models of teaching can be attributed to Bruce Joyce and Marsha Weil (1972) who have transformed prevailing theories and theoretical knowledge into different 'Models of Teaching' which can be readily used by teachers in school settings. Today, teachers can select the teaching approaches based on different models of teaching best suited for their classroom.

Rationale of the Study and Statement of the Problem

Considering the state of Mizoram, especially in the elementary levels of school education, behaviouristic approach to teaching-learning is widely practiced. Rote memorization is rampant from the pre-primary up to even the higher levels of education. In fact, in order to secure good grades and marks at the examinations it is undoubtedly encouraged. This trend does not contribute to good quality education. Elementary stage of education is the foundation for higher education. The study habits formed at this stage is crucial in deciding the kind of learning approach that a child will develop. If the teaching practices will encourage cramming and rote memorization then the child will resort to cramming at every level of education and will solely depend on the instruction and study materials provided to him instead of putting his own ideas and knowledge about the subject matter taught to him. The child will always look for cooked up knowledge and will never put his mind, think critically, analyse, synthesise or construct his own. Therefore, the choice of teaching strategies adopted at this stage is very important to the shaping of the future progress of learners, and teachers play a very important and indispensable role in this context. In fact, their knowledge and attitude which reflect in their practices in teaching go a long way in determining the success or failure and career of students.

The teachers' approaches to teaching have significant bearing not only on students' learning and achievement but also on development of study habits. There is dearth of research on constructivist teaching-learning strategies in our country in general and in Mizoram in specific. Though, at any stage of education, it is not possible to focus the teaching-learning approach wholly on constructivism, there should be a transformation in the approaches that is from behaviourism to constructivism as the latter has long term effect upon students' creation of knowledge and promote self-learning. Choice of a right teaching approach depends largely on the knowledge and attitude of teachers. If teachers have adequate knowledge, understand the importance and develop positive attitude towards a teaching approach, then only they can put them in their practices. Thus knowledge and attitude are the prerequisites for practice. If we expect that our teachers should prefer constructivist approach to their teaching then it is essential that they should have the right kind of knowledge and attitude; then only they can put them in practice. In this context the following questions are raised:

- Do the elementary school teachers teaching different subjects in Mizoram have knowledge about constructivism as a teaching-learning approach? If so, to what extent?
- What type of attitude (positive/negative) the elementary school teachers teaching different subjects in Mizoram possess towards constructivism as a teaching-learning approach?
- Do the elementary school teachers teaching different subjects in Mizoram adopt constructivist approach to teaching-learning?
- Is there any variation in the knowledge of elementary school teachers teaching different subjects in Mizoram relating constructivist teaching-learning approach?
- Is there any variation in the attitude of elementary school teachers teaching different subjects in Mizoram relating constructivist teaching-learning approach?
- Is there any variation in the practices of elementary school teachers teaching different subjects in Mizoram in adopting constructivist teaching-learning approach?
- Is there any gender difference in the knowledge of elementary school teachers teaching different subjects in Mizoram relating constructivist teaching-learning approach?
- Is there any gender difference in the attitude of elementary school teachers teaching different subjects in Mizoram towards constructivist teaching-learning approach?
- Is there any gender difference in the practices of elementary school teachers in Mizoram in adopting constructivist teaching-learning approach with reference to their locale; and gender ?
- Is there any relationship among knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach?
- Are there any differences among various groups of elementary school teachers teaching different subjects in the relationship between their knowledge and attitude relating to constructivism as a teaching-learning approach?
- Do the elementary school teachers teaching different subjects in Mizoram encounter constraints in adopting constructivist teaching-learning approach?

- What type of measures can be taken for effective adoption of constructivist teaching-learning approach by the elementary school teachers in Mizoram?

Constructivism is a theory of learning that is widely practiced in the west and is also gaining popularity in our country because of its effectiveness on teaching-learning process. As mentioned in the preceding section, in Mizoram, students at all levels of education widely practice cramming in order to secure good grades and marks at the examinations. Teachers are also not equipped to teach students according to constructivist approach because of their ignorance, lack of training, lack of seriousness and the like. Research support is essential to reveal the causes and to address the issues, if any. Though many conceptual articles have been published in different journals and books, there is dearth of empirical studies in this area. To get answers to the questions raised in the preceding section, the following problem was undertaken for investigation.

Constructivist Approach to Teaching-Learning: Knowledge, Attitude and Practices of Elementary School Teachers in Mizoram

Objectives of the Study

1. To reveal the depth of knowledge of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach with reference to the subject they teach.
2. To reveal the attitude of elementary school teachers in Mizoram towards constructivism as a teaching-learning approach with reference to the subject they teach.
3. To assess the extent to which the elementary school teachers teaching different subjects in Mizoram adopt constructivist teaching-learning approach.
4. To reveal the variations if any in the knowledge of elementary school teachers teaching different subjects in Mizoram relating to constructivist teaching-learning approach.
5. To reveal the variations if any in the attitude of elementary school teachers teaching different subjects in Mizoram relating to constructivist teaching-learning approach.
6. To reveal the variations if any in the adoption of constructivist teaching-learning approach by elementary school teachers teaching different subjects in Mizoram.

7. To study the differences in the knowledge of elementary school teachers in Mizoram relating to constructivist teaching-learning approach with reference to their locale; and gender.
8. To study the differences in the attitude of elementary school teachers in Mizoram relating to constructivist teaching-learning approach with reference to their locale; and gender.
9. To study the difference in the practices of elementary school teachers in Mizoram in adopting constructivist teaching-learning approach with reference to their locale; and gender.
10. To find out the nature and extent of relationships among knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach.
11. To study the differences among various groups of elementary school teachers, teaching different subjects in the relationship between their knowledge and attitude relating to constructivism as a teaching-learning approach.
12. To reveal the constraints of elementary school teachers in Mizoram in adopting constructivist teaching-learning approach.
13. To suggest measures for effective adoption of constructivist teaching-learning approach in different subjects in elementary schools in Mizoram.

Hypotheses of the Study

1. Elementary school teachers teaching different subjects in Mizoram have adequate knowledge about constructivism as a teaching-learning approach.
2. Elementary school teachers teaching different subjects in Mizoram have positive attitude towards constructivism as a teaching-learning approach.
3. Elementary school teachers teaching different subjects in Mizoram adopt constructivist teaching-learning approach.
4. There are significant differences in the knowledge of elementary school teachers teaching different subjects in Mizoram relating to constructivist teaching-learning approach.
5. There are significant differences in the attitude of elementary school teachers teaching different subjects in Mizoram relating constructivist teaching-learning approach.

6. There are significant differences in the adoption of constructivist teaching-learning approach by elementary school teachers in Mizoram teaching different subjects.
7. There are significant differences in the knowledge of elementary school teachers in Mizoram relating to constructivist teaching- learning approach with reference to their locale; and gender.
8. There are significant differences in the attitude of elementary school teachers in Mizoram relating to constructivist teaching- learning approach with reference to their locale; and gender.
9. There are significant differences in the practices of elementary school teachers in Mizoram relating to constructivist teaching- learning approach with reference to their locale; and gender.
10. There are significant relationships among knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivism as a teaching-learning approach.
11. There are significant differences among various groups of elementary school teachers teaching different subjects in the relationship between their knowledge and attitude relating to constructivism as a teaching-learning approach.
12. There are constraints faced by elementary school teachers in Mizoram in adopting constructivist teaching-learning approach.
13. There are measures for effective adoption of constructivist teaching-learning approach in different subjects in elementary schools in Mizoram.

Delimitations of the Study

Conceptually and geographically the study was delimited in its scope as follows:

1. It was limited to constructivist approach to teaching-learning.
2. The study was primarily focused on the knowledge, attitude and practices of elementary school teachers teaching the four key subjects: mathematics, English, science and social science.
3. It was confined only to the state of Mizoram

Plan and Procedure:

Research Approach

The study was primarily intended to assess the knowledge, attitude and practices of elementary school teachers in Mizoram relating to constructivist teaching-learning approach. As such, descriptive survey approach was followed for the conduct of the study.

Sources of Data

In order to fulfill the objectives of the present study, data were collected from both primary and secondary sources.

Sample

The total sample of the study was comprised of 480 elementary government school teachers i.e. 120 teachers in each of the four subjects, viz., mathematics, English, science and social science, teaching at classes VI and VII. Out of the 120 teachers teaching each of the four specific subjects, 60 were from urban areas and the rest 60 from rural areas with 30 male and 30 female teachers.

Tools and Techniques Used

The following tools were developed by the investigator for collection of data for the study.

- I. Questionnaire to assess the knowledge of elementary school teachers relating to constructivist teaching-learning approach.
- II. Questionnaire to assess the attitude of elementary school teachers relating to constructivist teaching-learning approach.
- III. Questionnaire to assess the practices of elementary school teachers relating to constructivist teaching-learning approach.
- IV. Separate observation schedules for observation of the teaching practices of elementary school teachers teaching the four key subjects: mathematics, English, science and social science. Though there were some common criteria in the observation schedules, specific criteria were also there for different subjects.
- V. A checklist for teachers teaching the four subjects - mathematics, English, science and social science for revealing the constraints that they face in adopting constructivist approach in teaching.

Major Findings of the Study

Depth of Knowledge of Elementary School Teachers in Mizoram on Constructivism as a Teaching-Learning Approach

- Majority of elementary school teachers teaching the four subjects- mathematics, English, science and social science, irrespective of their gender and locale, were found to have moderate knowledge about constructivist teaching-learning approach.
- Among the mathematics teachers, irrespective of their gender and locale, 16.6% and 19.2% were found to have low and high level of knowledge about constructivist teaching-learning approach respectively.
- Among the English teachers, irrespective of their gender and locale, 15% and 21% were found to have low and high level of knowledge about constructivist teaching-learning approach respectively.
- Among the science teachers, irrespective of their gender and locale, 19.2% and 20.8% were found to have low and high level of knowledge about constructivist teaching-learning approach respectively.
- Among the social science teachers, irrespective of their gender and locale, 25.8% and 21.7% were found to have low and high level of knowledge about constructivist teaching-learning approach respectively.

Attitude of Elementary School Teachers in Mizoram towards Constructivism as a Teaching-Learning Approach with reference to the Subjects they Teach

- All of the elementary school teachers teaching the four subjects- mathematics, English, science and social science, irrespective of their gender and locale, were found to have positive attitude towards constructivism as a teaching-learning approach.

Practices of Elementary School Teachers teaching different subjects in Mizoram adopting Constructivist Teaching-Learning Approach

From the report of the teachers (through the questionnaire) about their classroom practices it was found that:

- Majority of elementary school teachers teaching the four subjects- mathematics, English, science and social science; irrespective of their gender and locale; were found to practice constructivist teaching-learning approach moderately.
- Among the mathematics teachers, irrespective of their gender and locale, 4.2% and 25.8% were found to have low and high level of practice of constructivist teaching-learning approach respectively.
- None of the male mathematics teachers belonging to the urban areas and female mathematics teachers belonging to the rural areas was found practicing constructivist teaching-learning approach. But, few male mathematics teachers belonging to the rural areas and female mathematics teachers belonging to the urban areas were found practicing constructivist teaching-learning approach.
- Among the English teachers, irrespective of their gender and locale, 4.2% and 25.8% were found to have low and high level of practice of constructivist teaching-learning approach respectively.
- Among the science teachers, irrespective of their gender and locale, 11.7% and 20% were found to have low and high level of practice of constructivist teaching-learning approach respectively.
- Among the social science teachers, irrespective of their gender and locale, 6.7% and 29.2% were found to have low and high level of practice of constructivist teaching-learning approach respectively.
- On the whole, it was found that out of all the elementary school teachers teaching different subjects, maximum number of science and social science teachers rarely practiced constructivist teaching-learning approach.
- On the whole, it was found that out of all the elementary school teachers teaching different subjects, the maximum number of mathematics and English teachers moderately practiced constructivist teaching-learning approach.

From the observation of the classroom practices of the teachers it was found that:

- Concept mapping and inquiry approach to teaching were not found to be practiced by any mathematics teacher.
- Asking students to memorise information, explanation and solving text book sums were found practicing by all the mathematics teachers.
- Among the mathematics teachers, more female teachers were found asking students to solve sums on the board than their male counterparts.
- Very few mathematics teachers were found encouraging brainstorming; female teachers were found practicing this method more than male teachers.
- Majority of the mathematics teachers were found giving examples outside the text book. Further, more male teachers were found giving examples outside the text book than their female counterparts.
- The number of mathematics teachers evaluating the students at the end of the lesson was very low.
- English teachers were found asking questions to the students.
- Female teachers teaching English were found discussing and using oral translation more than the male teachers.
- None of the English teachers were found using audio-visual aids, collaborative learning and inquiry approach.
- None of the male English teachers were found practicing explanation in their classroom. Recitation was practiced more by female teachers.
- None of the science teachers was found using anchored instruction, audio-visual aids, collaborative learning, concept mapping, experimentation, and inquiry approach while teaching in the class rooms.
- Brainstorming was not practiced by rural male science teachers at all. Some rural female science teachers were found practicing brainstorming.

- Majority of science teachers were found practicing explanation as a tactic of teaching.
- Elaboration on the topics was hardly followed by the science teachers.
- None of the science teachers were found evaluating after delivering the lesson.
- Majority of the science teachers were found giving examples outside the text book.
- Majority of the science teachers were found using locally available resources for their teaching.
- All the science teachers were found solving text book sums.
- The tactics of asking questions, explanation, use of pictures, charts and maps, and text book materials were found to be adopted by majority of the social science teachers.
- The use of concept mapping was hardly practiced by social science teachers.
- Discussion as a tactic of teaching was practiced by majority of social science female teachers.
- It was found that collaborative learning and inquiry approach were not adopted by any of the teachers teaching social science. However, textbook materials were used by all the teachers.

Comparison of Knowledge, Attitude and Practices of Elementary School Teachers teaching different subjects in Mizoram relating to Constructivist Teaching-Learning Approach

- It was found that all the teachers teaching the four subjects were having more or less similar knowledge about constructivist teaching-learning approach.
- Mathematics teachers were found to have better positive attitude towards constructivist teaching-learning approach in comparison to science teachers. Similarly, social science teachers were found to have better positive attitude towards constructivist teaching-learning approach in comparison to English

teachers. The other groups were found to have more or less similar attitude about constructivist teaching-learning approach.

- From the responses of the teachers, it was found that all the teachers teaching the four subjects were having more or less similar practices about constructivist teaching-learning approach in their classrooms. However, variations were observed during observations.

Differences in the Knowledge, Attitude and Practices of Elementary School Teachers in Mizoram relating to Constructivist Teaching-Learning Approach with reference to their Locale; and Gender

- Both urban and rural elementary school teachers in Mizoram were found to have more or less similar knowledge on constructivist approach to teaching-learning.
- Both male and female elementary school teachers in Mizoram were found to have more or less similar knowledge on constructivist approach to teaching-learning.
- Urban teachers were found to have better positive attitude than rural teachers toward constructivist teaching- learning approach.
- Both male and female elementary school teachers in Mizoram were found to have more or less similar positive attitude toward constructivist approach to teaching-learning.
- Both urban and rural elementary school teachers in Mizoram were found to have more or less similar practices on constructivist approach to teaching-learning.
- Both male and female elementary school teachers in Mizoram were found to have more or less similar practices on constructivist approach to teaching-learning.

Nature and Extent of Relationship among Knowledge, Attitude and Practices of Elementary School Teachers in Mizoram relating to Constructivism as a Teaching-Learning Approach

- Positive and significant relationship was found between knowledge on constructivist approach to teaching and attitude of elementary school teachers to adopt it in class room practices among the elementary school teachers in Mizoram.
- Positive and significant relationship was found between knowledge of the elementary school teachers on constructivist approach to teaching and their practices in the class rooms.

- Positive and significant relationship was found between attitude of the elementary school teachers towards constructivist approach to teaching and their practices in the class rooms.

Differences in the Relationship between Knowledge and Attitude of Elementary School Teachers teaching different subjects in Mizoram relating to Constructivism as a Teaching-Learning Approach

- It was found that there was no significant difference in the correlation coefficients between Knowledge on constructivism as an approach to teaching-learning and the attitude of the four groups of elementary school teachers teaching different subjects to adopt it in the class room practices. The correlation coefficients between knowledge and attitude of different groups of teachers teaching different subjects were found to be more or less similar.

Constraints of Elementary School Teachers in Mizoram in adopting Constructivist Teaching-Learning Approach

- All the teachers teaching the four subjects- mathematics, English, science and social science viewed that the headmasters used to give the teachers freedom to practice their own teaching strategies while teaching; allow them to use audio-visual aids to supplement their teaching; headmasters made proper use of funds meant for buying teaching aids and necessary instructional tools; teachers used to assign project works to their students; teachers used to appreciate when their students ask questions in the classrooms; teachers would like to know more about constructivism, and they realized that constructivism would influence better teaching-learning among students.
- Majority of the teachers teaching the different subjects viewed that they were given the freedom to take their students to visit museums, zoos, etc. as part of the teaching-learning process. However, a considerable number of teachers were of the view that they were never given the freedom to take their students to visit museums, zoos, etc, as part of the teaching-learning process.
- Majority of the teachers were found to make use of maps, globes, flashcards, pictures and models in their classroom teaching.
- Majority of the teachers were trained.
- Majority of the teachers revealed that there were no projectors in the school.

- Majority of the teachers teaching the different subjects were found to have no idea about constructivism.

Suggestions for Effective Adoption of Constructivist Teaching-Learning Approach by the Elementary School Teachers

- Emphasis should be given both in pre-service and in-service training of teachers on constructivist approach to teaching-learning.
- Teacher education programmes, particularly syllabus, need to be redesigned focusing on child centered pedagogy.
- During training teacher trainees should be taught in a way that reflects constructivist approach to teaching-learning.
- During training emphasis should be given to use interdisciplinary approach so that they can see the interrelationships that occur naturally in a real world.
- During training emphasis should be given to use instructional strategies/tactics like collaborative learning, discussion techniques, inquiry approach, problem-solving, assessment etc so that teachers witness for themselves how these strategies/tactics serve as important vehicles for teaching different subjects.
- In-service training should focus on teachers' thinking on traditional approach to teaching-learning and constructivist approach to teaching-learning and bringing change in their thought, attitude and practice.
- Teachers should be trained how to;
 - Prompt students to formulate their own questions;
 - Allow the students to have multiple interpretations and expressions of learning;
 - Relate new information to prior knowledge;
 - Encourage learners' autonomy and initiatives;
 - Make use of primary sources and physical materials;
 - Encourage group work;
 - Use their peers as resources (collaborative learning);
 - Allow student responses to drive lessons;
 - Inquire about students' understandings of concepts before sharing their own understandings of those concepts;
 - Encourage students to engage in dialogue both with the teacher and one another;

- Encourage students inquiry ability by asking thoughtful and open-ended questions and encouraging them to ask questions to each other;
 - Nurture students' natural curiosity;
 - Help students in restructuring prior knowledge;
 - Help students learn to transfer their learning in different situations;
 - Help students to aim towards understanding rather than memorization;
 - Help learners to engage in self-regulation and being reflective;
 - Help students to set their own learning goals;
 - Help students to know how to correct errors etc.
- An important aim of education is to link the school to the community. In this regard, teachers should give opportunities to students for social participation.
 - People learn best when they participate in activities that are perceived to be useful in real life and are culturally relevant. Hence, teachers should give opportunities to students to participate in cultural events.
 - Research findings show that children learn best when their individual differences are taken into consideration. As such, teachers should create motivation with the learners by keeping in mind their developmental characteristics and individual differences.
 - In the schools, groupings students according to their ability should be avoided as it gives the wrong message that ability is valued more than effort.
 - In the school, cooperation among the students should be encouraged rather than competition because competition encourages students to work alone to achieve high grades but tend to give the message that ability is more valued. It may kill the intrinsic motivation of other weak students.
 - Teachers should assign innovative and interesting tasks to the students at the appropriate level of difficulty taking note of individual differences that challenge their curiosity and higher order thinking skills.
 - Teachers in a school should share their ideas in planning, and implementing their day to day academic activities in collaborative manner.
 - Freedom and opportunities for teachers should be given to participate in decision making relating how effectively they can transact their lessons to attain both immediate and ultimate objectives.
 - Teachers should try out various innovative tactics in developing concepts among the students in their classrooms.

- Schools should be provided with computers and projectors and training should be given to teachers on how to use them

Educational Implications

Teacher and student engagement is significant in the classroom because it has the power to define whose knowledge will become a part of school-related knowledge and whose voices will shape it. According to NCF 2005, the role of teachers is to provide a safe space for children to express themselves, and simultaneously to build in certain forms of interactions.

There are many approaches to teaching from constructivist perspective, but very few are adopted in the classrooms. There is a need to overcome this backwardness by improving teacher education programme. NCF 2005 advocates learning for construction of knowledge and has suggested the teaching of different subjects accordingly. The teaching of Mathematics should be based on mathematisation (ability to think logically, formulate and handle abstractions) rather than ‘knowledge’ of mathematics (formal and mechanical procedures). It should enhance children’s ability to think and reason, to visualise and handle abstractions, to formulate and solve problems. In the teaching of Science, the content, process and language of science teaching must commensurate with the learner’s age-range and cognitive reach. Teaching should engage the learners in acquiring methods and processes that will nurture their curiosity and creativity, particularly in relation to the environment. Science teaching should be placed in the wider context of children’s environment to equip them with the requisite knowledge and skills to enter the world of work. The teaching of English should ensure language skills- speech and listening, reading and writing- cut across school subjects and disciplines. Their foundational role in children’s construction of knowledge right from elementary classes through senior secondary classes needs to be recognised. Similarly, Social science teaching content needs to focus on conceptual understanding rather than lining up facts to be memorised for examination, and should equip children with the ability to think independently and reflect critically on social issues.

Educational planners are required to take cognizance of the scenario and plan the educational system of the country so that the teacher educators and teachers are thoroughly trained to impart proper learning that leads to the construction of

knowledge. For effective learning to take place, it requires the active and constructive involvement of the learner. So it is a challenge for educators to generate creative, challenging and interesting environments that will promote the active involvement of students. This can be achieved by presenting students with hands-on activities, such as experiments, observations, projects, etc. It is essential for the teachers to ensure that classrooms are devoid of situations where the students are inactive, unreceptive and passive listeners for long periods of time. Therefore, the syllabi/curriculum of different levels of education should be planned and designed keeping in mind the age and ability level of students. Administrators have to see that the designed schemes are properly implemented to achieve the ends.

When we talk of teachers' knowledge, attitude and practices in the present research, it implies that sufficient knowledge or awareness about constructivism is likely to garner correct and positive attitude towards it, which is likely to foster the effective utilization of different tactics and approaches by the teachers in their classrooms. If teachers would lack the knowledge of constructivism they cannot be expected to develop positive attitudes towards it nor have the ability to practice it. Hence, it is important to develop proper awareness among the teachers about constructivism.

The current model of teacher education should be revamped to meet the needs of the changing times. Teacher education should be learner- centric, flexible, recognise learners' autonomy, provide scope for multidisciplinary with multiple and divergent exposure, multifarious and continuous lifelong learning. Both pre-service and in-service teacher education programmes should be organized for creating necessary awareness and developing skills required by the teachers.

Constructivist teachers are considered to be facilitators and guides who provide ample opportunity to the learners to control their own learning. In this context, Sri Aurobindo has recorded "*the first principle is that nothing can be taught. The teacher is not an instructor or task master; he is a helper and guide. His business is to suggest and not to impose. He does not actually train the pupil's mind, he only shows him to perfect his instruments of knowledge and helps and encourages him in the process. He does not impart knowledge to him; he shows him how to acquire knowledge for himself. ...*". These ideals imply that the task of teachers is to build

circumstances for students to assume important roles in their learning, to interact and relate with each other, to communicate their opinions and to appraise other students' arguments. Similarly, students have to be active, critical and industrious learners, respect their teachers and fellow students, perform their duties and co-operate with one another and learn to work in groups for the greater good of all.

Limitations of the Study

The investigator had tried to be scientific and objective in the process of investigation. However the study contains the following limitations:

- The sample of the study was limited 480 teachers, 120 teaching each of the four key subjects: mathematics, English, science and social science. Out of the 120 teachers teaching specific subjects, as mentioned, 60 were males and 60 were females and among them, 30 were from urban schools and 30 were from rural schools.
- The samples were selected from Mizoram state only.
- For the collection of data no standardized tool was used. All the tools were developed by the investigator which might have some defects.
- All the tools were self-reporting ones. Administration of self-reporting tools assume that while taking the tools the respondents will be honest, sincere and will interpret the same meaning of the items as the authors of the tools do. This could not be judged objectively.
- Due to lack of resources the investigator might not have gone through all relevant literature and research studies on this broad concept.

Concluding Remarks

For any educational system to be successful the relationship between the teacher and taught has to be cordial and pleasant. Since education plays a major role in promoting national development in all its ramifications, every country develops its system of education to express its unique socio-cultural identity and also to meet the challenges of the times. As such, teachers remain important and indispensable, and are undoubtedly responsible for the progress of the nation as a whole. Given that educational institutions are fundamental to any society, the teachers are the pivots to any such institutions- school, college or university. Hence, the choice of teaching

approaches, tactics and strategies adopted by the teachers will determine the kind of learners that are being prepared for the future.

Adopting a constructivist perspective, teaching becomes a vigorous, vibrant and social process of making sense of experiences, by involving enjoyable activities and opportunities to examine problems from a multiplicity of perspectives, and also by cooperating with each other. Contrary to criticisms by traditional educators, the role of the teacher is very demanding. Constructivism modifies that role so that teachers can help students to construct knowledge rather than reproduce a series of facts. It is desirable to create life-long authentic learners who can make use of their prior experiences and knowledge for the construction of new ones. As such, constructivist teachers are expected to have such skills in assisting learners.

John Dewey has enumerated “ *the more a teacher is aware of the past experiences of students, of their hopes, desires, chief interests, the better will he understand the forces at work that need to be directed and utilized for the formation of reflective habits*”. Dewey elaborated further by writing, “*The teacher is a guide and director, he steers the boat but the energy that propels it must come from those who are learning.*”

According to Montaigne, a French philosopher “ *a tutor should not be continually thundering instruction into the ears of his pupil, as if he was pouring it through a funnel, but, after having, put the lid, like a young horse, on a trot before him, to observe his paces, and see what he is able to perform, should according to the extent of his capacity, induce him to taste, to distinguish, and to find out things for himself, sometimes opening the way, at other times leaving it for him to open*”.

Constructivist teachers serve as facilitators rather than experts by creating atmosphere where students invent their own constructs or solutions by thinking critically, become actively involved in defining questions in their own language and work out answers competently instead of mechanically receiving and reproducing materials presented by the teacher or the textbook.

Our schools today need more teachers who can engage students in activities that bring tremendous richness to the classroom processes. Without doubt, this will require teachers to engage in planning, organising, preparing and administering

activities. Teachers will have to make efforts to set up the classroom culture for activities and to institute the rules that will direct the space and use of resources. As teachers have to be trained how to teach from a constructivist point of view, similarly enlightening students to be successful learners is an essential concern in establishing environments favourable to useful scholarship. We can achieve these by reflecting on one of the important quotes of Piaget which reads: *“The principle goal of education is to create men who are capable of doing new things, not simply of repeating what other generations have done - men who are creative, inventive and discoverers”*.

Students are the future of our society. At present there is tough competition every where to find a place in the job market and to get a scope to earn livelihood. Mizoram, being a small state and predominantly inhabited by tribal people, should not deprive a single child from getting quality education. All maladies should be addressed by appropriate organisations and all concern should extend cooperation for this purpose. If right steps are not taken at right time, Mizoram may lose its present status of one of the first developing states of the country.

REFERENCES

Abd Hamid, Nor Hashidah (2006). *Analysis of Changes in Teachers Concerning Constructivist Perceptions, Philosophies, and Practices Resulting From the Year – Long Iowa Chautauqua Professional Development Project*. Ph.D., The University of Iowa. 153 pp. Dissertation Abstracts International, Vol. 67 No. 8 February.

Afolabi, F. (2009). *Constructivist Problem Based Learning Technique and the Academic Achievement of Physics Students with Low Ability Level in Nigerian Secondary Schools*. EJPCE, Vol.1,No.1,2009. DOR: 8/6/2016.

Agarwal, R. (2010). *Enriching the Elementary Education with Constructivistic Approach*. AIERJournal. (available online on [www.ejournal.aiaer.net,vol.22,no.1,june 2010](http://www.ejournal.aiaer.net/vol.22,no.1,june2010)).

Akbar,H., & Yildirim,A. (2009). *Change in Teacher Candidates' Metaphorical Images about Classroom Management in a Social Constructivist Learning Environment*. Teaching in Higher Education,Vol.14, Issue 4,2009. Web of Science. DOR: 8/6/2016.

Alam (1997). *Effectiveness of Inductive Thinking and Inquiry Training Models of Teaching Biology to Secondary School Students*. Ph.D., Edu., Jamia Millia Islamia.

Aldridge et al (2000). *Constructivist Learning Environments in a Cross-National Study in Taiwan and Australia*. International Journal of Science Education, Vol.22, No.1, pp. 37-55.

Ali Abdi (2014). *The Effect of Inquiry-Based Learning Method on Students' Academic Achievement in Science Course*. Universal Journal of Educational Research, 2, pp. 37-41. Horizon Research Publishing, USA.

Anwar, K. (2015). *A Constructive Teaching Model in Learning Research Concept for English Language Teaching Students*. International Education Studies, Vol.8,No.5, pp 62-68. Canadian Center of Science and Education. Also available at <http://dx.doi.org/10.5539/ies.v8n5p62> DOR: 8/6/16.

Ayishabi, T.C. (1996). *Teaching of Zoology through Concept Attainment Model at the Plus-Two Level: An experimental study*. Journal of Indian Education, Vol.21 (4), pp. 65-70. Also available in Indian Educational Abstracts, 3, 1997.

Bawa (1991). *Conceptual Learning and Research Possibilities: Bruner's View*. In M.B.Buch (Ed), Fifth Survey of Educational Research, Vol.I, NCERT, 1988-92, New Delhi, pp. 1403.

Bhattacharya, G.C. (1985). *Effectiveness of Various Models for Teaching Geography in Relation to Institutional Resources*. Ph.D., Education. Banaras Hindu University. Also available in Indian Educational Abstracts 4, January 1998.

Bhattacharjee, J. (2015). *Constructivist Approach to Learning- An Effective Approach of Teaching-Learning*. International Research Journal of Inter-Disciplinary & Multidisciplinary Studies (IRJIMS), Vol-1, Issue VI, July 2015, pp. 65-74. Scholar Publications, Karimganj, Assam, India.

Buddhisagar (1987). *Development and Comparison of Instructional Materials Developed by Using Advance Organiser Model and Operant Conditioning Model for Teaching Educational Psychology to B.Ed Students*. In M.B.Buch (Ed), Fourth Survey of Research in Education, Vol.II, NCERT, 1991, New Delhi, pp.769-770.

Bhairagya ,S.S, Ghosh, S.K & Mete, J.(2005). *A Study on Relative Effectiveness between Concept Attainment Model and Traditional Method of Teaching in Economics*. Indian Educational Abstracts.Vol.6, No.1, pp.17-18.

Bhattacharya (1985). *Effectiveness of Various Models for Teaching Geography in Relation to Institutional Resources*. Ph.D., Edu., Banaras Hindu University.

Bruce Joyce & Martha Weil (1980). *Models of Teaching*. Prentice-Hall, inc., New Jersey 07632.

Bhaveja (1989). *The Effectiveness of the Information-Processing Models of Teaching*. In M.B.Buch (Ed), Fifth Survey of Educational Research, vol.I, NCERT, 1988-92 , New Delhi, pp. 1403-1404.

Bhaveja (1989). *Information-Processing Models of Teaching in the Indian Classroom*. In M.B.Buch (Ed), Fifth Survey of Educational Research, vol.I, NCERT, 1988-92 , New Delhi, p.1404.

Bimbola, O., & Daniel, O.I. (2010). *Effect of Constructivist Based Teaching Strategy on Academic Performance of Students in Integrated Science at the Junior Secondary School Level*. Educational Research and Reviews Vol.5 (7), pp. 347-353. Also available online at <http://www.academicjournals.org/ERR2> D.O.R: 8/6/2016

Cambridge Advanced Learner's Dictionary.

Carr (2004). *Using Reflective Practice and Constructivist Learning Design in Washington State Private Parochial Schools to Provide Support for Student Learning*. Ed.D., Seattle University, pp.179. Dissertation Abstracts International Vol.66.No.6.

Chan et al. (1992). *Constructive Activity in Learning from Text*. American Educational Research Journal. Vol.29, No.1, pp.97-118.

Chaudhury (1989). *Teaching of Concepts through the Concept Attainment Model and Facts through Traditional Teaching: Competency in Teaching Skills of Pre-Service Teachers*. In M.B.Buch (Ed), Fifth Survey of Educational Research, Vol.I, NCERT, 1988-92, New Delhi, pp. 1405.

Chaudhari et al. (1999). *Effect of Synectics Model(SM), Gaming Strategy and Traditional Method upon Self-Concept, Creativity and Achievement*. Perspectives in Education, Vol.15(1), pp. 25-34.

Chaney, Tammy Kaye (1995). *Design and Implementation of a Constructivist Instructional Model to Support Teacher Change: A Case Study*. Ph.D. Indiana University, 1995, pp.282. Dissertation Abstracts International Vol .57 No. 1 July 1996.

Child, Dennis (2004). *Psychology & the Teacher*. 7th Edition, Continuum, London, New York, p.123.

Cherry, K (2014). *What is Humanistic Psychology?* Available at About.com.D.O.R: 8/3/16.

Cherry, K (2015). *What is Cognitive Psychology?* Available at About.com.D.O.R: 8/3/16.

Cherry, K (2015). *What is Behaviourism?* Available at About.com.D.O.R: 8/3/16

Cornu, R Le; & Peters, J. (2005). *Towards Constructivist Classrooms: The Role of the Reflective Teacher*. Journal of Educational Enquiry, Vol.6,No.1, pp. 50-61.

Davis et al (1993). *Transitions from Objectivism to Constructivism in Science Education*. International Journal of Science Education, Vol.15, No.6, pp. 627-636.

Duffy & Cunningham (2010). *Constructivism: Implications for the Design and Delivery of Instruction*.(1:\constructivism(18aug2010)\).D.O.R: 18/8/10.

Donald P. Kauchak & Paul D. Eggen (1998). *Learning and Teaching (research-based methods)*, Allyn and Bacon, MA 02194.

Dewey, J. (1910). *How We Think*. Lexington,MA: D.C.Heath& Co. Available at en.wikipedia.org/wiki/dewey.D.O.R:1/11/14.

Deoghare, P and Wanjari, S. (2013). *A Study of Concept Understanding Ability of Students Using 'Self Guided Learning Method' and 'Teacher Guided Learning Method' Exposed to the Constructivist Approach*. (Available online on www.ijbar.impactfactor.org International Journal of Basic and Advanced Research, 2013 ; 2 (4); 72 -80 ISSN: 2278 – 7143)

Dogra, B. (2010). *Recent Curriculum Reform in India and Constructivism. Constructivist Classroom Activities for Biology Learning*. Journal of Indian Education, Vol,XXXVI,No.2, Published by, The Head, Publication Deptt, NCERT, New Delhi-110016.

Erdogen (2006). *The Effect of Different Levels of Constructive Teaching Practices on Teacher Question Asking Behaviors*. Ph.D.,The University of Iowa, pp. 266. Dissertation Abstracts International Vol. 68 , No.1 .

Fox, L. (1969). *Effecting the Use of Efficient Study Habit*. Journal of Mahetri, 1962: pp.75-76.

Garrison (1995). *Deweyan Pragmatism and the Epistemology of Contemporary Social Constructivism*. American Educational Research Journal.Vol.32, No.4, pp. 716-740.

Greeno (1997). *Theories and Practice of Thinking and Learning to Think*. American Journal of Education, Vol.106, The University of Chicago.

Gupta, H.O. (2000). *Constructivist Learning In School Settings. A constructivist Enquiry Learning Model for Science Education*. Indian Educational Review, Vol.36.No.2.

Gupta (1995). *A Study of Relative Effectiveness of some Information Processing Models of Teaching on Mental Process and Attitude towards Science*. Indian Educational Review, Vol.30 (2), pp. 156-161.

Gupta, N.K (1995). *A Study of Relative Effectiveness of some Information Processing Models of Teaching on Mental Process and Attitude towards Science*. Indian Educational Review,Vol.30(2),pp. 156-161. Also available in IEA, 2, January 1997.

Gupta (1991). *Effectiveness of the Advance Organiser Model of Ausubel's In Developing the Teaching Competence of Student-Teachers, and their Attitude towards Teaching: An Experiment*. In M.B.Buch (Ed), Fifth Survey of Educational Research, Vol.I, NCERT, 1988-92, New Delhi, pp. 1407-1408.

Gutherie et al. (2004). *Increasing Reading Comprehension and Engagement through Concept-Oriented Reading Instruction*. Journal of Educational Psychology, 96(3), pp.403-423.

Hmelo –Silver, Duncan, & Chinn (2007). *Scaffolding and Achievement in Problem-Based and Inquiry Learning: A Response to Kirschner, Sweller, and Clark (2006)*. Educational Psychologist,42(2),pp. 99-107.

Holt-Reynolds, D. (2000). *What Does the Teacher Do? Constructivist Pedagogies and Prospective Teachers' Beliefs about the Role of a Teacher*. *Teacher And Teacher Education*, 16, pp.21-32. 1999 Elsevier Science Ltd. Pergamon

IGNOU (2010). *Educational Evaluation*, ES-333. IGNOU, New Delhi.

Jaimini (1991). *Effect of Teaching Strategies on Conceptual-Learning Efficiency and Retention in Relation to Divergent Thinking*. In M.B.Buch (Ed), *Fifth Survey of Educational Research*, Vol.I, NCERT, 1988-92, New Delhi, pp. 1408.

Janine A. Kaste (2004). *Scaffolding through Cases: Diverse Constructivist Teaching in the Literary Method Course*. *Teacher and Teacher Education*, Vol.20, pp. 31-45.

James, A. (1999). *Construction of Mathematical Knowledge: Constructive Perspective: An Analysis*. *Perspectives in Education*, Vol.15, No.2, pp.87-96.

Joshi & Patra (1993). *Impact of Concept Attainment Model on General Mental Ability*. *Research Bulletin -Maharashtra State Council of Education Research and Training*, Vol.xxiii (1&2), IAE ,pp. 21-23.

Kablan, Z.,& Kaya, S. (2014). *Preservice Teachers' Constructivist Teaching Scores based on their Learning Styles*. *Australian Journal of Teacher Education*. Vol, 39, Issue 12, pp. 66-73. Also available at <http://ro.ecu.edu.au/ajte/vol39/iss12/5>

Kalpana, T. (2014). *A Constructivist Perspective on Teaching-Learning: A Conceptual Framework*. *International Research Journal of Social Sciences*, Vol.3(1),pp.27-29. DOR: 9/6/16.

Kathuria (1984). *The Effect of Teacher Led, Self Learning, Peer Group Discussion and Mass Media Approaches of Teaching Population Education to Classes IX and X on Knowledge, Attitudes and Beliefs of the Students about Population Explosion in India*. In M.B.Buch (Ed), *Fourth Survey of Research in Education*, vol.II, NCERT, 1991, New Delhi, pp.1026-1028.

Kaur (1991). *Effectiveness of Bruner and Ausubel Models for Teaching of Concepts in Economics to High and Low Achieving Students Across Creativity Levels*. In M.B.Buch (Ed), Fifth Survey of Educational Research, Vol.I, NCERT, 1988-92, New Delhi, pp.1410-1411.

Kaushik (1988). *The Long-Term Effect of Advance Organisers upon Achievement in Biology in Relation to Reading Ability, Intelligence and Scientific Attitude*. In M.B.Buch (Ed), Fifth Survey of Educational Research, Vol.I, NCERT, 1988-92, New Delhi, pp.1411-1412.

Khader (2005). *Learner as a Constructor of Knowledge in an Enabling Context*. Journal of Indian Education, NCERT, Vol.31, No.3., pp. 5-18.

King, A. (1994). *Guiding Knowledge Construction in the Classroom: Effects Of Teaching Children How to Question and How to Explain*. American Educational Research Journal, Vol.31, No.2, pp.338-368.

Kim, Jong Suk (2005). *The Effects of a Constructivist Teaching Approach on Student Academic Achievement, Self-Concept, and Learning Strategies*. Asia Pacific Education Review, 6(1), pp. 7-19.

Kulkarni (1991). *The Use of Drama in Improving the Teaching-Learning Process*. In M.B.Buch (Ed), Fifth Survey of Educational Research, Vol.I, NCERT, 1988-92, New Delhi, pp.1412-1413.

Kumar B.B. (1994). *Higher Education in Northeast India*. Omsons Publications, Rajouri Garden, New Delhi-110027.

Kumar & Kaur (1998). *Effectiveness of Inquiry Training Model in the Development of Process Skill in Geography in Relation to Cognitive Style and Personality Types*. Journal of Indian Education, Vol.24 (2), pp. 42-48.

Libman, Z. (2010). *Integrating Real-Life Data Analysis in Teaching Descriptive Statistics: A Constructivist Approach*. Journal of Statistics Education, Vol.18, No.1.

Available at www.amstat.org/publications/jse/v18n1/libman.pdf. DOR: 8/6/16.

Li, Lei & Guo, R (2015). *A constructivism Approach to Promote Student Engagement*. Journal of Instructional Pedagogies, Vol.15. Also available at <http://www.aabri.com/copyright.html> DOR: 8/6/16.

Mahajan (1992). *A Comparative Study of the Effectiveness of Two Models of Teaching, Viz, Bruner's Concept Attainment Model and Ausubel's Advance Organiser Model*. In M.B.Buch (Ed), Fifth Survey of Educational Research, Vol.I, NCERT, 1988-92, New Delhi, p.1414.

Manocha (1991). *The Development of Textual Material in Biology for Class IX Using Bruner's Concept Attainment Model of Teaching*. In M.B.Buch (Ed), Fifth Survey of Educational Research, VOL.I, NCERT, 1988-92, New Delhi, p.1417.

Mangal, S.K. (1999). *Advanced Educational Psychology*. Prentice-Hall Private Limited, New Delhi-110001.

Mehra, V. & Mondal, H.R. (2005). *Effects of Peer Tutoring on Learning Outcomes of High School Science Students*. Indian Educational Abstracts. Vol.6 No.1, pp.56-58.

Mehar, Dr. A & Singh, P (2014). *Effect of Concept Mapping Strategy on Achievement in Biology in Relation to Attitude towards Biology*. New Frontiers in Education. Vol.47, No.1, pp. 64-74.

Mehmet (2006). *The Influence of Computer – Supported Instruction (CSI) on the Principles of Constructivist Pedagogy in the Social Studies Curriculum*. Ph.D., The Ohio State University, pp. 215. Dissertation Abstracts International Vol. 67 No. 7.

Mishra, J (1998). *Learning Styles in Relation to Information Processing Models and Multiple Talents*. Psycho-lingua, Vol.XXVIII(1), pp.7-18.

Mishra, P.K. (2014). *Teaching Social Science through Constructive Approach at Secondary Level*. A Journal of Education for Teachers Empowerment in the Era of Knowledge Application (TEEKA), Vol.3, No.1&2, pp.89-96.

Mogashoa, T. (2014). *Applicability of Constructivist Theory in Qualitative Educational Research*. American International Journal of Contemporary Research. Vol.4,No.7.Center for Promoting Ideas, USA. Available at www.ajjernet.com DOR: 8/6/16.

Mukherjee, R (1993). *Teaching of English Composition through Concept Organisation*. Ph.D.,Education. Visva-Bharati.

Mujibul Hasan Siddiqui & Mohd. Sharif khan (2004). *Models of Teaching-Theory and Research*. Ashish Publishing House, New Delhi-110026.

Mujibul Hasan Siddiqui (2008). *Encyclopaedia of Education*.Vol.1. *Models of Education*. APH Publishing Corporation, New Delhi.

Nayar, R. K. & Senapathy, H.K. (2009). *Effect of Constructivist Approach in Fostering Creativity of Primary School Children*. Journal of Indian Education. VOL.XXXVII, NO.3, November 2011, pp. 85-93.

Neo, M., & Neo, T,-K (2009). *Engaging Students in Multimedia-Mediated Constructivist Learning-Students' Perceptions*. Educational Technology & Society, 12 (2), pp. 254-266.

NCERT (2005). National Curriculum Framework-2005.New Delhi.

Oxford (1997). *Constructivism: Shape-Shifting, Substance, and Teacher Education Applications*. Peabody Journal of Education.Vol.72,No.1. Teacher and Teacher

Education in the United States: Perspective from members of the Japanese-United States Teacher Education Consortium (1997), pp. 35-66. (Also available at :<http://www.jstor.org/stable/1493260>) D.O.R: 18.8.10.

Ongowo, Richard O. (2013). *Constructivist Learning Environment (Secondary School Teachers' Perceptions of Biology Constructivist Learning Environment in Gem District, Kenya.)* Retrieved at www.soeagra.com/ijert/ijertjune2013/1.pdf, D.O.R: 6/12/2013.

Padhi, J.S. (1996). *Effect Of Competency-Based, Activity -Centred Approach To Teaching On Attainment Of Mastery Level Learning In Environmental Studies.* In Studies on Classroom Processes and School Effectiveness at Primary stage. NCERT. Indian Educational Abstracts,6,January 1999.

Panda, B.B. (1994). *Effect of Advance Organiser and Set Induction on Learning.* *Experiments In Education*, Vol.XXII(9), pp.194-100. Also available in Indian Educational Abstracts, 3,July 1997)

Panda, B.N. (1996). *Effect of Activity-Based–Cum-Evaluation Strategy on Child Achievement and Retention.* In studies on classroom Processes and school effectiveness at Primary stage. NCERT. Also available in Indian Educational Abstracts,6,January 1999.

Pandey (1986). *Effectiveness of Advance Organiser and Inquiry Training Models for Teaching Social Studies to Class VIII Students.* In M.B.Buch (Ed), Fourth Survey of Research in Education, Vol.II, NCERT, 1991, New Delhi, pp. 1037.

Panda (1994). *Effect of Advance Organiser and Set Induction on Learning.* *Experiments in Education* , Vol.XXII (9), pp.194-199.

Parida et al. (2011). *Less Familiar Pathways in Constructivism.* Indian Educational Review, Vol.48, No.1, NCERT, pp.111-126.

Patil (1995). *A Comparative Study of the Effectiveness of Inductive Thinking Model and Concept Attainment Model for Teaching Marathi Grammar to Class VII Students*. Ph.D., Edu. Shreemati Nathibai Thackersey Women's University.

Patnaik & Mohanan (1993). *Achievement in History: Effect of Advance Organiser*. Journal of Indian Education, Vol.19 (2), pp. 37-42.

Panda (1996). *Effect of Activity-Based-Cum Evaluation Strategy in Child Achievement and Retention*. In Studies on Classroom Processes and School Effectiveness at Primary Stage. NCERT. Indian Educational Abstracts, Vol.6, January 1999.

Padhi (1996). *Effect of Competency-Based Activity -Centred Approach to Teaching on Attainment of Mastery Level Learning In Environmental Studies*. In Studies on Classroom Processes and School Effectiveness at Primary Stage. NCERT. Indian Educational Abstracts, Vol.6, January 1999.

Pandey (1981). *Teaching Style and Concept Attainment in Science*. In M.B.Buch (Ed), Third Survey of Research in Education, NCERT, 1987, New Delhi.

Pirie & Kieren (1992). *Creating Constructivist Environments and Constructing Creative Mathematics*. Educational Studies in Mathematics 23, 1992 Kluwer Academic Publishers. Printed in the Netherlands. pp.505-528.

Prabha, S. (2005). *To Study the Change of Conceptual Structures Pertaining to Reflection and Refraction through Concept Mapping of the Students of Class X*. Indian Educational Abstracts.Vol.8 No.2,pp. 49-50.

Prabha (2010). *Characteristics of a Constructivist Classroom in the Context of Science Education*. Journal of Indian Education.Vol.XXXVI, No.1.NCERT. pp. 20-28.

Ramesh Dhar Dwivedi (2010). *From Behaviorism to Constructivism: A Paradigm Shift In Teaching- Learning Process*. University News,48(07) February 15-21,2010

Roustae, R., Kadir, S. Abd., Asimiran,S. (2014). *A Review of Constructivist Teaching Practices*. Middle-East Journal of Scientific Research 19 (Innovation challenges in multidisciplinary research & practice), IDOSI Publications, pp. 145-152.

Rout, S., & Behera,S .K. (2014). *Constructivist Approach in Teacher Professional Development: An Overview*. American Journal of Educational Research, Vol.2 (12A),pp. 8-12. Pubs.sciepub.com DOR: 9/6/16.

Satya Prakas & Patnaik (2005). *Effect of Co-Operative Learning on Development of Process Skills in Biology*. Ram –Eesh Journal of Education, Vol.2 (1), pp. 22-26.

Savasci (2006). *Science Teacher Beliefs and Classroom Practices Related to Constructivist Teaching and Learning* .Ph.D., The Ohio State University, pp. 258, Dissertation Abstracts International Vol. 67 no. 7 January.

Chauhan, S.S (1987). *Advanced Educational Psychology*. Vikas Publishing House Pvt Ltd, New Delhi.

Siddiqui (2008). *Encyclopaedia of Education.Vol.1*. Models of Education. APH Publishing Corporation, New Delhi.

Senapathy & Pradhan (2005). *Constructivist Pedagogy in Classroom. A paradigm Shift*. NCERT. Journal of Indian Education, Vol.31, No.1, pp. 5-14.

Standridge, M. (2002). *Behaviorism*. In M. Orey (Ed.) *Emerging Perspectives on Learning, Teaching, and Technology*.DOR:6/11/14, from <http://epltt.coe.uga.edu>.

Swamy, A.M.Ajatha. (1995). *Effect of Inquiry Training Model of Teaching Science on Science Process Skills, Creativity and Curiosity of Secondary School*

Students. Ph.D., Education, Karnatak University. Indian Educational Abstracts,7&8,July 1999&January 2000.

Saminathan, B (1999). *Effect of Information Processing Approach on Developing Problem-Solving Ability in Physics*. Ph.D.,Alagappa University.

Saxena, A.B. (1994). *Alternative Frameworks and Addressing Conceptual Change*. Independent study, Regional College of Education, Bhopal.(ERIC funded). Indian Educational Abstracts, 2, 1997.

Shivaprakasham M.N. (2003). *Elementary Education in 21st Century*. Rajet publications, New Delhi-110002.

Sreekala E (2010): *Pedagogical Lacunae in Web Based Learning*. University News, 48(14) April 05-11, 2010.

Sixth Survey of Educational Research (1993-2000) Vol.1.

Simon & Schifter (1993). *Towards a Constructivist Perspective: The Impact of a Mathematic Teacher In-service Program on Students*. Educational Studies In Mathematics 25, pp.331-340.1993 Kluwer Academic publishers. Printed in the Netherlands.

Simon & Schifter (1992). *Assessing Teachers' Development of a Constructivist View of Mathematics Learning*. Teaching and Teacher Education, Vol.8, No.2, pp.187-197.

Sharma, S. (2001). *Constructivism- A Paradigm Shift*. Perspective in Education, Vol.17, No.2.

Sharma, S. (2008). *Constructivist Teaching in Primary Classes*. The Primary Teacher,Vol.XXXIII,No.1-2, NCERT Publication .

Satya Prakash, C.V. & Patnaik, S.P. (2005). *Effect of Co-Operative Learning on Achievement Motivation and Achievement in Biology*. Indian Educational Abstracts.Vol.6 No.1, January 2006, p.11.

Satya Prakash, C.V. & Patnaik, S.P. (2005). *Effect of Co-Operative Learning on Development of Process Skills in Biology*. Indian Educational Abstracts.Vol.6 No.1, p. 58.

S, Jayalekshmi & Pereira, C. (2013). *Assessment Practices in Constructivist Paradigm at the Higher Secondary Level in Kerala*. Journal of Indian Education, Vol. XXXVIII, No. 4, February 2013.pp.63-69.

Staub & Stern (2002). *The Nature of Teachers' Pedagogical Content Beliefs Matters for Students' Achievement Gains: Quasi-Experimental Evidence from Elementary Mathematics*. Journal of Educational Psychology, Vol.94, No.2, pp. 344-355.

Singh (1990). *Effectiveness of Inquiry Training Model and Concept Attainment Model over Traditional Teaching Methods for Teaching Physical Science*. In M.B.Buch (Ed), Fifth Survey of Educational Research,vol.I, NCERT,1988-92 , New Delhi, p.1429.

Sood (1990). *Comparison of Advance Organiser and Reception Strategies for Acquisition of Language Concepts In Relation To Cognitive Style, Intelligence and Creativity among Class IX Students*. In M.B.Buch (Ed), Fifth Survey of Educational Research,Vol.I, NCERT,1988-92 , New Delhi, pp.1430-1431.

Saminathan (1999). *Effect of Information Processing Approach on Developing Problem-Solving Ability in Physics*. Ph.D.,Edu., Alagappa University.

Saxena (1994). *Alternative Framework and Addressing Conceptual Change*. Independent study, Regional College of Education, Bhopal. ERIC Funded. Indian Educational Abstracts,Vol 2,January 1997.

Swamy (1995). *Effect of Inquiry Training Model of Teaching Science on Science Process Skills, Creativity and Curiosity of Secondary School Students*. Ph.D., Edu., Karnatak University.

Statistical Handbook of Mizoram 2014, Directorate of Economics and Statistics, Mizoram, Aizawl.

Steffe, L.P. & Kieren, T. (1994). *Radical Constructivism and Mathematics Education*. Journal for Research in Mathematics Education, Vol.25, No.6, pp.711-733.

Tynjala (1999). *Towards Expert Knowledge? A Comparison between a Constructivist and a Traditional Learning Environment in the University*. International Journal of Educational Research 31(1999), pp. 357-442.

Tichy – Reese, Michelle Lee (2006): *Constructive Controversy: A long Overlooked Path to Moral Development*. Ph.d. , University of Minnesota. pp. 69, Dissertation Abstracts International Vol. 67 No. 7 January.

Tsai, C.-C. (1999). *The Progression Toward Constructivist Epistemological Views of Science: A Case Study of the STS Instruction of Taiwanese High School Female Students*. International Journal of Science Education.

Tsai, C.-C. (2000). *Relationships between Student Scientific Epistemological Beliefs and Perceptions of Constructivist Learning Environments*. Educational Research Vol.42 No.2 summer 2000,pp.193-205.

Tuna, A& Kacar, A. (2013). *The Effect of 5E Learning Cycle Model in Teaching Trigonometry on Students' Academic Achievement and the Permanence of their Knowledge*. International Journal on New Trends in Education and their Implications Vol.4, Issue 1 or www.ijonte.org DOR: 8/6/2016.

Vaish, Renu (2004). *Self-study Skills in Learning Science at the Middle School level*. Indian Educational Abstracts. Vol.6 No.1,pp. 41-42.

Vaca James., Jr. (2010). *The Effect of Constructivist Teaching Strategies on Science Test Scores of Middle School Students*. Ed.D. Waldes University. Pp.255, Dissertation Abstracts International Vol.17 No. 10 April.

Vosniadou, S. (2004). *How Children Learn?*. In Digumarti Bhaskara Rao (ED).*Educational Practices. Research and Recommendations*. Discovery Publishing House, New Delhi. pp.1-15.

W.D.Wall (1975). *Constructive Education for Children*. Harrap the Unesco Press,Paris.

Woldab (2011). *Constructivist Didactics in Teaching Economics. A Shift in Paradigm to be Exemplary Teacher*. Journal of Indian Education, Vol.XXXVII, No.1.NCERT. pp. 87-96.

Zhu, C; Vlcke,M;&Schellens, T. (2010). *A Cross-Cultural Study of Teacher Perceptive on Teacher Roles and Adoption of Online Collaborative Learning in Higher Education*. European Journal of Teacher Education Vol.33, No.2, pp. 147-165. Routledge Taylor & Francis Group.

Constructivism(learningtheory).Available at

[http://en.wikipedia.org/wiki/constructivism_\(learning_theory\)](http://en.wikipedia.org/wiki/constructivism_(learning_theory)): D.O.R: 10/8/09

Dr. C.George Boere.Behaviorism .Available at

<http://webpace.ship.edu/cgboer/beh.html>Copyright 1998, 2000, C. George

Boeree.D.O.R: 6/11/14

TIM ELMORE.Growing Leaders.com/blog. D.O.R:1/11/14

<http://www.slideshare.net/deyoungaj/behaviorism-learning-theory>.D.O.R:6/11/1

<http://www.learningandteaching.info/learning/behaviourism.htm>.D.O.R:6/11/14

Nayak,kumar Rajendra Dr.,(2000): A Study on Effect of Constructivist Pedagogy on Students' Achievement in Mathematics at Elementary Level.

(Retrieved from www.ncert.nic.in/pdf_files/Rajendra%20Kumar%20Nayak.pdf)

Jonassen, D. H. (1999). *Constructing learning environments on the web: Engaging students in meaningful learning*. EdTech 99: Educational Technology Conference and Exhibition 1999: Thinking Schools, Learning Nation.

Jonassen, D. (1994). Towards a constructivist design model. *Educational Technology*, 34(4), 34-37. Available at <http://www.yourdictionary.com/demonstrating>. D.O.R:1/11/14

http://www.schools.ac.cy/klimakio/Themata/Anglika/conf_semin_workshops/Stories_ioannougeorgioudoloresramirez.pdf).D.O.R:1/11/14

shoresacademy.com/concept.htm.D.O.R: 1/11/14

<http://www.criticalthinking.org/pages/our-concept-of-critical-thinking/411>.D.O.R: 1/11/14

<http://philosophy.hku.hk/think/critical/ct.php>. D.O.R: 1/11/14

<http://online.sfsu.edu/rpurser/revised/pages/problem.htm>.D.O.R:1/11/14

<http://education-portal.com/academy/lesson/cooperative-and-collaborative-learning-in-the-classroom.html#lesson>.D.O.R:1/11/14

<http://zvavanhuchopper.blogspot.in/2010/10/discussion-method-of-teaching-and.html>. D.O.R: 1/11/14

http://www.ucdoer.ie/index.php/Education_Theory/Constructivism_and_Social_Constructivism .D.O.R: 6/11/14

<http://www.univie.ac.at/constructivism/EvG/papers/114.pdf>. D.O.R:6/11/14 (1710/1858; p. 122).

www.specialconnections.KU.edu/?q=instruction/cognition-strategies/teacher-tools/elaboration-strategies. D.O.R:1/11/14

APPENDICES

Appendix-A1

QUESTIONNAIRE ON AWARENESS OF SCHOOL TEACHERS ON CONSTRUCTIVIST APPROACH TO TEACHING-LEARNING

INSTRUCTION:

This questionnaire contains twenty-five statements with four alternative responses. Please read the statements and alternatives carefully and put a tick () mark in the response of your choice.

1. Constructivism to a teacher means

(zirtirtu tan constructivism hi)

a) Constructive criticism to students by teachers

(zirlaite thiam taka sawiselna)

()

b) Construction of new knowledge by the students

(hriatna leh thiamna thar zirlaiten an siam chuah)

()

c) Constructive deliberation of teachers with the students

(zirlaite nena nasa taka sawi hona)

()

d) Constructive debate among the students

(zirlaiten thiam taka an ron hnialna)

()

2. Constructivism is

(*constructivism hi*)

a) Same as behaviourism

(*behaviourism nen an in ang*)

()

b) The opposite of behaviourism

(*behaviourism a chhawn a awm*)

()

c) Secondary to behaviourism

(*behaviourism aia hniam zawk*)

()

d) Complimentary to behaviourism

(*behaviourism belhchhahtu ani*)

()

3. Constructivism is a theory of

(*constructivism in a thil chhui dawnna (rindan) chu*)

a) Knowledge

(*hriatzauna*)

()

b) Motivation

(*fuih, duhna chawk tho*)

()

c) Intelligence

(*finna, hmangchang hria*)

()

d) Personality

(*mimal thil neih, nungchang*)

()

4. Constructivism tries to explain how people

(*constructivism hian a thil hrilhfiah tum chu engtin nge mite hian...*)

a) Remember experiences

(*thil an hriatreng thin*) ()

b) Forget past experiences

(*hun hlui kalta an theihngilh thin*) ()

c) Know what they know

(*an thil hriatte hi engtin nge an hriat thin*) ()

d) Interact with each other

(*midang nen an inlawm tawn thin*) ()

5. Constructivist philosophy believes that teachers should provide

(*constructivist philosophy in a rindan chuan zirtirtute chuan henghi an pe tur ani..*)

a) Guidance only

(*inkaihhruaina chauh*) ()

b) Study materials only

(*zirna bungrua chauh*) ()

c) Scope for thinking

(*ngaihtuahna hmantir*) ()

d) Moral support

(*thiltha thlawp*) ()

6. In a Constructivist classroom students and teachers are

(constructivist classroom- ah zirlaite leh zirtirtute hi..)

a) Indifferent

(an inngaihsak lo) ()

b) Independent

(mimal thu neihna) ()

c) Interactive

(an inlawm tawn thin) ()

d) Competitive

(an inel thin) ()

7. The classroom climate that facilitates constructive learning is

(constuctivism nena inmil thiamna neih nan chuan

classroom boruak chu hengtiang tur hi ani..)

a) Competitive

(inelna) ()

b) Autocratic

(mipakhat aduh dan ang anga rorelna) ()

c) Democratic

(mipui duhdan anga rorelna) ()

d) Laissez faire

(tumah inrawlhlohna) ()

8. In a Constructivist classroom ideas initiated by students are

(*constructivism nena in mil classroom- ah naupangten an ngaihndan an sawi chu...*)

a) Discouraged

(*tha tihpui loh ani*) ()

b) Neglected

(*ngaihsak loh ani*) ()

c) Ignored

(*tum reng ahriat duh loh ani*) ()

d) Accepted

(*pawm tha tihpui ani*) ()

9. In Constructivist classroom

(*constructivism nena in mil classroom- ah chuan...*)

a) Students' opinions have no place

(*zirlaite ngaihndan in hmun a chang lo*) ()

b) Teachers' opinions have no place

(*zirtirtute ngaihndan in hmun a chang lo*) ()

c) Students' opinions are valued

(*zirlaite ngaihndan hlutpui ani*) ()

d) Teachers' opinions are valued

(*zirtirtute ngaihndan hlutpui ani*) ()

10. The most important character of a Constructivist classroom is

(*constructivism nena in mil classroom- ah thil hmuh theih*)

pawimawh bera ngaih chu...)

- a) Play
(*infiam*) ()
- b) Activity
(*thiltih*) ()
- c) Discussion
(*sawiho*) ()
- d) Dictation
(*zirtir dan hrilh*) ()

11. Constructivism is based on

(*constructivism in innghah nan a hman chu...*)

- a) Observation and scientific study
(*thil enchianna leh scientific zirtirna ani*) ()
- b) Observation and reinforcement
(*thil enchianna leh thil pek belha ti chak ani*) ()
- c) Rote memorisation and reinforcement
(*vawn leh thil pek belha ti chak ani*) ()
- d) Observation and rote memorisation
(*thil enchianna leh vawn ani*) ()

12. People can better understand and construct their own

understanding and knowledge of the world through

*(mite hian khawvelah thil tam tak hriat thiamna leh finnate
chu heng hmang hian an hre thei ani..)*

a) Experiencing things

(an thil tawn atangin) ()

b) Reading

(lekha chhiar atangin) ()

c) Hearsay

(thu thangva atangin) ()

d) Adaptation

(thil siamrem theih atangin) ()

13. Constructivist approach is

(constructivist sawngbawl dan hi..)

a) Teacher-centred

(zirtirtu thu neihna hmun) ()

b) Learner-centred

(zirlaite thu neihna hmun) ()

c) Subject-centred

(zirlai chauh endikna hmun) ()

d) Discipline-centred

(inthununna hmun) ()

14. The most important feature of constructivist learning is that, it is

(constructivism nena in mil zirtirna a danglam bikna chu)

- a) Static and organised
(danglam lo leh fel taka rem khawm theih zirna ani) ()
- b) Transferable and organised
(hmun pakhat atanga hmun dang a sawn leh fel taka rem khawm theih zirna ani) ()
- c) Static and unorganised
(danglam lo leh fel taka rem khawm theih loh zirna ani) ()
- d) Transferable and unorganised
(hmun pakhat atanga hmun dang a sawn leh fel taka rem theih loh zirna ani) ()

15. Constructivist teachers are

(constructivism nena in mil zirtirtu te hi... ..)

- a) Partners in the process of meaning-making
(thu awmzia leh thil tum te naupangte hriat thiam theih nanah thawhputu an ni) ()
- b) Carefree
(thoveng, engmah ngaihtuah em em lo an ni) ()
- c) Shapers of behaviour through reinforcement
(an hriat tur pek belha naupangte nungchang kaihruiatu an ni) ()
- d) Strict disciplinarians
(inthununna khirh duh mi an ni) ()

16. A Constructivist learning is

(*constructivism nena in mil zirtirna hi..*)

a) Lecture-based

(*inzirtirna thusawi a innghat ani*) ()

b) Activity-based

(*intihphurna ,thathona a innghat ani*) ()

c) Memory-based

(*hriatreng theihna a innghat ani*) ()

d) Demonstration-based

(*hmuhtheih hmanga entirna a innghat ani*) ()

17. Constructivist learning focuses on

(*constructivism nena in mil zirtirna in a ngaihven chu..*)

a) Text-books

(*zirlai lekhabu*) ()

b) Syllabus

(*syllabus*) ()

c) Electronic media

(*electronic media*) ()

d) Real-world context

(*a taka nitin a kan tawm*) ()

18. In Constructivist approach recognition of students' prior knowledge is essential for

(*constructivism nena in mil tura zirtirna sawngbawlnaah chuan*)

naupangin an lo hriat tawh sa te hriatpui ngei chu atul ani..)

a) Progress

(hmasawn nan) ()

b) Motivation

(duhna chawk thawh nan) ()

c) Drill

(tih nawn tir char char nan) ()

d) Reinforcement

(zirtirna pek belh a tih chak nan) ()

19. In constructivist approach, students learn from

(constructivism nena in mil zirtirna sawngbawlna a, naupangten thil an zirte chu..)

a) Simple to complex and whole to parts

(a awl atanga harsa leh a pumpui atanga bung khat) ()

b) Simple to complex and parts to whole

(a awl atanga harsa leh bung khat atanga a pumpui) ()

c) Complex to simple and whole to parts

(a harsa atanga awl leh a pumpui atanga bung khat) ()

d) Complex to simple and parts to whole

(a harsa atanga awl leh bung khat atanga a pumpui) ()

20. Constructivist philosophy encourages activities like

(constructivist philosophy hian thathonan leh phurna fuih nan henghi a tih tir thin..)

- a) Brainstorming and project works
(mani thluak hman thiam leh project works- te) ()
- b) Project works and memorisation
(project works leh vawn turte) ()
- c) Memorisation and demonstration
(vawntur leh hmuh theih entirna te) ()
- d) Memorisation and brainstorming
(vawntur leh thluak hman thiam te) ()

21. Constructivism is a theory which promotes

(constructivism theory hian zirna kawnga a chawikan chu..)

- a) Listening skills
(bengkhawn thiamna) ()
- b) Demonstration skills
(thil entir a thiamna) ()
- c) Debating skills
(hnialthiamna) ()
- d) Problem solving skills
(harsatna sutkian thiamna) ()

22. Learning is enhanced when learners work with teachers who are more

(zirna hi a hlutna tisang tur chuan zirlaiten hetiang zirtirtu

hi an mamawh...)

- a) Assertive and active
(mahni inring tawk leh thatho tak a thil tih) ()

b) Assertive and passive

(*mahni inring tawk leh thatho vaklo*) ()

c) Active and skilled

(*thathe tak a thil tih leh thiam theihna nei*) ()

d) Passive and skilled

(*thathe vak lo leh thil thiam theihna nei*) ()

23. Learning becomes effective through

(*zirna hi hman tlaka ah awm theih nan chuan heng hi a tul...*)

a) Thinking and predicting

(*rilru hman leh sawilawk thiam*) ()

b) Observing and predicting

(*en chian leh sawilawk thiam*) ()

c) Noting and memorising

(*ziah leh vawn thiam*) ()

d) Observing and organising

(*enchian leh fel taka rem khawm thiam*) ()

24. Students in constructive classroom get the scope to

(*zirlaite chuan constructivism nena in mil classroom-ah
heng hi an ti thei...*)

a) Question things

(*an thil zirah zawhna an siam thei*) ()

b) Listen

(an thil zirte an ngaithla thei) ()

c) Memorise

(an thil zir an vawng thei) ()

d) Absorb

(an thil zir an tuipui thei) ()

25. Constructivist learning gives students ownership of

*(constructivism nena in mil classroom- ah zirlaiten hengah
hian thu neihna an nei..)*

a) Study-materials

(zirtirna bungrua) ()

b) What they learn

(an thil zir) ()

c) Their identity

(an nihna dik tak) ()

d) Their belief

(an rinna) ()

Appendix-A2

QUESTIONNAIRE TO ASSESS THE ATTITUDE OF SCHOOL TEACHERS ON CONSTRUCTIVIST APPROACHES TO TEACHING-LEARNING

INSTRUCTION:

This questionnaire contains thirty-four statements with three alternatives as AGREE, UNDECIDED and DISAGREE. Please read each statement carefully and put a tick () mark against the option of your choice. However, you can choose 'UNDECIDED' only when you are not able to decide your response as 'AGREE' or 'DISAGREE'.

1. Teachers should adopt an attitude of eagerness for new knowledge.

Zirtirtu te hian hriatna thar neih an chak tur ani.

(AGREE/UNDECIDED/DISAGREE)

2. Teachers do not have to provide chapter-wise subject-repetition till students are able to understand it thoroughly .

Zirtirtu ten naupangin an hriatthiam hma chu chapter tin an tih nawn pui a ngai kher lo.

(AGREE/UNDECIDED/DISAGREE)

3. Neglecting and criticizing students' initiatives is right on the part of the teachers.

Zirtirtu tan naupang te thil tih ve te ngaithah a sawisel sak hi a awm ve reng ani.

(AGREE/UNDECIDED/DISAGREE)

4. Teachers should reflect as to whether students have clearly understood what is being taught in class.

Zirtirtu hian naupang te an zirlai an hriat thiam leh thiam loh ngaihtuah let thin tur ani.

(AGREE/UNDECIDED/DISAGREE)

5. Teachers should be willing to modify their teaching strategies with the emerging needs of students.

Zirtirtu ten naupang te mamawh ang zel in an zirtir dan an ti danglam thin tur ani.

(AGREE/UNDECIDED/DISAGREE)

6. Children should memorise more in order to learn more.

Naupang te hian zir belh zel tur leh thiamna an neih belh zel theih nan an zirlai an vawn peih angai.

(AGREE/UNDECIDED/DISAGREE)

7. Teachers are partners in the process of meaning-making.

Zirtirtu te hi naupangte hrilhfiah tu te an ani.

(AGREE/UNDECIDED/DISAGREE)

8. Students should listen actively to learn more.

Zirlai ten an zirlai thiam tur in ngun takin an ngaithla tur ani.

(AGREE/UNDECIDED/DISAGREE)

9. Education works best when it concentrates on rote memorization.

Zirlaite hian an zirlai an vawn(by heart) hi an tan a tha ber .

(AGREE/UNDECIDED/DISAGREE)

10. Students should be taught in such a way that they are able to transfer their learning in similar situations.

Zirtirtu te hian naupangte an zirlai thiam tak a an zir a thil dang pawh an hman tangkai theih turin an zirtir tur ani.

(AGREE/UNDECIDED/DISAGREE)

11. The classroom should be teacher-centred.

Class room chu zirtirtu tlangnel na hmun tur ani

(AGREE/UNDECIDED/DISAGREE)

12. Teachers should always play a dominating role in the classroom.

Zirtir tu thu hnuaiah zirna engkim a thleng tur ani (Hotu ten an thu neihna an tih lan na hmun tur ani)

(AGREE/UNDECIDED/DISAGREE)

13. Democratic environment of the classroom facilitates learning better.

Boruakzalentak a zirtir na hian naupang a zir that theih tir zawk.

(AGREE/UNDECIDED/DISAGREE)

14. Students should not be allowed to question things.

Zirlai naupangte engmah an zawh phal tur a ni lo.

(AGREE/UNDECIDED/DISAGREE)

15. Teaching-learning should be based on real-world context.

Zirtir na hi thil tak tak (i.e,hmutheite) hmang a zirtir tur ani.

(AGREE/UNDECIDED/DISAGREE)

16. Learning in the classroom should not deprive students, the ownership of what they learn.

Naupangte thil thiamsa classroom zirnaah kan hnualsuat sak tur anilo.

(AGREE/UNDECIDED/DISAGREE)

17. Teachers should be aware that ideas initiated by students are often vague and useless.

Naupangte ngaihdan zawng zawng hi a dik vek kherlo tih zirtirtu in an hre tur ani.

(AGREE/UNDECIDED/DISAGREE)

18. Awareness of students' prior knowledge is essential for teaching-learning process in a classroom.

Naupangin an lo hriat tawh sa te chu zirtirtu in a hriat a pawimawih a, zirtirna leh hriattirna kawng ah a pawimawih ani.

(AGREE/UNDECIDED/DISAGREE)

19. Students' opinions should have no place in the classroom.

Zirlai naupangte ngaihdan in class roomah hmun a nei tur ani lo.

(AGREE/UNDECIDED/DISAGREE)

20. Teachers are the promoter of knowledge, hence their opinion should occupy utmost importance in the classrooms.

Zirtirtu te hi hriatna chhungkhawm tu te an ni a, chu vangin class ah an ngaihdan hi a lal ber tur ani.

(AGREE/UNDECIDED/DISAGREE)

21. Teachers should accept ideas initiated by students and encourage it.

Zirtirtu chuan naupangten ngaihdan an thawh ve te pawm thiamin a fuih phur thin tur ani.

(AGREE/UNDECIDED/DISAGREE)

22. Acknowledgement of students' prior knowledge facilitates the teaching-learning process.

Naupangin an lo hriat tawhsa te hi, zirtirtu in a hriat pui a tha.

(AGREE/UNDECIDED/DISAGREE)

23. Students should accept and learn only those things that teachers' teach them in the classroom.

Naupangin zirtirtu te zirtirna chauh an pawm in an zir tur ani.

(AGREE/UNDECIDED/DISAGREE)

24. Learning resources such as books, videotapes, internet etc..facilitate and expand the knowledge base of students.

Zirtirtu zirtirna bakah heng, lekhabu, videotape,internet ,te hian naupang hriatna atih zau sak in a belh chhah ani.

(AGREE/UNDECIDED/DISAGREE)

25. Students should be provided with the platforms for initiating discussions in the classroom.

Zirlai ho hi an mahni ngaihdan zalen taka sawi tlan theih natur hun pek a tha.

(AGREE/UNDECIDED/DISAGREE)

26. The use of diagrams, maps, globes etc, is not necessary to provide information to students.

Diagrams,maps,globes,thil dang dang te hi naupangte an zirlai tan puitu turin pek(tel) kher an ngai lo.

(AGREE/UNDECIDED/DISAGREE)

27. Learning from the text books and within the syllabus is sufficient for students irrespective of their grades.

Zirlaite tan hian an pawl zat ang zel a an textbook leh syllabus te hi an tan a tawk.

(AGREE/UNDECIDED/DISAGREE)

28. Brainstorming sessions should not be encouraged in the classroom.

Classroomah naupangte thluak hmang turin kan fuih tur ani lo.

(AGREE/UNDECIDED/DISAGREE)

29. The use of pictures and drawings does not make the learning atmosphere enjoyable.

Milem entir leh thil lem ziah tir hian zirna lamah phurna a pe lo.

(AGREE/UNDECIDED/DISAGRE E)

30. Teachers should begin new chapters by recapitulation of previous learning.

Zirtirtu in naupang zir hmasak bung kha hriat reng tir pah in bung thar an tan tir tur ani.

(AGREE/UNDECIDED/DISAGREE)

31. It is necessary to make use of locally available materials in the transaction of knowledge.

Thil awlsam tak awmsa, kan bul hnai a awmte, zirna kawnga tangkai te naupang zirtir nan, hman tur ani(tehkhin nan, hmu theih a awm, leitur awmlo angte chu hman loh tur ani)

(AGREE/UNDECIDED/DISAGREE)

32. Project works and group-discussions should be part of teaching-learning process.

Project works leh group discussions te hi zirnan leh zirtirnan hman tur ani.

(AGREE/UNDECIDED/DISAGREE)

33. Examples should always be cited from the text-books rather than from real-life situations.

Tehkhinna(entirna) reng reng chu textbooks ami chauh hman thin tur ani.

(AGREE/UNDECIDED/DISAGREE)

34. It is not the responsibility of the teachers to provide concrete experiences to the students.

Naupangte zirtir nan hmuh theih/ khawih theih entir nan a hman kher hi zirtirtu hna a ni lo.

(AGREE/UNDECIDED/DISAGREE)

Please provide the following information about yourself

Name :

Gender :

Teaching Experience :

Major Teaching Subject: Mathematics/English/Science/Social Science

(Please put a tick mark)

Name of the School

Appendix-A 3

QUESTIONNAIRE TO ASSESS THE PRACTICES ADOPTED BY ELEMENTARY SCHOOL TEACHERS IN TEACHING

INSTRUCTION:

This questionnaire contains thirty statements with two alternative responses. Please read the statements carefully and put a tick () mark in the response of your choice.

1. What type of teaching practices do you prefer to use in the classroom?
(*Classroom-ah eng ang chiah a zirtir nge i duh?*)

a) Teaching practices that leads to accumulation of cooked knowledge
(*zirtirtu zirtir chiah naupang in zir se*)

()

b) Teaching practices that leads to the construction of new knowledge
(*naupang in hriatna thar an neih belh theih nan zirtir nise*)

()

2. What type of belief influences your teaching practices?
(*zirtirna kawnga hian engin nge kai hruai che a i hriat?*)

a) That pupils learn school curriculum only when taught by the teacher

(naupangin school curriculum chu zirtirtu in a zirtir chauhin an thiam)

()

b) That pupils learn school curriculum even without being taught by the teacher

(naupangin school curriculum chu zirtirtu tel lo pawhin anmahni in an zir thei)

()

3. When decisions about learning are to be taken, what do you prefer to do?
(zirtirna chungchanga thuthlukna i siam dawn in, eng e i duh zawk?)

a) Involve pupils in making decisions about learning

(naupangte ngaihda zirtir na kawnga lak ve a tha)

()

b) Respect pupils' opinion but make decisions by self

(naupangte ngaihda zahsak ,amaherawh chu thutlukna mahni a siam)

()

4. What do you do when a student voluntarily shares his or her ideas in the classroom?

(classroom-ah naupangin mahni ngaihda a pekve

chuan, eng tin ge i tih ang?)

a) Accept and use the idea even if it is not appropriate

(a ngaihda hmangin pawm sak)

()

b) Ignores the idea if it is not appropriate

(a ngaihda pawm sak lo)

()

5. While teaching subjects requiring demonstration and modelling,

what do you prefer to do?

(Zirtirna ah lemchan emaw entirna emaw tul i tih chau in, eng tia tih nge i duh?)

a) Perform the demonstration by self
(entirna (lemchan na), nangman tih) ()

b) Involve pupils in the presentation of demonstration
(zirlai naupangte lemchan na entirna a tel tir ve) ()

6. For topics on Ecology, Biology, Geography etc., what type of teaching strategy do you prefer to follow?

(ecology, biology leh geography ang subject te i zirtir dawn in eng ang zirtirna nge i hman duh?)

a) Take students for nature walk
(naupangte pawn ah i chuah pui thin) ()

b) Teach students in the classroom
(naupangte classroom- ah i zirtir thin) ()

7. When teaching subjects that may require a little extra effort by the students, what do you prefer to do?

(subject then khat zirtirnaah belh chhah tur awm ta se, eng nge nangman tha i tih?)

a) Provide scope for memorisation
(naupangte an zirlai Chiangtak in vawn tir) ()

b) Provide scope for thinking
(naupangte an ngaihtuahna hman tir) ()

8. What do you do when teaching subjects like Social Studies, Science, Languages etc., to students, dealing with social relationships?

(social studies, science leh languages ah midang nena

inlaichhinnate chungchang i zirtirin eng tin nge i tih thin?)

a) Provide students with concrete examples
(naupangte tehkhinna an environment mil in pek thin) ()

b) Provide students with textual examples
(naupangte tehkhinna lekhabu ami chauh pek thin) ()

9. What kind of resources do you prefer to use in the transaction of knowledge to students?

(eng ang hmanruah nge i hman duh zirtir na ah?)

a) Easily available study materials in the classroom
(awlsam tak a zirtir na bungrua class room ah awm te) ()

b) Locally available resources relevant for use in the classroom
(bul hnai leh awlsam taka hmu thei hmanruah class room-ah hman theih awm te) ()

10. What type of teaching materials do you prefer to use when teaching in the classroom?

(class roomah zirtir nan eng ang zirtirna nge hman tha i tih?)

a) Make use of the textbook as it is the only gateway to knowledge
(text book hi hman tangkai a tha zirtir na rabi hmasa anih avangin)

()

b) Make use of various models, charts and teaching aids available in the school

(teaching aids hrang hrang school-ah awmte hman tangkai a tha)

()

11. To make the teaching more interesting to the students, what would you prefer to do?

(class roomah naupangte tih phur ti tha tho nan engtia zirtir nge i duh?)

a) Give home works to students

(in lam ah an tih tur pek thin ka duh)

()

b) Give project works to students

(project work pek thin ka duh)

()

12. While giving project works to students, what activities do you prefer?

(naupangte project works i pek in eng anga tih tir nge i duh dan?)

a) Activities based only on the syllabus and topics to be dealt with in the class

(an syllabus leh zirlai bu ami pek)

()

b) Activities broad-based and of variety for enriching the learning experiences of students

(thil zau tak hriatna chi hrang hrang hmanga pek a tha)

()

13. What do you do when beginning new chapters in the class?

(bung thar i zirtir dawn in engtin nge i ti thin?)

a) Begin each new chapter with recapitulation of previous learning
(bung thar tan dawn in naupang in anlo hriat to sa kha ka thlir

let pui thin) ()

b) Begin each new chapter without recapitulation of previous learning
(bung thar chu naupangin anlo hriat tawh sa te thlir let kher

lovin ka tan thin) ()

14. When situations require giving examples to students to simplify the subject-matter, what do you prefer to do?

(zirtirna boruak ah tehkhina pek tur anih in, eng ang tehkhinna

nge tha itih?)

a) Give examples illustrated in the text-books
(lekhabu a awm tehkhina pek)

()

b) Give examples from real life situations
(kan nitin thil tawn atanga tehkhinna pek)

()

15. What do you prefer to do to encourage students can come up with their own ideas and examples?

(eng anga zirtirna nge tha i tih? naupang in an mahni

ngaituahna hmanga tekhinna thilte an ngaidan ah an pekin)

a) Ideas initiated by students are praised and encouraged
(naupangte thurawn leh ngaituahna lawmpui a fuih a tha) ()

b) Ideas initiated by students are ignored
(naupangte ngaih dan hi thil tangkai lo ani)

()

16. What do you prefer to do when teaching topics that are likely

to contain a lot of questions?

(eng nge i duh ang, zirtirna kawnga zawhna tam tak a awm hun in?)

a) Provide all the information and supplementary materials to students
(hriatna zawng zawng leh hmanruah thenkhat pek) ()

b) Provide the platform and encourage students to raise questions
and try to explore the answers

*(naupangte zawhna chhan hun peka fuih bawka an mahni in
chhangthiam ngei nan)* ()

17. In a classroom, what do you prefer to do to make teaching
effective for every learner?

*(naupang nungchang hrang hrang class roomah an rawn
kal khawm in, eng ang in nge i zirtir hlauhtlin ang?)*

a) Adjust and adapt instructional method and materials to
individual needs, wherever required

(an mizia a zirin ,an hriat thiam theih ber natur a zirtir tur ani)
()

b) Follow the same instructional method and materials to avoid
prejudice

(tu naupang po rualtlang taka zirtir tur, dusak bik neihlo nan) ()

18. What are your preferences when holding discussions in the classroom?
(class roomah zirlai naupangte a huhovin i sawi tlanpui thin em?)

a) Initiate discussions by self
(mahni in sawi tlan na hun ka siam thin) ()

b) Encourage students to initiate discussions
(naupang sawitlan nah hun nei turin ka fuih thin) ()

19. What do you prefer to do when additional materials
may be needed to supplement your inputs?

(eng tin nge i tih duh ang i zirtir thil belhchah tura a awm in?)

a) Make use of ready-made materials available in the market
(bazaar ah note siam sa te hman tangkai) ()

b) Develop suitable materials
(zirlai nen a in mil tur note siam sak) ()

20. For the promotion of learning in a joyous manner songs have
often been used, what do you prefer to do as a teacher?

(hla hmangin subject thenkhat te hi naupangte hlim tak leh

phur takah zirtir an ni thin a. Zirtirtu i nih na angin eng tia

tih nge i duh?)

a) Songs to be incorporated
(hla hi hman a tha) ()

b) Lessons can be made joyful even without songs
(hla tello pawhin a in zirtir theih) ()

21. To make teaching more interesting and effective, do you prefer to make use of story-telling techniques?

(thawn thu hmanga naupang zirtir hi i lo ching ve thin em?)

a) No, story-telling is only a waste of time and unnecessary for elementary stages

(aih, thawn thu hmanga zirtir hi hun khawralna leh thil

tangkailo ani) ()

b) Yes, story-telling sustains students interest and is suitable to elementary stage of education

(aw, thawn thu hmanga zirtir hi naupang pawn an tui phah in

pawl(class) tin a hman a tha) ()

22. What is your feeling about having costume parties occasionally in the schools as part of the learning process?

(naupangte themthiamna phochhuak turin costume party te

Huaihawt sak thin tha i ti em?)

a) Costume parties are for kindergarten
(costume parties hi kindergarten naupangte tan bik ani) ()

b) Costume parties are for elementary stage groups
(costume parties hi elementary zirlai naupangte tan ani) ()

23. When setting goals before the students, what do you prefer to do?

(tumna siam sak an nih in, eng tin nge hma i lak?)

a) Direct and give detailed instruction to students
(*chiang tak leh famkim takin an zir dan tur hrilhfiah*) ()

b) Allow discussion and negotiation with students
(*an tihur engkim hrilh lo a, a tul anga kaihhruai*) ()

24. In setting goals, what do you do?

(*tumna siam sak huna, eng e it thin?*)

a) Take into account the existing level of students, their interests and attitudes

(*naupangte an mahni phu tawk an tuina leh an ngidan kalpui*) ()

b) Take into account the objectives and educational aspects/ implications of the task at hand

(*naupangte lekha zirna hmabak enpui*) ()

25. What are your beliefs about Out of Classroom Learning ?

(*class room zirtirna piah lama pawn lam a zirtirna pek hi eng e i ngaihdan?*)

a) Out of Classroom Learning is time consuming and expensive
(*class room piah lamah zirtirna hi hun khawhralna leh sum*)

sena a ni)

()

b) Out of Classroom Learning takes students from theoretical learning to real life situations in the environment

(class room piah lamah zirtirna hi naupangte a thu anhriat aiin

a taka anva hmuh chuan an hriatna ati chiang zawk)

()

26. What do you prefer to do when a learner has made errors?

(zirlai naupang in tih sual a neih in engtin nge i ti ang?)

a) Discourage his failures and point out the mistakes

(a hlawhchham na chhan sawi fiah sak a, a kalbi(ti dan) a dik

lo zia hriat tir)

()

b) Guide him to reflect and think afresh to select alternative strategies to correct himself

(a ti dan tur kawh hmuh a,tihdan thar hmang tura fuih)

()

27. What do you do to enable students to achieve mastery over

the learning task?

(engtin nge naupang thiam takin(hlawhtling takin) i zirtir ang?)

a) Encourage students to reflect, correct and even re-perform to achieve mastery over the learning task

(zirlaite fuih a an zirsu te en nawn tir a,nal tak a thiam tir) ()

b) Encourage students to learn-by-heart and even practice

drill to achieve mastery over the learning task

(zirlaite an rilrua vawn tir {byheart tir}) ()

28. Do you feel it is appropriate to organise quiz among the students?

(zirlaite hi quiz neih pui thin a tha i ti em ?)

a) Yes, after the end of every lesson

(aw, zirlai ka zirtir zawh piang in) ()

b) Rarely because it does not contribute much to learning

(nei vak ngailo, zirtirna kawnga hmasawn na ani si lova) ()

29. What are your personal beliefs and practices regarding variety in teaching-learning process?

(naupang ten an hriat thiam theih nan zirtirna chi hrang hrang

hman hi e nge i ngaihda?)

a) Variety of learning experiences should be provided to students to match with their learning preferences

(zirtirna chi hrang hrang te hi naupangte mamawh ang zel a

hman a tha) ()

b) Too much variety in learning loses the significance and meaning of a lesson or task

(zirtirna chi a tam lutuk chuan a nihna taktak hrechiang lovin a

palzul theih) ()

30. What do you prefer to do to ensure that pupil's time is fully and meaningfully utilized in the classroom?

(engtin nge naupangin an zirlai an thiam vek tawh ani ti i hriat ang?)

a) Ensure that syllabus is covered
(syllabus zawh chian pui) ()

b) Ensure that students have learnt
(naupangte an thiam leh thiam loh hriat pui) ()

Please provide the following information about yourself

Name :

Gender :

Teaching Experience :

Major Teaching Subject: Mathematice/English/Science/Social Science

(Please put a tick mark)

Name of the School :

Appendix- A5

CHECKLIST FOR TEACHERS TO REVEAL THEIR CONSTRAINTS IN ADOPTING CONSTRUCTIVIST TEACHING-LEARNING APPROACH

INSTRUCTION: In your teaching practice you must have encountered some difficulties. Please think critically about the various constraints in your teaching and respond to the various items of this checklist.

This checklist contains twelve questions. Please read each question carefully and put a tick () mark against the option of your choice “Yes” or “No”.

1. Does your headmaster give you the freedom to practice your own teaching strategies?

(YES/NO)

2. Does your headmaster allow you to use audio-visual aids to supplement your teaching? **(YES/NO)**

3. Does your headmaster make proper use of funds meant for buying teaching aids and necessary instructional tools? **(YES/NO)**

4. Are you given the freedom to take your students to visit museums, zoos, etc. as part of the teaching-learning process? **(YES/NO)**

5. Do you have projectors in the school? **(YES/NO)**

6. Do you make use of maps, globes, flashcards, pictures and models in your classroom teaching? **(YES/NO)**

7. Do you give project works to your students? **(YES/NO)**

8. Do you appreciate students asking you questions in the classroom?
(YES/NO)

9. Are you a trained teacher? **(YES/NO)**

Have you ever heard of, read about or have been told about “constructivism”?
(YES/NO)

10.

11. Would you like to know more about “constructivism”? **(YES/NO)**

12. Do you think “constructivism” would influence better teaching-learning
among students? **(YES/NO)**

Appendix-A4 (i)

Observation Schedule for Classroom Practices of Mathematics Teachers

| Criteria | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|
| Asking students to memorize information | | | | | | | | | | |
| Asking students to solve sums on the board | | | | | | | | | | |
| Brainstorming | | | | | | | | | | |
| Concept mapping | | | | | | | | | | |
| Citing examples beyond the text books | | | | | | | | | | |
| Explanation | | | | | | | | | | |
| Elaboration | | | | | | | | | | |
| Evaluation | | | | | | | | | | |
| Inquiry approach | | | | | | | | | | |
| Solving text book sums | | | | | | | | | | |
| Using locally available resources | | | | | | | | | | |

Appendix-A4 (ii)

Observation Schedule for Classroom Practices of English Teachers

| Criteria | | | | | | | |
|---------------------------|--|--|--|--|--|--|--|
| Asking Questions | | | | | | | |
| Brainstorming | | | | | | | |
| Collaborative learning | | | | | | | |
| Discussion | | | | | | | |
| Explanation | | | | | | | |
| Evaluation | | | | | | | |
| Inquiry approach | | | | | | | |
| Oral Translation | | | | | | | |
| Recitation | | | | | | | |
| Singing songs | | | | | | | |
| Use of Hardware /Software | | | | | | | |

Appendix-A4 (iii)

Observation Schedule for Classroom Practices of Science Teachers

| Criteria | | | | | | | |
|---------------------------------------|--|--|--|--|--|--|--|
| Anchored Instruction | | | | | | | |
| Brainstorming | | | | | | | |
| Collaborative learning | | | | | | | |
| Concept mapping | | | | | | | |
| Demonstration | | | | | | | |
| Discussion | | | | | | | |
| Elaboration | | | | | | | |
| Encouraging critical thinking | | | | | | | |
| Experimentation | | | | | | | |
| Evaluation | | | | | | | |
| Inquiry approach | | | | | | | |
| Problem-based learning | | | | | | | |
| Project works | | | | | | | |
| Scientific models | | | | | | | |
| Text book materials | | | | | | | |
| Use of Hardware /Software | | | | | | | |
| Use of Pictures , Charts and Diagrams | | | | | | | |

Appendix-A4 (iv)

Observation Schedule for Classroom Practices of Social Science Teachers

| Criteria | | | | | | |
|----------------------------------|--|--|--|--|--|--|
| Asking Questions | | | | | | |
| Collaborative learning | | | | | | |
| Concept mapping | | | | | | |
| Discussion | | | | | | |
| Explanation | | | | | | |
| Elaboration | | | | | | |
| Evaluation | | | | | | |
| Inquiry approach | | | | | | |
| Singing Songs | | | | | | |
| Telling Stories | | | | | | |
| Text book materials | | | | | | |
| Use of Hardware / Software | | | | | | |
| Use of Pictures, Charts and Maps | | | | | | |

Appendix-B

Table 3.01: List of Sampled Schools

| Sl. no | Name of the School | Locality | District |
|--------|-------------------------|----------|----------|
| 1. | GOVT. Chaltlang M/S | Urban | Aizawl |
| 2. | Govt. Ramhlun South M/S | | |
| 3. | Govt. Laipuitlang M/S | | |
| 4. | Govt. Tanhril M/S-I | | |
| 5. | Govt. Tanhril M/S-II | | |
| 6. | Govt. Zonuam M/S | | |
| 7. | Govt. Ramthar North M/S | | |
| 8. | Govt. Ramthar M/S | | |
| 9. | Govt. Electric M/S | | |
| 10. | Govt. Chhing Veng M/S | | |
| 11. | Govt. Dinthar M/S-I | | |
| 12. | Govt. Dinthar M/S-Ii | | |
| 13. | Govt. Zemabawk M/S | | |
| 14. | Govt. C.Z.Huala M/S | | |
| 15. | Govt. Edenthar M/S | | |
| 16. | Govt. Chandmari M/S | | |
| 17. | Govt. Chanmari West M/S | | |
| 18. | Govt. Dawrvengthar M/S | | |
| 19. | Khatla-Thanbuka M/S | | |

| | | | | | |
|-----|---|--|--|-------|--|
| 20. | Govt. Maubawk M/S | | | | |
| 21. | Govt. Ramhlun Venglai M/S | | | | |
| 22. | Govt. Ramhlun North M/S | | | | |
| 23. | Govt. Aizawl Venglai M/S | | | | |
| 24. | Govt. Tuithiang M/S | | | | |
| 25. | Govt. Vaivakawn M/S | | | | |
| 26. | Govt. Luangmual M/S | | | | |
| 27. | Govt. Chawlhmun M/S | | | | |
| 28. | Govt. Thuampui- T.S. M/S | | | | |
| 29. | Govt. Saron M/S | | | | |
| 30. | Govt. Paul Zosangliana M/S (Chaltlang) | | | | |
| 31. | Govt. Lengpui M/S-I | | | Rural | |
| 32. | Govt. Lengpui M/S-II | | | | |
| 33. | Govt. Durtlang M/S-I | | | | |
| 34. | Govt. Durtlang M/S-II | | | | |
| 35. | Govt. Aibawk M/S | | | | |
| 36. | Govt. Fallkawn M/S | | | | |
| 37. | Govt. Muthi M/S | | | | |
| 38. | Govt. Kelsih M/S | | | | |
| 39. | Govt. Lamchhip M/S | | | | |
| 40. | Govt. Sumsuih M/S | | | | |
| 41. | Govt. Thiak M/S | | | | |
| 42. | Govt. Tachhip M/S | | | | |
| 43. | Govt. Seling M/S | | | | |
| 44. | Govt. Thingsulthliah M/S-I | | | | |

| | | | | | |
|-----|-----------------------------------|--|--|-------|---------|
| 45. | Govt. Thingsulthliah M/S-II | | | | |
| 46. | Govt. Thingsulthliah M/S-III | | | | |
| 47. | Govt. Lalhnam M/S | | | | |
| 48. | Govt. Hualngohmun M/S | | | | |
| 49. | Govt. Tlungvel M/S-I | | | | |
| 50. | Govt. Tlungvel M/S-II | | | | |
| 51. | Govt. Melthum M/S | | | | |
| 52. | Govt. Saikhamakawn M/S | | | | |
| 53. | Govt. Hlimen M/S-I | | | | |
| 54. | Govt. Hlimen M/S-II | | | | |
| 55. | Govt. Tlangnuam (VZBM M/S) | | | | |
| 56. | Govt. Keifang M/S-I | | | | |
| 57. | Govt. Keifang M/S-II | | | | |
| 58. | Govt. Saitual M/S-I | | | | |
| 59. | Govt. Saitual M/S-II | | | | |
| 60. | Govt. Saitual M/S-III | | | | |
| 61. | Govt. Electric Veng M/S | | | Urban | Lunglei |
| 62. | Govt. Bethlehem M/S Electric veng | | | | |
| 63. | Govt. JNM M/S Electric veng | | | | |
| 64. | Govt. Farm veng M/S | | | | |
| 65. | Govt. Salem M/S | | | | |
| 66. | Govt. Lunglawn M/S | | | | |
| 67. | Govt. Ramthar Mt.Hermon M/S | | | | |
| 68. | Govt. Sethlum M/S | | | | |
| 69. | Govt. Theiriat M/S | | | | |
| 70. | Govt. Darphawka Memorial M/S, | | | | |

| | | | |
|-----|--------------------------------|-------|--|
| | Theiriat | | |
| 71. | Govt. Hrangchalkawn M/S | | |
| 72. | Govt. Zobawk M/S-I | | |
| 73. | Govt. Zobawl M/S-II | | |
| 74. | Govt. Bazaar M/S | | |
| 75. | Govt. College veng M/S | | |
| 76. | Govt. Venghlun M/S | | |
| 77. | Govt. Rahsiveng M/S-I | | |
| 78. | Govt. Rahsiveng M/S-II | | |
| 79. | Govt. Standard M/S Bazaar veng | | |
| 80. | Govt. Diet Practising M/S | | |
| 81. | Govt. Zohnuai M/S | | |
| 82. | Govt. Pukpui M/S-I | | |
| 83. | Govt. Pukpui M/S-II | | |
| 84. | Govt. Serkawn M/S | | |
| 85. | Govt. M/S Venglai | | |
| 86. | Govt. Zothlang M/S | | |
| 87. | Govt. Luangmual M/S | | |
| 88. | Govt. R.Zakhuma mem.M/S | | |
| 89. | Govt. Hauruang M/S | | |
| 90. | Govt. Sazaikawn M/S | | |
| 91. | M/S Hawlawng | | |
| 92. | Govt. Zokhawsang M/S Haulawng | Rural | |
| 93. | Govt. Sekhum M/S | | |
| 94. | Govt. Ramlaitui M/S | | |
| 95. | Govt. Chhipphir M/S | | |
| | | | |

| | | |
|------|--------------------------------------|--|
| 96. | Govt. Gospel centenary M/S Chhipphir | |
| 97. | Govt. Zote 'S' M/S | |
| 98. | Govt. Bualpui 'V' M/S | |
| 99. | Govt. Mualthuam 'N' M/S | |
| 100. | Govt. Thingfal M/S | |
| 101. | Govt. Vaisam M/S | |
| 102. | Govt. Tuichawng M/S | |
| 103. | Govt. Zodin M/S Tlabung | |
| 104. | Govt. Tlabung M/S | |
| 105. | Govt. SVP M/S Tlabung | |
| 106. | Govt. Thuampui M/S | |
| 107. | 'S' Lungdai M/S | |
| 108. | Govt. Serte M/S | |
| 109. | Govt. Sertlangpui M/S | |
| 110. | Govt. Phairuankai M/S | |
| 111. | Govt. Dinthar M/S Putlungasih | |
| 112. | Govt. Buarpui M/S | |
| 113. | Govt. Lungsen M/S-I | |
| 114. | Govt. Lungsen M/S-II(R) | |
| 115. | Govt. Pangzawl M/S-I | |
| 116. | Govt. Pangzawl M/S-II | |
| 117. | Govt. Rawpui M/S | |
| 118. | Govt. Lungmawi M/S | |
| 119. | Govt. Hnahthial M/S | |
| 120. | Model M/S Hnahthial 'S' | |

Appendix-C 1

RAW SCORES OF MATHEMATICS TEACHERS

| Sl. No | Knowledge (25) | Attitude (34) | Practises (30) |
|---------------|-----------------------|----------------------|-----------------------|
| 1 | 18 | 23 | 26 |
| 2 | 14 | 24 | 22 |
| 3 | 14 | 30 | 25 |
| 4 | 11 | 14 | 20 |
| 5 | 15 | 17 | 24 |
| 6 | 15 | 16 | 23 |
| 7 | 17 | 23 | 26 |
| 8 | 21 | 31 | 24 |
| 9 | 19 | 29 | 25 |
| 10 | 17 | 22 | 21 |
| 11 | 12 | 23 | 25 |
| 12 | 17 | 28 | 20 |
| 13 | 16 | 31 | 25 |
| 14 | 12 | 16 | 20 |
| 15 | 18 | 29 | 22 |
| 16 | 15 | 23 | 22 |
| 17 | 18 | 32 | 21 |
| 18 | 7 | 22 | 21 |
| 19 | 18 | 28 | 26 |
| 20 | 21 | 25 | 23 |

| | | | |
|----|----|----|----|
| 21 | 23 | 24 | 29 |
| 22 | 21 | 34 | 25 |
| 23 | 18 | 30 | 24 |
| 24 | 21 | 24 | 17 |
| 25 | 19 | 27 | 24 |
| 26 | 17 | 34 | 23 |
| 27 | 20 | 28 | 27 |
| 28 | 13 | 19 | 25 |
| 29 | 20 | 28 | 20 |
| 30 | 17 | 17 | 19 |
| 31 | 17 | 28 | 20 |
| 32 | 16 | 31 | 25 |
| 33 | 12 | 16 | 20 |
| 34 | 18 | 29 | 22 |
| 35 | 15 | 23 | 22 |
| 36 | 18 | 32 | 21 |
| 37 | 7 | 22 | 21 |
| 38 | 12 | 12 | 21 |
| 39 | 21 | 30 | 27 |
| 40 | 20 | 23 | 21 |
| 41 | 13 | 28 | 27 |
| 42 | 22 | 25 | 24 |
| 43 | 17 | 32 | 24 |
| 44 | 15 | 17 | 23 |
| 45 | 10 | 18 | 21 |
| 46 | 23 | 28 | 25 |

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|----|----|----|----|
| 47 | 15 | 28 | 21 |
| 48 | 21 | 28 | 26 |
| 49 | 17 | 20 | 29 |
| 50 | 12 | 24 | 28 |
| 51 | 23 | 21 | 27 |
| 52 | 13 | 13 | 18 |
| 53 | 13 | 15 | 20 |
| 54 | 19 | 12 | 26 |
| 55 | 20 | 12 | 27 |
| 56 | 16 | 21 | 18 |
| 57 | 17 | 24 | 15 |
| 58 | 18 | 24 | 21 |
| 59 | 18 | 20 | 17 |
| 60 | 19 | 27 | 29 |
| 61 | 12 | 22 | 21 |
| 62 | 15 | 26 | 29 |
| 63 | 13 | 24 | 22 |
| 64 | 10 | 22 | 20 |
| 65 | 20 | 28 | 24 |
| 66 | 17 | 25 | 21 |
| 67 | 12 | 16 | 20 |
| 68 | 24 | 31 | 21 |
| 69 | 9 | 23 | 23 |
| 70 | 14 | 18 | 19 |
| 71 | 11 | 22 | 16 |
| 72 | 15 | 21 | 28 |

| | | | |
|----|----|----|----|
| 73 | 12 | 22 | 15 |
| 74 | 19 | 31 | 24 |
| 75 | 21 | 29 | 25 |
| 76 | 19 | 30 | 27 |
| 77 | 16 | 22 | 27 |
| 78 | 18 | 28 | 27 |
| 79 | 24 | 27 | 25 |
| 80 | 21 | 29 | 27 |
| 81 | 25 | 29 | 26 |
| 82 | 22 | 22 | 27 |
| 83 | 16 | 30 | 29 |
| 84 | 16 | 30 | 28 |
| 85 | 20 | 30 | 29 |
| 86 | 25 | 24 | 28 |
| 87 | 22 | 28 | 28 |
| 88 | 23 | 26 | 26 |
| 89 | 18 | 28 | 29 |
| 90 | 22 | 24 | 28 |
| 91 | 20 | 34 | 25 |
| 92 | 22 | 31 | 26 |
| 93 | 11 | 25 | 22 |
| 94 | 18 | 21 | 23 |
| 95 | 18 | 32 | 27 |
| 96 | 20 | 34 | 22 |
| 97 | 23 | 27 | 25 |
| 98 | 16 | 26 | 23 |

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|-----|----|----|----|
| 99 | 15 | 22 | 29 |
| 100 | 20 | 34 | 23 |
| 101 | 13 | 14 | 27 |
| 102 | 17 | 26 | 21 |
| 103 | 19 | 30 | 25 |
| 104 | 18 | 34 | 25 |
| 105 | 17 | 29 | 28 |
| 106 | 15 | 29 | 23 |
| 107 | 18 | 28 | 26 |
| 108 | 15 | 24 | 27 |
| 109 | 18 | 17 | 25 |
| 110 | 15 | 30 | 23 |
| 111 | 18 | 24 | 26 |
| 112 | 12 | 16 | 21 |
| 113 | 19 | 29 | 25 |
| 114 | 22 | 28 | 29 |
| 115 | 9 | 19 | 21 |
| 116 | 23 | 34 | 28 |
| 117 | 18 | 30 | 22 |
| 118 | 7 | 13 | 21 |
| 119 | 13 | 28 | 21 |
| 120 | 11 | 19 | 21 |

Appendix-C 2

RAW SCORES OF ENGLISH TEACHERS

| Sl.No | Knowledge (25) | Attitude (34) | Practises (30) |
|--------------|---------------------------|--------------------------|---------------------------|
| 1 | 0 | 28 | 25 |
| 2 | 10 | 22 | 22 |
| 3 | 22 | 31 | 23 |
| 4 | 15 | 19 | 23 |
| 5 | 22 | 18 | 23 |
| 6 | 12 | 21 | 25 |
| 7 | 15 | 21 | 28 |
| 8 | 14 | 21 | 25 |
| 9 | 13 | 22 | 21 |
| 10 | 19 | 31 | 24 |
| 11 | 23 | 26 | 27 |
| 12 | 17 | 28 | 24 |
| 13 | 18 | 18 | 25 |

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|----|----|----|----|
| 14 | 21 | 27 | 22 |
| 15 | 17 | 30 | 19 |
| 16 | 19 | 28 | 27 |
| 17 | 23 | 34 | 21 |
| 18 | 18 | 16 | 21 |
| 19 | 20 | 18 | 21 |
| 20 | 13 | 20 | 23 |
| 21 | 15 | 25 | 19 |
| 22 | 19 | 25 | 20 |
| 23 | 22 | 28 | 30 |
| 24 | 15 | 25 | 17 |
| 25 | 21 | 30 | 27 |
| 26 | 21 | 33 | 24 |
| 27 | 18 | 24 | 29 |
| 28 | 18 | 26 | 25 |
| 29 | 21 | 29 | 22 |
| 30 | 21 | 25 | 28 |
| 31 | 16 | 29 | 18 |
| 32 | 19 | 24 | 21 |
| 33 | 20 | 28 | 19 |
| 34 | 12 | 13 | 22 |
| 35 | 21 | 28 | 26 |
| 36 | 19 | 28 | 23 |
| 37 | 18 | 24 | 23 |
| 38 | 11 | 20 | 22 |
| 39 | 9 | 7 | 13 |
| 40 | 17 | 23 | 21 |

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|----|----|----|----|
| 41 | 13 | 25 | 24 |
| 42 | 15 | 23 | 21 |
| 43 | 11 | 18 | 24 |
| 44 | 20 | 32 | 27 |
| 45 | 22 | 28 | 24 |
| 46 | 8 | 18 | 26 |
| 47 | 14 | 23 | 24 |
| 48 | 8 | 17 | 21 |
| 49 | 15 | 11 | 23 |
| 50 | 21 | 26 | 21 |
| 51 | 22 | 26 | 23 |
| 52 | 23 | 29 | 25 |
| 53 | 19 | 15 | 27 |
| 54 | 15 | 26 | 24 |
| 55 | 18 | 19 | 27 |
| 56 | 18 | 21 | 27 |
| 57 | 21 | 20 | 25 |
| 58 | 20 | 17 | 27 |
| 59 | 17 | 19 | 24 |
| 60 | 22 | 28 | 30 |
| 61 | 14 | 19 | 21 |
| 62 | 18 | 22 | 22 |
| 63 | 10 | 6 | 15 |
| 64 | 13 | 26 | 28 |
| 65 | 19 | 25 | 24 |
| 66 | 20 | 24 | 28 |
| 67 | 8 | 16 | 18 |

| | | | |
|----|----|----|----|
| 68 | 17 | 30 | 26 |
| 69 | 14 | 23 | 21 |
| 70 | 22 | 34 | 24 |
| 71 | 14 | 30 | 20 |
| 72 | 13 | 24 | 21 |
| 73 | 11 | 26 | 24 |
| 7 | 22 | 30 | 26 |
| 75 | 12 | 21 | 24 |
| 76 | 24 | 28 | 20 |
| 77 | 11 | 14 | 20 |
| 78 | 20 | 18 | 22 |
| 79 | 15 | 15 | 23 |
| 80 | 14 | 15 | 23 |
| 81 | 22 | 29 | 24 |
| 82 | 12 | 19 | 29 |
| 83 | 16 | 28 | 29 |
| 84 | 18 | 24 | 28 |
| 85 | 23 | 27 | 27 |
| 86 | 17 | 23 | 26 |
| 87 | 18 | 18 | 19 |
| 88 | 17 | 16 | 26 |
| 89 | 19 | 26 | 29 |
| 90 | 15 | 17 | 23 |
| 91 | 10 | 8 | 21 |
| 92 | 9 | 24 | 12 |
| 93 | 9 | 26 | 20 |
| 94 | 20 | 27 | 23 |

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|-----|----|----|----|
| 95 | 18 | 24 | 21 |
| 96 | 21 | 31 | 27 |
| 97 | 18 | 26 | 22 |
| 98 | 19 | 26 | 22 |
| 99 | 18 | 28 | 27 |
| 100 | 17 | 22 | 24 |
| 101 | 20 | 29 | 22 |
| 102 | 16 | 2 | 27 |
| 103 | 22 | 19 | 24 |
| 104 | 19 | 25 | 21 |
| 105 | 20 | 24 | 27 |
| 106 | 15 | 26 | 21 |
| 107 | 22 | 13 | 21 |
| 108 | 16 | 28 | 24 |
| 109 | 17 | 16 | 27 |
| 110 | 15 | 18 | 24 |
| 111 | 15 | 16 | 23 |
| 112 | 12 | 24 | 26 |
| 113 | 15 | 23 | 28 |
| 114 | 13 | 19 | 26 |
| 115 | 14 | 7 | 21 |
| 116 | 15 | 28 | 25 |
| 117 | 13 | 4 | 25 |
| 118 | 14 | 22 | 28 |
| 119 | 19 | 22 | 29 |
| 120 | 16 | 23 | 29 |

Appendix-C 3

RAW SCORES OF SCIENCE TEACHERS

| Sl.No | Knowledge (25) | Attitude (34) | Practises (30) |
|--------------|---------------------------|--------------------------|---------------------------|
| 1 | 17 | 21 | 28 |
| 2 | 24 | 31 | 21 |
| 3 | 21 | 33 | 25 |
| 4 | 15 | 24 | 27 |
| 5 | 10 | 18 | 24 |
| 6 | 11 | 21 | 21 |
| 7 | 15 | 31 | 20 |
| 8 | 19 | 21 | 24 |
| 9 | 19 | 25 | 17 |
| 10 | 14 | 15 | 25 |
| 11 | 18 | 22 | 21 |
| 12 | 16 | 13 | 20 |
| 13 | 22 | 15 | 23 |
| 14 | 18 | 28 | 25 |
| 15 | 21 | 17 | 22 |
| 16 | 14 | 12 | 21 |
| 17 | 17 | 24 | 26 |
| 18 | 22 | 34 | 18 |
| 19 | 13 | 20 | 27 |
| 20 | 9 | 22 | 18 |

| | | | |
|----|----|----|----|
| 21 | 11 | 16 | 21 |
| 22 | 20 | 34 | 27 |
| 23 | 13 | 26 | 23 |
| 24 | 13 | 17 | 21 |
| 25 | 22 | 27 | 29 |
| 26 | 20 | 17 | 20 |
| 27 | 19 | 24 | 22 |
| 28 | 15 | 25 | 25 |
| 29 | 23 | 32 | 30 |
| 30 | 21 | 34 | 29 |
| 31 | 9 | 22 | 16 |
| 32 | 16 | 15 | 20 |
| 33 | 15 | 5 | 12 |
| 34 | 20 | 31 | 24 |
| 35 | 15 | 13 | 15 |
| 36 | 22 | 21 | 27 |
| 37 | 13 | 17 | 18 |
| 38 | 23 | 29 | 23 |
| 39 | 10 | 16 | 17 |
| 40 | 11 | 23 | 21 |
| 41 | 22 | 32 | 24 |
| 42 | 8 | 18 | 26 |
| 43 | 20 | 28 | 27 |
| 44 | 15 | 18 | 24 |
| 45 | 14 | 23 | 26 |
| 46 | 8 | 17 | 21 |
| 47 | 14 | 15 | 28 |

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|----|----|----|----|
| 48 | 16 | 15 | 20 |
| 49 | 18 | 21 | 27 |
| 50 | 21 | 24 | 21 |
| 51 | 13 | 21 | 18 |
| 52 | 18 | 13 | 24 |
| 53 | 15 | 28 | 21 |
| 54 | 15 | 27 | 21 |
| 55 | 13 | 24 | 18 |
| 56 | 21 | 24 | 25 |
| 57 | 12 | 13 | 28 |
| 58 | 21 | 28 | 23 |
| 59 | 13 | 22 | 25 |
| 60 | 19 | 24 | 25 |
| 61 | 15 | 18 | 19 |
| 62 | 18 | 20 | 21 |
| 63 | 13 | 26 | 27 |
| 64 | 11 | 17 | 15 |
| 65 | 17 | 22 | 22 |
| 66 | 6 | 24 | 22 |
| 67 | 21 | 25 | 23 |
| 68 | 22 | 30 | 25 |
| 69 | 21 | 16 | 14 |
| 70 | 13 | 28 | 25 |
| 71 | 8 | 16 | 17 |
| 72 | 17 | 23 | 26 |
| 73 | 15 | 16 | 23 |
| 7 | 15 | 17 | 24 |

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|-----|----|----|----|
| 75 | 11 | 14 | 20 |
| 76 | 14 | 30 | 25 |
| 77 | 14 | 24 | 22 |
| 78 | 18 | 23 | 26 |
| 79 | 19 | 29 | 25 |
| 80 | 10 | 32 | 24 |
| 81 | 12 | 29 | 25 |
| 82 | 16 | 15 | 23 |
| 83 | 11 | 26 | 24 |
| 84 | 13 | 22 | 25 |
| 85 | 15 | 11 | 23 |
| 86 | 8 | 11 | 18 |
| 87 | 20 | 26 | 21 |
| 88 | 16 | 11 | 21 |
| 89 | 22 | 24 | 21 |
| 90 | 8 | 19 | 26 |
| 91 | 15 | 27 | 25 |
| 92 | 14 | 23 | 25 |
| 93 | 21 | 25 | 25 |
| 94 | 17 | 24 | 26 |
| 95 | 15 | 26 | 23 |
| 96 | 18 | 22 | 28 |
| 97 | 23 | 23 | 22 |
| 98 | 15 | 20 | 29 |
| 99 | 18 | 29 | 22 |
| 100 | 22 | 25 | 27 |
| 101 | 16 | 24 | 23 |

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|-----|----|----|----|
| 102 | 15 | 24 | 18 |
| 103 | 19 | 22 | 22 |
| 104 | 20 | 25 | 28 |
| 105 | 18 | 21 | 23 |
| 106 | 21 | 24 | 30 |
| 107 | 16 | 28 | 29 |
| 108 | 19 | 28 | 25 |
| 109 | 15 | 32 | 22 |
| 110 | 19 | 18 | 24 |
| 111 | 20 | 29 | 24 |
| 112 | 16 | 28 | 25 |
| 113 | 17 | 22 | 27 |
| 114 | 12 | 27 | 21 |
| 115 | 11 | 15 | 19 |
| 116 | 22 | 34 | 27 |
| 117 | 21 | 20 | 27 |
| 118 | 18 | 19 | 25 |
| 119 | 16 | 24 | 28 |
| 120 | 7 | 19 | 24 |

Appendix-C 4**RAW SCORES OF SOCIAL SCIENCE TEACHERS**

| Sl.No | Knowledge (25) | Attitude (34) | Practises (30) |
|--------------|---------------------------|--------------------------|---------------------------|
| 1 | 8 | 23 | 24 |
| 2 | 22 | 32 | 24 |
| 3 | 20 | 28 | 27 |
| 4 | 13 | 23 | 21 |
| 5 | 11 | 23 | 24 |
| 6 | 17 | 25 | 24 |
| 7 | 14 | 18 | 26 |
| 8 | 8 | 17 | 21 |
| 9 | 15 | 18 | 21 |
| 10 | 10 | 17 | 23 |
| 11 | 18 | 27 | 25 |
| 12 | 22 | 15 | 27 |
| 13 | 17 | 28 | 22 |
| 14 | 23 | 17 | 21 |
| 15 | 19 | 24 | 20 |
| 16 | 21 | 22 | 25 |
| 17 | 19 | 26 | 26 |
| 18 | 22 | 28 | 29 |
| 19 | 18 | 28 | 27 |
| 20 | 22 | 28 | 29 |
| 21 | 17 | 24 | 27 |
| 22 | 23 | 28 | 29 |

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|----|----|----|----|
| 23 | 13 | 18 | 21 |
| 24 | 12 | 14 | 20 |
| 25 | 18 | 23 | 25 |
| 26 | 19 | 26 | 26 |
| 27 | 18 | 25 | 29 |
| 28 | 22 | 23 | 22 |
| 29 | 15 | 21 | 27 |
| 30 | 22 | 34 | 28 |
| 31 | 14 | 26 | 23 |
| 32 | 12 | 34 | 22 |
| 33 | 7 | 15 | 18 |
| 34 | 8 | 16 | 21 |
| 35 | 12 | 19 | 18 |
| 36 | 14 | 22 | 22 |
| 37 | 9 | 15 | 14 |
| 38 | 6 | 8 | 11 |
| 39 | 8 | 11 | 17 |
| 40 | 15 | 16 | 22 |
| 41 | 24 | 22 | 21 |
| 42 | 12 | 26 | 29 |
| 43 | 14 | 24 | 22 |
| 44 | 9 | 22 | 20 |
| 45 | 11 | 28 | 24 |
| 46 | 17 | 25 | 21 |
| 47 | 20 | 16 | 21 |
| 48 | 10 | 31 | 21 |
| 49 | 13 | 18 | 19 |

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|----|----|----|----|
| 50 | 15 | 23 | 23 |
| 51 | 12 | 22 | 16 |
| 52 | 13 | 20 | 29 |
| 53 | 19 | 24 | 27 |
| 54 | 21 | 23 | 29 |
| 55 | 11 | 26 | 28 |
| 56 | 8 | 31 | 21 |
| 57 | 19 | 26 | 23 |
| 58 | 16 | 34 | 25 |
| 59 | 14 | 22 | 27 |
| 60 | 22 | 15 | 27 |
| 61 | 9 | 16 | 23 |
| 62 | 12 | 24 | 27 |
| 63 | 12 | 19 | 20 |
| 64 | 14 | 28 | 27 |
| 65 | 16 | 22 | 17 |
| 66 | 14 | 26 | 19 |
| 67 | 14 | 23 | 21 |
| 68 | 9 | 20 | 25 |
| 69 | 8 | 16 | 13 |
| 70 | 10 | 28 | 25 |
| 71 | 16 | 26 | 27 |
| 72 | 13 | 23 | 22 |
| 73 | 11 | 15 | 19 |
| 7 | 20 | 16 | 25 |
| 75 | 17 | 22 | 26 |
| 76 | 17 | 23 | 21 |

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|-----|----|----|----|
| 77 | 20 | 25 | 25 |
| 78 | 18 | 23 | 22 |
| 79 | 18 | 34 | 27 |
| 80 | 19 | 11 | 24 |
| 81 | 22 | 34 | 25 |
| 82 | 16 | 30 | 29 |
| 83 | 23 | 32 | 28 |
| 84 | 21 | 21 | 22 |
| 85 | 18 | 28 | 29 |
| 86 | 16 | 16 | 19 |
| 87 | 18 | 28 | 29 |
| 88 | 21 | 34 | 29 |
| 89 | 18 | 13 | 22 |
| 90 | 21 | 23 | 20 |
| 91 | 15 | 27 | 19 |
| 92 | 18 | 28 | 26 |
| 93 | 19 | 24 | 21 |
| 94 | 20 | 27 | 25 |
| 95 | 12 | 12 | 20 |
| 96 | 12 | 17 | 23 |
| 97 | 21 | 21 | 27 |
| 98 | 17 | 28 | 23 |
| 99 | 23 | 26 | 25 |
| 100 | 11 | 15 | 22 |
| 101 | 16 | 13 | 21 |
| 102 | 22 | 25 | 24 |
| 103 | 10 | 22 | 26 |

| | | | |
|-----|----|----|----|
| 104 | 10 | 18 | 21 |
| 105 | 21 | 34 | 28 |
| 106 | 19 | 20 | 23 |
| 107 | 21 | 26 | 27 |
| 108 | 11 | 13 | 21 |
| 109 | 19 | 28 | 25 |
| 110 | 16 | 31 | 27 |
| 111 | 17 | 24 | 22 |
| 112 | 22 | 26 | 28 |
| 113 | 22 | 24 | 21 |
| 114 | 15 | 26 | 27 |
| 115 | 13 | 17 | 24 |
| 116 | 15 | 28 | 20 |
| 117 | 14 | 18 | 29 |
| 118 | 23 | 18 | 23 |
| 119 | 22 | 31 | 28 |
| 120 | 19 | 26 | 30 |