CONSTRUCTIVIST APPROACH AND TEACHING LEARNING PROCESSES IN SECONDARY SCHOOLS OF MIZORAM: A CRITICAL STUDY

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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Submitted

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CERTIFICATE

This is to certify that the thesis entitled, '***Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study***' submitted by **Mikael L. Chuaungo,** having Registration No. **MZU/Ph.D./1214 of 19.03.2019** to the Mizoram University for the degree of Doctor of Philosophy in Education has been completed by him under my guidance and supervision. The work done by the candidate is the original one and it has not been submitted to any other university or Institution for the award of any degree or diploma and it is within the area of registration.

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DECLARATION

I, Mikael L. Chuaungo, hereby declare that the subject matter of this thesis is the record of work done by me, that the contents of this thesis did not form basis of the award of any degree to me or to do 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.

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Dated: Aizawl (Mikael L. Chuaungo)
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INTRODUCTION

1.0 Introduction

In the past, constructivist theories and viewpoints were given very little attention due to a lack of attention towards education for young children. Among the first to contradict this point of view was Jean Piaget, who brought attention to the importance of play as a vital tool for developing a child's cognitive abilities. Constructivist theories are now prevalent in most of the informal education sector. The Investigate Centre at the Natural History Museum in London is a superb example of constructivist learning in an environment very different from traditional schools. Researchers have combed through a collection of authentic natural history items in order to develop their scientific skills and find new things. Constructivism has both philosophical and psychological roots.Some historical figures who influenced constructivism are Giambattista Vico , Immanuel Kant, John Dewey, Maria Montessori, Jean Piaget, and Lev Vygotsky to name a few (Afoladi, 1992)

1.1 Understanding Constructivism

The major component of constructivism is that students should not be seen as a mechanical object, but rather as an organic entity who actively constructs meaning based on experiences and by making use of appropriate models in a given area. This is the foundation of the research. Constructivists propose the notion that learnersactively organizes and arranges his or her knowledge based on past and present experiences, rather than having the new notion imposed on them. Constructivism emphasizes students' active participation in the learning process, which helps them remember what they have learned (Elliot, 2000).

Students are not empty pit that the teachers have to fill with knowledge. Knowledge is situated inside the sole that they themselves have created actively (Bhogayata, 2003). Students' knowledge generation is not an easy undertaking when it comes to teaching. Only the teacher may assist students in doing so. A teacher's job

is to facilitate learning. Various elements influence the construction of knowledge in the minds of students. Learning becomes more meaningful and long-lasting when constructivist teaching incorporates hands-on experience with a topic, finding solutions, peer learning, collaborative learning, raising questions acquiring new ways and methodologies, and facilitates students to develop their own learning patterns, healthy discussions, compare and contrast methods, case study methods, and so on (Hasan, 2008).

1.2 Definitions of Constructivism

Various academics defined constructivism and suggested a number of features and descriptions so that the concept can be gained with clarity andwith a broad range of application. A few of the definitions are covered below:

According to Maher and Noddings (1990), students must generate their own knowledge, both independently and collaboratively.They believed that each student has a toolbox of concepts and skills from which they develop knowledge in order to tackle difficulties presented by the environment. The job of the teachers is to give a platform to face problems, and follow up with assistance that will stimulate development.

Glasersfeld (1995) said that knowledge, no matter how it is defined, is in the heads of persons and the thinking subject has no alternative but to construct what he or she knows on the basis of his or her own experience".

Brooks and Brooks (1993) suggested that constructivism is not a teaching theory, but instead a theory focusing student learning and student knowledge. According to this theory, knowledge is transient, developing, socially influenced, and hence non-objective.

Naylon and Keogh (1999) suggested that, the key concepts of this method are that learners can only make sense of new situations in terms of their prior understanding, and that learning is an active process in which learners generate meaning by connecting new ideas with prior knowledge.

Jenkins (2000) said that constructivistsare committed to the idea that the development of the understanding requires active engagement on the part of the learner

According to Cooper (2007) "Constructivism is a philosophical viewpoint on how the mind forms and modifies its understanding of reality. It is the foundation of our outlook on pedagogy and research."

According to Nola (2006), "Constructivism is a theory in education which posits that individuals or learners do not acquire knowledge and understanding by passively perceiving it within a direct process of knowledge transmission, rather they construct new understandings and knowledge through experience and social discourse, integrating new information with what they already know (prior knowledge). For children, this includes knowledge gained prior to entering school".

To summarize, constructivist settings begin with observations made in a world of genuine items anchored in genuine situations. While accessing a variety of materials and collaborating with their peers, students construct ongoing interpretations of their findings. Finally, in order to demonstrate their understanding of the content, students act as coaches and teachers to one another.

1.3 Types of Constructivism

Constructivism is a continuum rather than a single theoretical position. The assumptions that constitute this continuum differ across multiple dimensions and types of constructivism. We can differentiate this continuum into three basic divisions:

(1) Cognitive Constructivism

(2) Radical Constructivism

(3) Social Constructivism

1.4 Cognitive Constructivism

Learning is represented as a method of proactive discovery in which knowledge is constantly developed. It is not the teacher's responsibility to inculcate information in students by repetition or to motivate students to study through the use of rewards and penalties. The teacher's duty, instead, is to support discovery by providing suitable tools and advising students as they strive to assimilate new information into existing knowledge and adjust old knowledge to reflect new knowledge. While cognitivists recognise that "skill and drill" activities may help students memorise facts, equations, and lists, they place a greater priority on approaches that help students actively incorporate and absorb new information.

Piaget's principles of teaching and learning has the following two:

1. Learning is a process that requires active participation.
2. Learning should be complete, genuine, and real.

1.5. Radical Constructivism

Ernst Von Glasersfeld, an American psychologist, is its founder and most notable proponent of Radical Constructivism. He defined radical constructivism as a philosophy of knowing that takes a pragmatic approach to concerns of human comprehension, truth and reality. Radical constructivism is heavily influenced by Jean Piaget's constructivism, but it also combines epistemological principles from Saussure's structuralism, British empiricism and Kat's idealism. Von Glasersfeld, like Piaget, asserted that humans' conceptions and understanding of the world grow over time. Rather than the standard philosophical idea that knowledge is constitutive of truth, i.e., that it corresponds to an objective reality, knowledge is classed based on its usefulness in the world of experience. Radical Constructivism puts forward two main claims (Glasersfeld, 1989)

- The subject actively constructs knowledge rather than passively receiving it.
- The adaptive purpose of cognition is to organize the experienced environment, not to find actual reality.

Radical constructivists believe that all knowledge is constructed rather than discovered, and that knowing whether or not information reflects an objective reality is impossible and unnecessary. This isn't to say that there isn't an ontological reality; itis to say that knowledge doesn't have to play a role in it. Radical constructivism, or 'post-epistemology,' is stated to deal with "knowing without metaphysics" (Glasersfeld, 1992). The premise of radical constructivism is that knowledge cannot be appraised on the basis of its depiction of ontological or metaphysical reality.

According to radical constructivism, the key to assessing conflicting knowledge claims and the method by which one learns is the 'fitting' of information to our experiences, or its cognitive viability. As a result, knowledge is not tailored to the natural world, but rather the world adapts to cognitive needs.

Knowledge and memory are inextricably linked; rather than representing an ontological reality, both are formed based on their fitness and viability inside the mind of the knowing/remembering subject. The persistence of both knowledge and memory is heavily influenced by fluctuating social conditions, which define what makes sense to humans in a particular setting in part, but not entirely. However, this does not change the core principle of Radical Constructivism, which holds that reality is formed by cognitive operations of the human mind in an attempt to establish "equilibration in the cognizing subjects experience world." (Glasersfeld. 1986).

Both ontology and epistemology are redundant from a radical constructivist perspective as the existence of knowledge is not reliant on it existence in the past. Knowing is a dynamic adaptive process that leads to viable interpretations of experience. Knowledge of a "real" reality is not always constructed by the knower. As a result, knowledge is the result of a self-organizing cognitive process.

1.6 Social Constructivism

Social constructivism focuses on an individual's learning that occurs as a result of their interactions in a group, and it broadens constructivism by including the importance of culture and development. Teachers and parents play the role of carriers for cultural tools like language.

1.7 Social Constructivism and Education

Many educational psychologists'study social constructivism because of its implications for teaching and learning. What sets it apart from social learning theory is it emphasis on interaction over observation.

Jean Piaget and Lev Vygotsky had a lot in common in terms of their views on children's learning, however, Jean Piaget gave more importance to the social aspect of learning.His ideas have been used for the development of various discovery learning models which reduces the role of teachers in classroom while the students take control of his or her own learning. In Vygotsky's theories both teachers and older or more experienced children play very important roles in learning.

There are various similarities between social constructivist theory and cognitive constructivism. Lev Vygotsky, in his constructivist theory, gave more attention to the importance and impact of an experienced teacher in a student's learning. Vygotsky also believed that culture provides the learner with the cognitive tools necessary for cognitive development.He gave a lot of importance to culture and society and focused on its influence on a child's learning, and for this reason his interpretation of constructivism is called social constructivism. The zone of proximal development (ZPD) is undoubtedly Vygotsky's most well-known theory. According to this theory,students are able to master difficult concepts with the help of teachers and senior students, concepts those students couldn't have mastered on their own.Nostrand believed that if students engaged in discussion and group work with their peers, they could use language as a way of expressing their personal ideas, thoughts, feelings etc.Students' interaction during group projects and assignmentsallows them to make meaning by bargaining with others' opinions. This method of learning encourages long-term memory and in-depth processing of information through cognitive manipulation.

1.8 Implications of Social Constructivism on Teaching Method.

"Teaching techniques may also be defined as the core art and science that guides the management and strategies utilised in the classroom for lesson delivery" Dorgu (2015). According to Dorgu, teaching technique is the approach through which a teacher presents subject matter to a learner based on predefined instructional objectives in order to improve student learning. According to Westwood (2008), teaching strategies include the ideas and procedures employed by teachers to facilitate student learning. These definitions tell us that teaching is made up of concepts and practices targeted at improving student learning and are based onsocial constructivist theories and principles.

Most social constructivist share a common thought in the idea that knowledge emerges out of social interaction and shared experience. Kelly (2003) proposes that social constructivism be used in the classroom through the use of instructional approaches such as case studies, research projects, problem-based learning, brainstorming, collaborative learning / group work, guided discovery learning, and simulations, among others. A teacher may ask the students in the class to form groups, and ask them to form ideas and opinions based on the topics of the lesson. Discussion and group work are two very popular techniques used by teachers following social constructivist practice.

Discussion:Omwirhiren (2015) describes discussion teaching technique as "a strategy that uses guided interaction to emphasize a certain subject matter with the intention of helping the students". According to Jegede (2010), the technique improves learning by allowing students to strengthen their communication skills, mental abilities such as critical thinking, reflective thinking, and assessing varied opinions. The teacheracts as the facilitator of learning and guides the student in such a way that students can form opinions and ideas on a topic on their own. A successful classroom discussion session can be achieved by separating students in groups are involving the entire classroom.The teacher initiates the discussion by giving students enough inputs so that they can followthrough. The teacher must ensure that the discussion is well coordinated and proper etiquettes are followed to ensure the

classroom doesn't devolve into chaos.Discussion method keeps students engaged, enhances their retention of knowledge, encourages the interchange of ideas, and makes students active participants. It helps promote an idea of democracy in the classroom as every student is made to feel that their voice and opinion matters and they are active contributors to knowledge creation. They acquire reflective thinking abilities, which allow them to carefully study and comprehend topics. This teaching methods helps student develop critical thinking and the investigative abilities. Students develop the ability and patience to listen others' ideas and form a critical opinion around it.

Activity/Group work: This is a constructivist teaching technique where students are assigned to various different groups with the purpose of accomplishing a common learning goal as group. Every student plays an important role in a group, and their roles are switched around to allow every student to contribute to the team in different ways. It emphasises on learners' reflection and thinking so that they can design their own learning. During group work and group activities, the teacher's role is to foster learning by providing scaffolding assistance and guiding the group towards the common goal. Sometimes, a group member may be inactive, or maybe get overshadowed by smarter group members. In these situations, the teacher must ensure that the weaker students are encouraged to speak out and participate in the group activity. This constructivist teaching methods like group activity and group work are prime examples that show the paradigm shift from traditional teaching methods, which is dominated by monotonous lectures, to a newer, more innovative, more effective student-centered learning process. The problem-based teaching/learning technique is an example of group work.

Bell (2010) describes ***Project-Based Teaching/Learning*** as an "innovative method to learning that offers a variety of skills needed for success in the twenty-first century". Learners in this teaching technique study inquiry while also working cooperatively to explore and produce projects that represent their knowledge. Constructivists widely agree that project-based learning leads to wholesome learning experience for students and is an innovative teaching and learning technique that

helps student study and analyse a problem and understand problems that exists in the real world.

Jigsaw:Another social constructivist approach to teaching is the Jigsaw method, which is used for guided exploration of a learning content. Jigsaw teaching technique, according to Igwe (2018), uses "cooperative learning method and its ideas". Students are separated in groups and are presented a scenario which has problems that need solving. Students collaborate and discuss ideas to solve these problems by piecing together ideas like a clue to a puzzle. Jigsaw method has been very effective in improving students' achievement due to that fact that every student's input is pivotal to the achievement of the common goal, thus leading to high level of self-satisfaction and self-fulfillment in students. It develops the idea in student's mind that combined effort can solve various real-world problems. A unique strategy adopted in Jigsaw method is the system of "home" groups. Students of a "home" group are made to specialize on one aspect of a topic. Then students of the "home" group meet students from other groups who are specialized on a different aspect of a topic. After acquiring knowledge from other groups, these students return back to their respective "home" groups to teach their fellow group members. Using this strategy, each member of each group forms a jigsaw piece that when combined forms the complete jigsaw puzzle.

1.9 Technological implications

Social constructivism is very closely related to technology. Information technology being a great tool for communicating information is very effective in enhancing social constructivist learning.Internet tools such as social media, instant messengers, emails etc. are examples of telecommunication tools that allow for interaction, discussion, and debate that leads to creation of new ideas through social interaction. Technology also enables students to break free from the confines of traditional classrooms and make use of constructivist learning practices on a global scale. Students can use tele communication tools access information which wouldn't have been possible without those said tools. It helps them get in touch with peers from various locations and from different cultural backgrounds. It expands their horizon and enhances their exposure to knowledge, giving them valuable ideas and

inputs to construct their own.

Technological tools such as networked writing programmes allows students to expand the scope of constructivist teaching learning methods like group discussion and team work/project work. These programmes allow students to interact with other students live, with real-time communication taking place without the confines of geographical boundaries.

Another technological innovation that enhances constructivist learning is simulations which can help students learn by putting what they're studying in the context of a "real-world" task like managing a private business, writing articles for an established newspaper, or solving problems such as pollution in their city.

Table- 1.1 Comparative account of three types constructivism

Sl No	Strand	Cognitive Constructivism	Radical Constructivism	Social Constructivism
1.	Proponent(s)	Jean Piaget and William Perry	Ernst von Glaserfeld	Lev Vygotsky
2.	Knowledge	Learners actively develop their own cognitive structures depending on their existing cognitive structures.	Self-organized Cognitive process	Culturally assimilated cognitive product
3.	Nature ofKnowledge	the learner actively constructs structures of the mind	Rather than being discovered, it is constructed.	Enculturation intoacommunal activity
4.	Learning	As a process of active discovery	Equilibration in cognizing subjects' experiential world	Collaborative and social activity
5.	Central tenet	Understanding the learners' existing intellectual frame work	Reality is constructed by cognitive operations of mind.	Ideas are constructed through social interactions.

6.	Cult of learning	Attempt to integrate the new with the old and change the old to make room for the new.	Creating connections between what we learn and what we experience	Learning happens through supervision from teachers or a much-learned adult.
7.	Conceptual/theoretical premise	Stage theory ofcognitive development	Cognitive Viability	Zone of proximaldevelopment
8.	Philosophical representation	Pragmatic-dynamism	Post epistemology	Representative realism
9.	Mode of knowledgeconstruction	Assimilation and Accommodation	Fitness and Viability	Interactive dialogue and discussion
10.	Technological implication	Multimedia and CD-ROMs (PC)	Cybernetics Self-Regulated devices (ProgrammedInstruction)	Computer-Aidedlearning (CSCL)(www)

1.10 Constructivismasphilosophyandtheoryoflearning

Constructivism arose from discontent with established Western views of knowing. As such, it stands in stark contrast to objectivist epistemology and positivism.(Crotty1998;Hendry,FrommerandWalkerï1999;Glasersfeld1995).In contrast to the objectivist concept of objective truth and meaning inherent in objects, independent of consciousness, constructivism holds that knowledge cannot exist outside of our minds; truth is not absolute; and knowledge is constructed by individuals based on experiences rather than discovered. (Crottyï 1998; Fosnotï 1996; Hendry, Frommer, and Walker, 1999). Constructivism substitutes the notion of viability for the conventional concept of truth as the right representation of an external reality, implying that descriptions of states or occurrences in the universe are relative to the observer (Glasersfeld, 1995). As a result, the constructivist viewpoint holds that knowledge is built by individuals or groups making meaning of their experiencing realities rather than passively acquired from the world or authoritative

sources. (Maclellan and Soden, 2004).Constructivism advances meaning making and knowledge construction as its foremost principles(Crotty, 1998; Fosnot, 1996; Phillips, 1995). It regards knowledge as transitory, subjective, internally produced, developing, and socially and culturally regulated. (Fosnot,1996).Individuals are considered to develop their own meanings and understandings, with this process involving the interaction of current information and beliefs with new knowledge and experiences. (Richardson, 1997, 2003; Schunk, 2004). This perspective of meaning-making throughpreviouslyconstructed knowledgehas the following implications:

- A learner is not a mere blank slate, but rather an intellectually productive person (able to raise questions, solve problems, and develop theories and knowledge).
- The goal of instruction should be to increase learners' thinking skills.
- The center of intellectual authority is the discussion facilitated by both teachers and learners, not the teacher or the materials
- Learning is an adaptation process that occurs based on the real-world contexts.
- Knowledge is constructed based on our interaction with society.
- Learning is basically a process of developing our understanding of the world.
- Learning is influenced by prior knowledge and experience.
- Learning is aided by social interaction.
- Effectivelearningrequiresrelevant,accessible and challengingproblemsforthelearner to solve

According to Welsch and Jenlink (1998) information is created by the learner. That is, rather than taking knowledge as is, the person reorganises his own information.He adoptsthe information he is provided in combination with his own information fitted into his ownconditions (Ozden, 1999). The constructivism describes structuring of the reader the mentalpresentationin an active manner by means of combining textual information withthe newinformation(Spivey, 1987) bythe learner.

Giambatista Vico claimed that "theonewhoknowssomethingalsoprovidesanexplanation".The same theory was extended further by Emmanuel Kant, who stated that "the human person is active in receiving information, establishing its relation to past knowledge, and creating his own information" .Psychologists like John Dewey, Piaget and Vygotsky had

contributed to the structuralism in thesense of shaping the construction with their works (Ozden, 1999). Idealist philosophers and constructivist philosophers have a lot in common. The constructivists claim that our ideas actually reflects our beliefs. They further claim that it is impossible to tell whether the observers are looking at the same things. They believe that how we perceive the world is determined by our experiences and opinions. “The truth is an individual structure. We regard the truth as beneficial to us. The bulk of constructivists do not see concepts as totally correct or incorrect. This is because it is the nature of truth is very subjective. A constructivist prefers to speak in the interests of the majority ofthe scientific societyratherthan whatis true”(Colburn, 2000).

The individual constructs the truth by their communication and interactions with their social and physical environment (Sivis 2002). For Descartes, rational activity enables the information; this is in fact revelation of what has been already there, a distinct form of the information (Stemhagen, 2004). According to Piaget (1969), structuralism stands behind the idea that“each individual creates a mental world in his individual informatory process”. Theseprocesses are in the individual’s discretion, the integration of the information (or its meaning)withpreassembleddiagrams(assimilation)and modify thediagramstosuitwith theframe.(Collins, 2003).

The philosophy of constructivism clearly makes a point that students cant simply be spoon fed ideas by the teacher and then expected to achieve desirable learning outcomes. Ideas are constructed by students through a an active and developmental process.ConstructivismdrawsonthedevelopmentalworkofPiaget(1977)andKelly(1991).Fosnot(1989)definesconstructivism by reference to four principles:

(i) Learning is influenced by what we already know.

(ii) New ideas emerge as we alter and adapt our pre-existing knowledge

(iii) Learning requires the creation of ideas rather than the “mechanical accumulation of facts”.

(iv) Meaningfullearning occurs through rethinking old ideas and coming to new conclusions about new ideas whichconflict with old ideas.

A classroom can be considered to be constructivist in nature if it is learner centered and promotes active communication. The teacher has the responsibility to be the provider of opportunities to students so as to allow students to manipulate ideas and items, pose questions relevant to the topic and explore new constructs.

Piaget (1977) claims that rather than being a passive recipient, learning happens through active creation of meaning. According to him, whenever a student learns something new, he or she enters a state of imbalance. To restore equilibrium or balance, one must change one's mindset. To do so, one assimilates new information into current knowledge by linking it with what one already knows. When one fails to link new knowledge with old knowledge, a process of adaptation takes place where existing knowledge has to be reorganized to accommodate the new knowledge.

Similar to this is Kelly's theory of personal constructs (Kelly, 1991). According to the theory of personal constructs, a person perceives the world only through the patterns they can form. Based on one's experiences, one develops methods of construing or understanding the world. When confronted with a fresh experience, try to apply these patterns to the current situation.

DuffyandCunningham(1996)presenttwobasicprinciplesthattypifyconstructivistinstruction:

(i) Learning is an active process where knowledge is constructed and not acquired,

(ii) The process of instruction supports knowledge construction rather than communicatingthat knowledge.

According to the constructivist view the learner is an active organism, whoengages in meaning making and sense seeking, rather than a passive one that responds to stimuli(Perkins,1992).Moreover,constructivistlearningischaracterisedbyinvolvinglearnersinsituated and authentic activities that reflects the real world (Duffy and Jonassen, 1992). Learningisactive(manipulative/observant),constructive(articulative/reflective),intentional(reflective/regulatory),authentic(complex/contextualized/realistic),andcooperative/collaborative/ conversational / socially negotiated (Bednar, Cunningham, Duffy, &

Perry, 1992;Driscoll,2000; Jonassen, Howland, Moore and Marra, 2003; Schunk, 2004).

1.11 Basicideasofconstructivistlearningtheory

"Construction" is a form of initiative, self-organization, and conscious recognition. Learning is a process of constructing and generating meanings on one's own initiative. The interaction of learners' old and new information completes this process. To put it another way, pure external stimulus has no meaning. It can only be true learning when learners process and develop information using their own personal insights and basing their ideas on their experiences in the world.

Students belong to different family backgrounds, cultural backgrounds, societal backgrounds as well as their own personal biases, opinion and perceptions attributing to their upbringing. This brings a plethora of vast ideas and perspectives to the classroom. Even when they encounter new ideas in their learning experience, they will try to generate unique assumptions based on their previous experiences and pre-existing values and ideas.These are logical assumption based on previous experiences, not an erroneous conjecture. As a result, teachers should facilitate students' use of pre-existing and prior knowledge and experiences in their learning experiences.

Teachers' roles should be shifted from initiator and indoctrinator to helper and motivator for students to develop meanings on their own, as the emphasis is on students as subjects. To put it another way, teachers should be the architects of the learning environment, as well as the academic advisors to students. Students are at the core of the new teaching paradigm, which is guided by teachers. Teachers are in charge of organising and guiding the entire teaching-learning process.

Development of new knowledge or change in knowledge of concepts takes placeonly when the student has determined that certain prerequisites or conditions have been met. Hewson and Thorley (1989) mentioned the following conditions:

1. Does the student understand the concept? Is the learner aware of what it means?

2. Is the learner's perception realistic (true)? That is, if the learner believes it to be true.

3. Is the concept beneficial to the learner? Does it accomplishes something useful? Does it address issues that would otherwise be difficult to solve? Is it implying new possibilities, paths, or ideas?

1.12Nurturingconceptualchange

The cumulative advice of conceptual change researchers to teachers has therefore been todiagnose,or become familiar with, their students'views(knowledge, preconceptions, naiveconceptions,misconceptions,oralternativeframeworks),andthentoapplyacognitiv econflictor dissonance strategy (if needed) to change these frameworks into more scientifically acceptableones(Hewsonand Thorley, 1989).

It is very important that students are given the freedom to form ideas irrespective of it being true or not.For an idea to be shared and transmitted from one person to another, there has to be a common ground of mutual understanding. A person has to understand and empathize with other's position for any progress in learning to happen

According to conceptual change theory (Strike and Posner, 1992), instructors must teach Science in order for pupils to see the world as a rational and understandable place. An important topic of leaning in science education is comprehension. On the other hand, most curricula emphasize recall rather than understanding. This limits students as they tend to focus more on recollection of information as that is what their curriculum rewards.

Constructivist views also emphasize generative learning, questioning or inquiry strategies(Slavin, 1994). An emphasis on constructivism and hands-on inquiry-oriented instruction topromote children's conceptual knowledge by building on prior understanding, active engagementwith the subject content, and applications to real world situations has been advocated in sciencelessons(StofflettandStoddart,1994).“Constructivistideas that focus ondiscovery,experimentation, and solving open-ended problems are often encouraged and applied in the field of science education” (Wildy and Wallace 1995). Wildy and

Wallace(1995)were of the opinion that successful science teachers are those who teach for in-depth comprehension. These teachers lead courses based on students' perception about science, allowing opportunities to test and question those concepts in order to assist students achieve a higher level of expertise. Such classrooms are learner-centred environments where group discussion, discovery, and problem-solving are prominent.

1.135E’sLearningconstructivistcycle

There are three standardized learning cycles in practice namely 4E’s, 5E’s and 7E’s thatincorporate constructivist principles. For the present study 5E’s learning cycle was considered inviewoflevel of learnersand nature of content.

The5E’slearningcycleincludes5phases

(1) Engage

(2) Explore

(3) Explain

(4) Extendand

(5) Evaluation.

Each phase has sound theoretical support from the cognitive development theoryof Jean Piaget (Renner & Marek, 1988)and applies constructivist learning procedures. The learning cycle ensures that through structured learning experiences students can easily develop their own ideas and explanations.Teachers will facilitatestudents to make use of pastknowledge and experiences and create connection between what students already know and what students are learning in the class at the moment. The links between the phases are depicted in the diagram below.

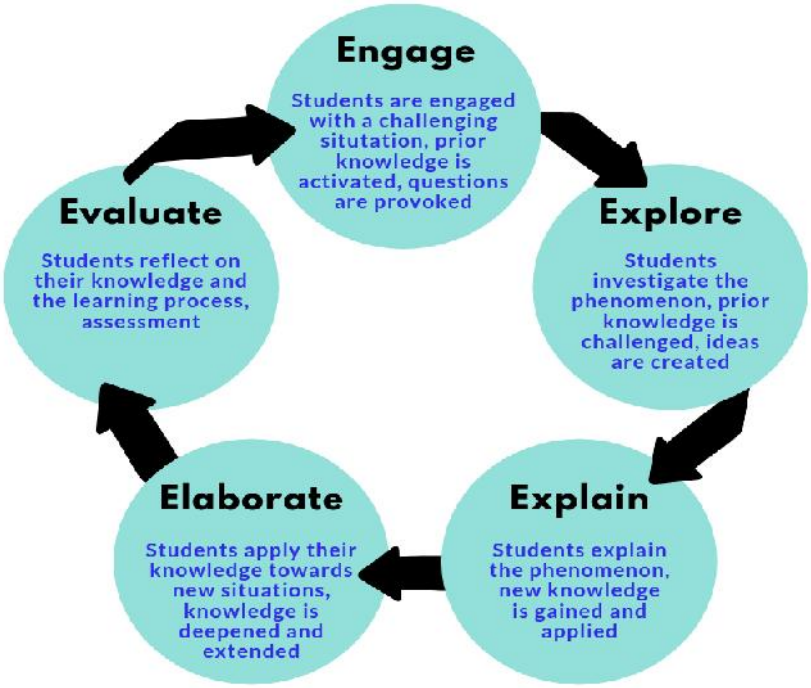


Fig.1Interlinkageofphasesof5E's

Thedescriptionsaboutthefivephases

(i) Engage

Throughout the first phase, teachers must engage students in their initial encounter and identify what students need to learn, create a plan for all the activities that are required for learning to be successful, and stimulate the students to participate in learning activates.Through teaching techniques like questioning, explaining an issue, demonstrating a surprising incident, or acting out a difficult circumstance, students might be engaged and focused on the learning goals.

(ii) Explore

In the second phase, students have the chance to have real-life experience with the learning concepts and materials. These activities invigorate students to better understand what they learned and solidify their theoretical base. This phase involves activities like group work which develops the spirit of collaboration and team spirit. The teacherwill facilitate the students and the provide resources that will enable

student’s learning. Students are encouraged to raise their doubts and queries.

(iii)Explain

In the third phase, the studentsbegin to translate their abstract experiences into a communicable form. Language enables individuals to arrange events in a logical order. Peers, the facilitator, and the learner himself all communicate with one other. As they verbalize their observations, thoughts, questions, and hypotheses in groups, learners reinforce one other's understanding. The tool of communicable labelling is provided by language. These labels, when added to abstract exploratory elements, allow the learner to share their findings. The facilitator's explanations can provide labels for historical and standard language on discoveries and events. The use of a common language between the facilitator and the students improves sharing and communication.

(iv) Extend

In the fourth phasethe students apply their knowledge in real world situations. This also provides feedback in the form of concrete understanding of what the students learned. By applying knowledge in to real world situations and experiences, students get their firsthand experience into the world of research.

(v) Evaluate

The final phaseis the evaluative phase where a constant evaluation process takes place through the teachers whose main task is to determine whether the students have satisfactory command over concepts. Evaluation can take place formatively or summative. Some of the tools that aid in this evaluation process are rubrics based on the lesson design, teacher’s observation checklists, student portfolios, interview schedule and embedded assessments.Displays of achievement and growth help all parties engaged in the educational process to understand each other better and can serve as a stepping stone for further development of students' education. These learning evidences assist the teacher in lesson planning and may indicate the need for modification or a change of course. The constructivist ideology has a cyclical structure because it views the evaluation process as a continuous one. The learning

process is flexible and open-ended.

1.14Teacher's influence on constructivist teaching

The task of a teacher is a very difficult one when it comes to constructivist pedagogy. Since constructivism removes the strict control of teacher over the teaching learning process by a considerable margin, as compared to traditional teaching, there are various variables teachers need to encounter that can make or break the classroom. A teacher acts like an investigator who has to constantly evaluate a student's learning process while also acting as a facilitator who has to constantly encourage the students to focus on creating new ideas.

Constructivist teaching uses the constructivist learning theory as its foundation.According to this theory, learning happens as a result of accommodating past knowledge into new knowledge. According to the constructivist viewpoint, individuals' later formed behaviours and ideas are built on previously generated conceptions, and learning is a process in which learners make correlations between their current knowledge and new ideas and experiences (Oludipe & Oludipe 2010).

The teacher must encourage the students to generate their own ideas and reinforce their knowledge through questions and encouraging feedbacks. The function of the teacher, according to Akinoglu and Tandogan (2007), is to begin and lead the learning process. The teacher should create a conducive environment for constructive learning that involves active participation and learning new things through inquiry. Teachers should take a back seat and avoid imposing their viewpoints. Students should be free to explore and experiment with different ideas while collaborating with their peers to discover new things. Yager (1991) concentrated on specific constructivistteaching techniques and instructional methods based on Piaget's principles.These teaching strategies represents what a constructivist teacher should do to create a constructivist learning environment.

a) identifying and utilizing student questions to steer teaching.
b) embracing and supporting student idea generation.
c) encouraging student self-regulation and action
d) directing lessons based on students' experiences
e) encouraging student to draw inspiration for their ideas from diverse sources.

f) using open ended questions whenever it is deemed practical

g) asking students questions that allow students to elaborate themselves freely.

Class Management and Organization

Teachers have always held the highest position in classrooms since the beginning of time. The popular consensus was that students are like a blank slate that needs to be filled with knowledge, and they are considered the reservoir of wisdom.Therefore, the teacher was essentially in charge of the classroom. However, things are different in a constructivist classroom, where the teacher plays the managerial role and guides the students whilebeing non-interfering and assisting them only when needed. According to the constructivist perspective. collaboration should be promoted for good class administration and organization,

Teachers should ensure that every student is actively participating and are consistently receiving positive reinforcement. During teaching, teachers are required to offer feedback, make remarks, or voice their opinions. Classroom activities like group work, brainstorming, class quiz etc. ensures that every student is given an opportunity to express themselves.

Constructivist educators believe in promoting and supporting student empowerment. Students' autonomy and empowerment can only be realized if they are made to be more active in the learning process, which may be accomplished by asking more probing, relevant, and effective questions that encourage them to reflect and generate their own ideas. Students develop greater awareness and control over their thinking when they have the freedom to openly ask questions and clarify their doubts.

The constructivist teacher must apply the indirect method of control. Rather than giving out strict orders and enforcing rigid guidelines, the teacher should instead direct student towards the right kind of behaviour which will promote self-discipline. By giving students certain authority and responsibility, the teacher is indirectly controlling the mood and attitude of the students without being apparent. A constructivist classroom does not have to deviate from the curriculum or school rules and regulations. Rather than imposing strict duties, teachers can encourage discipline and order by engaging students in responsibilities, such as maintaining cleanliness,

cleaning the blackboard after every class, taking roll call etc. Active student engagement, customized curricula, and the redistribution of power, authority, and responsibility are just a few of the factors that lead to a healthy student-teacher relationship.Constructivism offers all instructors, regardless of discipline, a platform and chance to construct classroom settings inway that promotes self-discipline.

Evaluation

An important role played by a teacher is that of an evaluator. It is essential because it lets the teacher and the student know about the progress of students. It also help judge the effectiveness of the teaching learning practices taking place in the class. Evaluation always indicates that there is a clear aim for training, and the expected progress is tracked by the assessment programme. The most popular form of evaluation in schools nowadays is based around objective evaluation. As a result, what teachers are actually evaluating is the ability of students to recall information. The purpose of a popular assessment activity is to eliminate biases and teacher's judgement from the grading process.In most instances, the teacher chooses the substance and phrasing of the questions, and students are expected to deduce the answers as intended. They must offer replies that correspond to those provided by the teacher. Responses that are unique and distinct are not encouraged. The only thing objective tests can disclose is pupils' knowledge and how well it matches the knowledge of the teacher. In contrast, the constructivist viewpoint encourages students to propose alternate ways to resolve a problem.

From a constructivist standpoint, evaluation should focus on the thought process. This can be accomplished by employing a variety of approaches, tactics, and strategies aimed at revealing the individual's knowledge building. Techniques such as idea mapping, Venn diagrams, scaffolding, performance-based assessments,portfolios, peer teaching and team testing can be employed in constructivist classrooms. This will allow students to express their thoughts and opinion on the difficulty of the content and be able to share their grievances with the teacher, thus allowing teachers to create better tests that can bring out the best from the students. From a constructivist perspective,tests should accommodate the various areas of cognitive learning. It shouldn't merely focus on recall and recollection but

also test a one's ability to device solutions to complex problems.

1.15Comparison between constructivist classroom with traditional classroom:

Table-1.2 Comparison between traditional and constructivist classroom

Sl. No	Traditional Classroom	Constructivist Classroom
1.	Topics are covered from part to whole	Topics are delivered in its entirety, with a focus on broader themes.
2.	The teacher takes a commanding and authoritative position.	Teacher interacts/negotiates with students
3.	Teacher plays the role of information giver.	Teachers are often involved and oversee the learning environment for students.
4.	High priority towards following strict guidelines of the curriculum. Teachers ask lots of questions. Textbooks and workbooks are heavily used in classroom activities.	Innovative teaching methods are incorporated in existing curriculum. Primary sources of data and interactive materials are frequently used in curriculum activities.
5.	Students are expected to be passive listeners to a teacher's lecture	Students are seen as active learners capable of critical thinking.
6.	Student learning is evaluated through standardised tests.	Student learning is evaluated simultaneously with teaching.
7.	Students learn independently and rarely discuss with their peers	Students usually work in groups to further expand their learning capabilities
8.	Teacherexpects students to give answers that are in line with their own ideas.	Teachers expect students to express themselves and share their inputs through their own unique perspective.

9.	Introductory and basic skills are prioritised. The importance of pre-defined and established programmes cannot be overstated. The programme is viewed as a void that teachers must fill. Teachers look for real answers to the questions they ask their students. The evaluation is carried out to assess student learning and is usually quantified through tests.	Deduction skills are prioritised. Students are divided into groups to study. Deduction and basic concepts are used to provide education. The programme is guided by the queries of the students. Firsthand data and used materials carry the most weight in programme operations. The student is viewed as a critical thinker who contributes to life and applicable rules.
10.	Knowledge doesn't change, it is simply transferred.	Knowledge is dynamic and changes with experiences.

1.16Essential components to constructivist teaching

If we want to use constructivist ideas in our classrooms or while constructing programmes, we must incorporate many key components.According to Baviskar, Hartle & Whitney (2009), the following are some of the essential components that teachers should keep in mind in a constructivist classroom.

(i) Bring out prior knowledge

Every student arrives to class with preexisting knowledge about the world. A teacher must make use of such prior knowledge to form a connection with newer concepts so that students can understand topic better. As a result, teachings require the articulation of relevant previous knowledge. Warm-up activities and pre-test can help teacher understand a student's state of mind before starting a new topic

(ii) Create cognitive dissonance

Students should be challenged with new information, especially ones that

do not conform with their prior beliefs. Projects and activities that require thorough study of a topic can give the students the much-needed challenge and engagement. Learners gain knowledge when they work through the challenging difficulty by meeting new challenges and revisiting prior schemas.

(iii) Application of knowledge

Teacher should encourage students to take in new knowledge and accommodate it with their prior knowledge. Students can be provided activities that lets them compare their preexisting knowledge to the new situations and scenarios. Activities like classroom presentations, class discussions, brainstorming etc. are activities can allow students to do these tasks while getting feedback from their teacher.

(iv) Reflective learning.

Teachers should develop in students the ability to evaluate what they previously knew in the context of what they newly learned. Reflection helps them revise their preexisting knowledge and make room for the new knowledge. Viable activities to encourage reflection are debates and discussions.

(v) Cooperative learning

Collaboration and cooperation allows students to take advantage of not just their own insights and ideas but ones of their peers too. Working together in groups not only enhances learning and development of new ideas, but also creates tolerance and respect of ideas and opinions opposing one's own.

1.17 Research Position on Constructivism

Constructivism has been a hot topic of discussion in the field of educational research for a very long time. There have been various studies with regards to constructivism, most of them focusing on the effectiveness of constructivist philosophy in teaching various subjects. Topics related to teacher education has also been covered. Information on research studies conducted on constructivism in India can be obtained from survey books published by M.S. University, Baroda and

NCERT, New Delhi. In total, 731,839, 1481, and 1652 research studies were assessed in the first, second, third, and fourth surveys of research in education. Analysing these research books, it is apparent that there have been very few studies with regards to constructivism, let alone its application in Indian schools. There are just a few studies explicitly or indirectly related to constructivism or constructivist techniques in teaching and learning, most of which involvedinformation processing family. Out of the twenty-four studies reported in Fifth Surveyof Educational Research on the models of teaching, one is a critical review ofresearch done on the Information Processing Model while two are reviewstudies on the research done on Concept-Attainment Model(Khan,&Siddique,.2004). The other research is of an experimental nature and is being undertaken at the school or teacher-training level. Individual models, such as the Advanced Organizer Model, have been contrasted with the Concept Attainment Model in various research by Sood, K. (1990), Jaimini, N. (1991), and Mahajan, J. (1992). In addition, the Concept Attainment Model was compared to the Inquiry Training Model (Singh.1990).

The Sixth Survey of Educational Research (1993-2000) shows in total 18 studies based on themodels of teaching. Studies conducted on the Concept AttainmentModel were undertaken by Joshi & Patra (1993); Saxena (1994); Ayishabi (1996); and Kumar& Kaur (1998). Mishra (1998) andSaminathan (1999) conducted studies on Information Processing Model, while Panda (1994) and Patnaik & Mohanan (1993) have conducted studies on Advanced OrganizerModel. However, no research in India have been discovered that demonstrate elementary school teachers' knowledge, attitudes, or behaviours in regard to constructivist approaches to teaching and learning.

The investigator discovered a few constructivism studies conducted abroad and a few in India, largely on constructivism-related teaching approaches. In Chapter II, the studies' findings will be reported. In Mizoram, there has been very few studies done on constructivist models of teaching.

1.18 Present Status of Secondary Education in Mizoram

According to theGovernment of Mizoram's Annual Publication 2017-18, the most recent secondary education statistics in Mizoram are as follows. Mizoram now has 669 high schools and 175 upper secondary schools, which is a fair quantity for the state's small population. However, there are still distant and rural locations where there are no high schools in the immediate proximity. Government (Central, State, and RMSA), Deficit, Ad-hoc Aided, Lump Sum Aided, and Purely Private are the various sorts of schools. The following table shows the distribution of schools on the basis of management.

Table 1.3 Distribution of Schools (based on management)

Management	**Secondary**	**Senior secondary**
Central	11	5
State	198	20
Private	203	119
RMSA	92	15
Ad-hoc Aided	129	13
Lump-sum Aided	27	11
Deficit	9	7
Total	669	175

Source: Annual Publication 2017-2018, DSE

Table 1.4 Distribution of Schools (by district)

District	Secondary	Senior secondary
Aizawl	223	79
Lunglei	118	32
Champhai	93	16
Lawngtlai	60	16
Kolasib	45	8
Mamit	45	4
Serchhip	45	11
Siaha	40	9

Source: Annual Publication 2017-2018, DSE

The distribution of schools among the districts presents a very uneven distribution with a third of the schools concentrated in Aizawl District. The scenario for senior secondary schools in even worse with Aizawl District hogging nearly half.

Table1.5 Enrolment of Students (based on management)

	Secondary		
Management	**Male**	**Female**	**Total**
Central Govt.	377	306	683
State Govt.	6569	6997	13566
Private	5582	5069	10651
RMSA	1301	1214	2515
Ad-hoc Aided	2906	3163	6069
Lump-sum Aided	554	575	1129
Deficit	1213	1581	2794
Total	18502	18905	**37407**

Source: Annual Publication 2017-2018, DSE

Most of the students are enrolled in private or state run schools with very few enrollment in central schools. As a result, it is clear that the governments, both state and federal, must enhance school enrollment. The proclivity of the wealthy to enroll their children in private schools may result in undesired social stratification, increasing elitism among the youngsters. Furthermore, a lack of government monitoring and assessment in these institutions has resulted in overcrowding beyond appropriate boundaries.

Most of Mizoram's population is urbanized, with Aizawl having the highest population density. Majority of the school aged population is confined to larger districts which acts as commercial and educational hubs. Aizawl and Lunglei Districts account for about half of secondary school enrollment. Such an uneven distribution of enrolment is a roadblock for the state's potential for educational growth and reflects negatively on the state's developmental efforts. Measures to lessen the discrepancy in enrolment across districts must be implemented. Mizoram's secondary school GER is 109.02. Mizoram has far higher GER statistics in secondary education than the national average, with figures above 100, while the national

average is still around 80. When GER levels surpass 100, it suggests that students from other age groups are attending secondary school. However, Mizoram's education system benefits from a positive teacher to pupil ratio.. The majority of secondary and senior secondary teachers are well-educated, but many are inexperienced, resulting in a significant backlog in teacher training.

Table 1.6 Distribution of Teachers of Secondary Stages based on Management type.

	Secondary		
Management	Male	Female	Total
Central	60	18	78
State	895	384	1279
Private	789	422	1211
RMSA	378	223	601
Ad-hoc Aided	615	237	852
Lump-sum Aided	85	42	127
Deficit	73	53	126
Total	2895	1379	4274

Source: Annual Publication 2017-2018, DSE

Most of the teachers are confined to bigger towns and densely populated districts. There also exists a wide discrepancy in terms of gender equality. It is also clear that the vast majority of teachers work in the private sector. Most teachers work in the private sector where they are not provided with adequate training and emoluments. Private school teachers receive fall fewer benefits compared to their government counterparts and this issue needs to be addressed to improve the standard of teaching in Mizoram.

A low pupil-teacher ratio is considered ideal for good learning environment. It indicates advanced educational growth and is desired at all stages of learning. In comparison to national norms, Mizoram has a very good pupil-teacher ratio. In both the secondary and senior secondary sectors, Mizoram's PTR is one-third of the national average. Although low PTRs indicate a good educational system, only a more comprehensive and exhaustive analysis might show the true situation.

On the other side these numbers reveal that educational funds are not being managed properly. There is a dire need for detailed studies in this regard to alleviate the problem and ensure the state manages the education system effectively and efficiently.

Table1.7Overall Results of Class X (2019)

	Male	Female	Total/Average
Appeared	8328	9018	17346
Passed	5778	6005	11783
Pass Percentage	69.38	66.59	67.93

Source: High School leaving Certificate Examinations 2019, Mizoram Board of School Education.

Although Mizoram can pride itself in having high literacy, the pass percentage is still very poor, even though it surpasses more developed states of this country.

1.19 Rationale of the Study

Secondary education serves as a foundation for further education, research, and contributions to the growth and progress of humanity and the nation. If secondary school students can grasp concepts properly, they will be able to quickly progress to higher education and secure their future.

There is a shortage of secondary school teachers in Mizoram, as a result of which children are often found to be behind in their studies. To teach the different subjects in secondary school teachers must use a constructivist approach. Secondary school teachers and teacher educators working in teacher education institutions such as DIETs, IASE and Department of Education, Mizoram University must ensure that teacher trainees and in service teachers are adequately oriented and trained to implement constructivist teaching methods.

To ensure that constructivist approach to teaching and learning is practiced and implemented properly, we need to understand the current situation of the schools. It is crucial to have a thorough understanding of the current state of

knowledge, awareness and practices of the current teaching workforce of Mizoram to implement policies and changes to the education system.

1.20 Research Questions

1. Are Mizoram's secondary school teachers well familiar with the constructivist method to teaching?
2. Is there a difference in awareness of the constructivist method to teaching and learning among Mizoram secondary school teachers in relation to their teaching subject?
3. Do the secondary school teachers of Mizoram practice constructivist teaching methods in their classroom?
4. Is there a difference in the practices of Mizoram's secondary school teachers when it comes to the constructivist approach in relation to their teaching subject?
5. How often do the secondary school students of Mizoram practice constructivism in their learning practice?
6. How do Mizoram's secondary school teacher perceive constructivism as a theory of teaching and learning?
7. Is there any relationship between awareness, practice and perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy?
8. What are the difficulties and challenges faced by secondary school teachers of Mizoram with regard to the adoption and practice of constructivist pedagogy?

1.21 Statement of the Problem:

While there has been various research work done on constructivist teaching learning approaches and practices, none have focused on secondary school instructors and students in Mizoram. It is critical to understand the present degree of understanding of constructivist teaching and learning techniques in Mizoram secondary schools so that relevant agencies may implement new policies and changes to enhance the education system.

Although constructivism and constructivist teaching learning theories is no longer a novel concept in our present day world, the fact that it is still out of the reach for many students shows how much we falter behind when it comes to educational development. In Mizoram, like the rest of the country, traditional teaching practices

that is dominated by lectures and rote memorisation is still prevalent. Schools as well as the guardians of the students are still fixated on high scores in exams which has encouraged detrimental learning practices among students. Teachers lack the training and expertise to educate students using a constructivist method due to lack of awareness, lack of in-service and pre-service training, lack of sincerity towards their profession, and various other factors. Support for research is required to uncover the root of this problem and deal with the issues that plague the current education system. Despite the fact that various literatures have been produced in this regard, very few imperial investigations that highlight grass root problems are available

To reveal the answers to the research questions stated above and get satisfactory resolution to the underlying issue, the following research problem is proposed to be undertaken:

"Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study".

1.22 Delimitation of the Study

The research is delimited to four (4) districts of Mizoram namely Aizawl, Mamit, Lunglei and Kolasib.Further, it was delimited to the government schools affiliated to Mizoram Board of Secondary Education

1.23Objectives of the Study:

1. To assess the awareness of secondary school teachers of Mizoram relating to constructivist approach to teaching and learning.
2. To compare the awareness of Secondary school teachers of Mizoram relating to constructivist approach to teaching and learning with reference to their teaching subjects (English, Math, Science, Social Science).
3. To reveal the practices of secondary school teachers of Mizoram in adopting constructivist pedagogy and role.
4. To compare the practices of secondary school teachers of Mizoram in adopting constructivist pedagogy with reference to their teaching subjects. (English, Math, Science, Social Science).
5. To reveal the learning practices of secondary school students of Mizoram in the

context of constructivist approach.

6. To compare the learning practices of secondary school students of Mizoram in the context of constructivist approach with reference to their gender.
7. To find out the perception of Secondary School Teachers teaching different subjects in Mizoram adopting Constructivist Teaching-Learning Approach
8. To compare the perceptions of Secondary school teachers of Mizoram relating to constructivist approach to teaching and learning with reference to their teaching subjects (English, Math, Science, Social Science).
9. To find out the relationship between awareness, practicesand perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy.
10. To compare the relationship between awareness, practices and perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy.
11. To reveal the constraints of secondary school teachers of Mizoram in adopting constructivist pedagogy.
12. To suggest measures for successful implementation of constructivist pedagogy in teaching and learning of different subjects in secondary schools of Mizoram.

1.24 Hypothesis of the Study

1. Secondary school teachers of Mizoram are aware of constructivist approach to teaching and learning.
2. Secondary school teachers of Mizoram teaching different subjects adopt constructivist pedagogy in teaching.
3. There is no significant difference in the awareness of secondary school teachers of Mizoram teaching different subjects relating to constructivist pedagogy in teaching.
4. There is no significant difference in the practices of secondary school teachers of Mizoram teaching different subjects adopting constructivist pedagogy.
5. There is no significant difference in the perception of secondary school teachers of Mizoram teaching different subjects adopting constructivist pedagogy.
6. The secondary school students of Mizoram practice constructivist approach in their learning practices.
7. There is no significant difference among secondary school students of Mizoram

adopting constructivist approach in their learning practices with reference to gender.

8. There are no constraints faced by secondary school teachers in Mizoram in adopting constructivist pedagogy.

1.25 Operational Definitions of Key Terms Used:

Various words have different implications depending on where they are used. The terms used in the topic title in this study have the operational definitions listed below.

1. **Constructivist approach**:The term 'constructivist approach' in this study refers to learner-centered education in which learners utilize their prior experiences to construct information, rather than knowledge supplied to them in fully structured form.
2. **Teaching-Learning process**: In the present study, 'teaching-learning process' implies the process of:
    a) delivery of information/knowledge to the learners by the teachers
    b) receiving of information/ knowledge by the learners and
    c) organizing or carrying out activities through which the learners construct knowledge
3. **Secondary schools:** In the present study, secondary schools mean those schools comprising of classes IX and X.
4. **Critical study:** The term 'critical study' in the title of the present study refers to a study that analyses, examines and criticizes different aspects of the area of the study wherever applicable so as to come with a certain measure for improvement in the area of the study.

CHAPTER II
REVIEW OF RELATED LITERATURE

"A literature review is an account of what has been published on a topic by accredited scholars and researchers. In writing the literature review, your purpose is to convey to your reader what knowledge and ideas have been established on a topic, and what their strengths and weaknesses are. As a piece of writing, the literature review must be defined by a guiding concept. It is not just a descriptive list of the material available, or a set of summaries"- D.Taylor

2.0 Introduction

A literature review is a detailed description of past research on a certain issue. The literature review examines academic papers, books, and other materials that are pertinent to a certain field of study. This past study should be enumerated, described, summarized, objectively evaluated, and clarified in the review. It should provide a theoretical foundation for the research and assist the researcher in determining the nature of their study. The literature review recognizes prior researchers' efforts, assuring the reader that the study is well-conceived. By acknowledging a previous work in the subject of study, it is expected that the author has studied, evaluated, and assimilated that work into the task at hand.

According to Wikipedia an Encyclopedia (2012) "A literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic." According to Moully (1984) the review of the related literature is essential to the development of the problem and to find out the best approach to finding its solution.

Review of the related literature allowsa researcher to be informed about the current state of knowledge and past researches in his or her field of study. It helps the

researcher to delimit and define his problem. Best (2010) states that, “A familiarity with the literature in any problem area helps the student to discover, what is already know, what others have attempted to find out, what method of attack have been promising or disappointing, what problems remained to be solved etc., ”The study of related research work is critical for making the research more successful since the outputs, learned information, and methodologies employed in earlier linked literature are critical in building a good research study. As a result, prior research and associated material must be considered for each investigation.

This chapter will cover the review of some of the available literature that is considered relevant to the study. It involves a thorough check and formal examination of the findings of various research works, articles, abstracts, information published in journals, newspapers and internet which had close connection with the area of investigation and the problem undertaken for research. The purposebehind it is to justify the need for the study by identifying the existing knowledge gaps, highlighting the relationship between the past and current study and taking a deep look into the research problem. With the forgoing in mind, the scope of the review included researches conducted in various parts of the country and outside the country

2.1 Importance of Review of Related Literature

A review of related literature assists the researcher in becoming well versed with current knowledge in the topic or area in his field of study.It is important because of the following:

- The review of related literature assists the researcher in defining and narrowing the score of study. Being aware and informed about linked literature keeps the researcher up to date with the work of other researchers,enabling the articulation of objectives clearly and simply.
- It prevents the researcher from engaging inirrelevant problems. He can select those areas where he can achieve positive results and the findings of his studies can contribute to development and evolution of knowledge.
- It helps the researcher to avoid areas that has already been studied, or avoid areas where his study will have irrelevant impact.

- Most studies have recommendations for further studies. Literature review can give inspiration for studies in areas that need further expansion of knowledge.
- It provides the researcher with an idea of the research technique and how the investigation will be carried out. It informs the researcher about the tools and equipment that have proven to be beneficial and promising in past investigations.

2.2 Studies related to constructivist teaching and learning

Curriculum transaction has long been concerned about a shift in teaching methodologies toward constructivism. Constructivism has a significant presence in research on teaching and learning at many levels. This section discusses some of the researches that are relevant to the current study.

Aslan, Arslan &Aydin (2021) conducted an evaluative study on 'Constructivist Approach in High School Teaching Process: A Scale Development and Validation'.The goal of this study was to assess students' educational experiences in Turkey in terms of basic concepts and methodologies based on the constructivist approach..Their findings suggested that the scale was compatible on both an item and a factor level, and that it was capable of serving the intended functions. It was concluded that the scale had construct validity. The feedback acquired based on the assessments of students enrolled in science high schools may play an important role in resolving these challenges by highlighting the flaws and errors linked to educational issues. This scale, it is hoped, will lead to more research.

Jemberie (2021) conducted a study onteachers' perception and implementation of constructivist learning approaches: Focus on Ethiopian Institute of textile and fashion technology, Bahir Dar.The primary goal was to energise instructors' perceptions and application of constructivist methodologies. The research focused on well-known constructivist approaches. The results also rekindled instructors' enthusiasm for constructivist learning. A descriptive survey design was used which included 82 teachers who had been teaching second year and higher in one of the three programmes offered at the time. The data was gathered via a questionnaire. The questionnaire had 18 questions, 10 of which assessed teachers' constructivism implementation and eight of which assessed teachers' perceptions on

constructivist learning and practices. The findings suggested that around half of the teachers positively viewed and applied the indicated constructivist techniques, while the other teachers continued to employ these methods in a traditional manner. Furthermore, teachers proved to be more constructivist in their knowledge and use of individual work techniques when compared to group-work activities. Teachers who participated in pedagogical workshops had a favourable opinion of constructivist learning and applied it appropriately, compared to teachers who did not. The findings offer significant insights into instructors' perspectives and the implementation of constructivist learning and teaching methodologies in higher education.

Roy and Saha (2021)published a paperonessence of 'SocialConstructivist Approach in Teaching-Learning Scenario and Revolving Questions on Its Relevance in Technological Era' and mentioned that constructivist teaching cultivates reflective thinking, critical thinking, and problem-solving skills in students, allowing them to apply what they've learned in real-life settings. It fills in all of the gaps in the old educational system. In comparison to the traditional approach, the constructivist approach is a new paradigm in teaching and learning that simultaneously encourages students to be actively involved in their learning activities. Students should be involved in their ideas and activities so that they can develop their own meaning in a collaborative problem-solving environment fostered by the teacher.It aids students in constructing new knowledge and understanding from material and information that has been digested. Though rapid technological advancement and enrichment have a significant impact on several areas of the teaching-learning system, it is difficult to determine if the use of technology in education is a blessing or a curse for students in today's world. However, this strategy motivates students to participate in their learning by asking meaningful open-ended questions that enhance social interaction and influence practical learning.

Akpan (2020)published an article in the 'British Journal of Education titled Social Constructivism: Implications on Teaching and Learning', which highlighted social constructivism as a learning theory and its implications on teaching techniques, students' learning motivation, and the overall teaching/learning process. According to Akpan (2020), "social constructivism is a collaborative learning approach that

emphasises student involvement, debate, and knowledge exchange". The teacher must use constructivist teaching practices that are student centred and encourages group work. In a constructivist classroom, students collaborate in groups to share ideas, solve problems and create new ideas. This learning paradigm emphasises active interaction among learners and with teachers. Among other benefits, it solidifies a student's foundation of a concept and students can quickly recollect facts and information if they themselves discovered it.

Ginga (2020)conducted a study Impact of a 'Social Constructivist Instructional Strategy on Performance in Algebra with an emphasis on Secondary School Students'.Low academic performance of students has always been a matter of concern among researchers and other education stakeholders. As a result, in the field of mathematics education, innovative teaching methodologies have gained traction. The goal of this study is to see how a social constructivist instructional style affects students' algebra performance. The studywas quasi-experimental, with 154 secondary school pupils randomly selected throughout four intact classes as the posttest control group. The validity of the results is thought to be improved by assigning students to treatment and control groups at random. The results indicated that the mean performance scores of the experimental and control groups varied significantly.These findings could be viewed as proof that the social constructivist instructional strategy is more effective than traditional teaching methods in increasing algebra skills.It was also revealed that there was a differencebetween the mean performance scores of males and females in the experimental group. As a result, the impact of the social constructivist instructional technique on students' algebra performance varies by gender.

Harjali (2019)conducted a study on 'Building Constructivist Learning Environment at Senior High School in Indonesia' where he examines how constructivist learning environment enhances students to be active participants in the classroom. Since students are at the center of learning, it is important to base instruction around student's worldview and perceptions. The goal of his study was to find out how teachers feel about using constructivism in a language class. Using the purposive sample technique, six teachers were chosen as participants. The findings of this study

shows that various elements such as teachers' support, task-oriented learning, deliberating cooperative activities, and applying relevant, critical, and negotiable learning influenced the majority of students' engagement in learning. Using constructive teaching learning methods, both students and teacher benefitted greatly, as it provided motivation for both students and teachers.

Mercy (2019) conducted a study to know the effectiveness of a 'Constructivist Instructional approach on students' Academic Achievement'. The results revealed a considerable disparity between constructivist and non-constructivist pupils' performance. The constructivist method has been shown to be more effective in raising student academic achievement.

Sarkar (2019)investigated the effect of a constructivist method on the academic achievement of senior secondary school science students. In this study, students taught using constructivist instruction outperformed those taught using traditional approaches in terms of academic achievement.

Prajapati (2019)conducted a study on'The effectiveness of constructivist approach of teaching-learning Process using 5e cycle in chemistry of acid-base conceptsat Schooling'.The major goal of this study was to see how efficient a 5E learning cycle model based on a constructivist approach was in improving tenth grade students' grasp of acid-base concepts when compared to standard Chemistry training. Thirty-nine tenth grade students from DMS School RIE Bhopal were involved in the study as part of a chemistry course (Acids and Bases topic) taught by the same teacher. The courses were split into two groups at random. Students in the first (control) group received traditional chemistry training, whereas those in the second (experimental) group received instruction based on the 5E learning cycle model.The findings showed that constructivist training resulted in much improved acquisition of scientific concepts linked to acid-base. The use of a constructivist approach to teaching and learning has resulted in significant gains in the learner's and teachers' performance. Both sets of students exhibited statistically equal growth in their attitudes toward chemistry as a school subject.

Fernando (2017)conducted a study on 'Constructivist Teaching/Learning Theory

and Participatory Teaching' and came with the following conclusions.1) Learning requires students to be active participant in classroom discourse; 2) Students' thoughts about the subject and topic being taught will be a part of their learning experience; 3) Learning is a dependent on social and cultural foundations.

Sandhu, B. K. and Rani, S. (2017) conducted a study on the effect of 'Constructivist approach on Academic Achievement of Elementary School' students in Hindi. It was revealed that academic achievement of students taught using a constructivist teaching approach was shown to be higher than that of students taught using a traditional teaching style.

Samaresh (2017) conducted a study on the effectiveness of 'Constructivist approach on Academic Achievement in Science at Secondary Level Students. The results showed that students who were taught using the Constructivist 7E model performed better than those who were taught using the traditional way.

Chowdhury (2016) investigated the effectiveness of 'Constructivist 5E learning on Mathematics Achievement'. To fulfill the objectives of research, qualitative cum quantitative method was followed by the researcher. Pretest Posttest two groups quasi-experimental design was employed. Thirty students in the Experimental group were taught using a constructivist 5 E learning strategy, whereas the remaining thirty students in the Control group were taught using traditional methods. The Mathematics Achievement Test (MAT) was used to assess IX grade students' mathematical abilities. In comparison to the previous way, data analysis demonstrated that the Constructivist Strategy greatly improved Mathematics Achievement. The 24 Constructivist 5 E Learning Approach has also proved to be equally successful for both boys and girls. When compared to knowledge and skill skills, students who were taught using constructivist teaching techniques had a considerably improved level of application and comprehension abilities.

Toraman and Demir (2016)conducted a meta-analysis associated to the previous studies on the effect of constructivist approach on student attitudes to lessons and to analyze their results. The researcher used the meta-analysis method, which involves collecting similar studies on a specific issue based on defined criteria and merging

the results. The study's findings demonstrated that students who were taught using the Constructivist Approach had more positive opinions regarding their lessons than students who were taught using traditional techniques. As moderating factors, only significant differences in lesson content were observed. When studies on student attitudes were taken into account, this conclusion was obtained. Overall, students' attitudes about science and technology teachings were shown to be more positive than their attitudes toward mathematics and other topics. The study's findings can be attributed to the fact that science and technology-based subjects are inherently more compatible with constructivist approach.

Siddiqui (2016)published empirical researchtitled 'Effectiveness of 5 E Learning Cycle Model of Constructivist Approach on ninth grade students' understanding of colloids. Pretest posttest control group quasi-experimental design was used in the research. The sample included 60 students of ninth grade belonged to two different sections of a secondary school in Kishanganj, Bihar, India. The understanding of colloids was tested using a self-developed Chemistry Achievement Test based on the idea of colloids, which has a Cronbach alpha reliability coefficient of 0.87. The difference between the pre- and post-test Achievement scores in Chemistry for each of these group was measured using a paired samples t-test. Because the differences in pretest scores were significant, ANCOVA was employed to ascertain the difference between the control group and the experimental groups. Data analysis using SPSS revealed that education based on the 5E learning Cycle Model considerably improved acquisition of scientific concepts linked to 'Colloids' when compared to standard Chemistry training.

Bhattacharjee (2015) in the article 'Constructivist Approach to Learning-An Effective Approach of Teaching Learning'studies the concept of constructivist learning, its major features, the contrast between constructivist learning and traditional learning, the role of the instructor in constructivist learning, the role of the student in constructivist learning, and the implications of constructivist learning.

Richard (2015) conducted a study on'Effects of Constructivist Teaching Approachon Students' Achievement in Secondary School Chemistry in Baringo North Sub-County, Kenya'. The researcher wanted to find out if the CTA technique

(constructivist teaching approach) could improve the learning capabilities of chemistry students. Purposive sampling was used to choose 160 pupils from a co-educational high school in Baringo North Sub-County. In the experimental group, the topic of "Structure and Bonding" was taught using a constructivist approach, while in the control group, a traditional teaching style was used. Before the therapy, the researcher taught the CTA technique to the Chemistry professors in the experimental groups. For three weeks, the experimental groups were given the Constructivist Teaching Approach (CTA). The t-test, ANOVA, and ANCOVA were used to evaluate the data. The study's findings revealed that the Constructivist Teaching Approach considerably enhanced students' Chemistry achievement. The findings of this study could help chemistry instructors, teacher educators, and help in developing better curriculum for the improvement in teaching learning process.

Thomas (2014) studied to find out whether the constructivist strategy enhances affective outcomes among integrated science students or not. Total 200 participants of grade 8 were involved in the study. The Affective Achievement Test with psychometric integrity and a non-equivalent control group design were utilized. The findings showed that employing the Constructivist Strategy increases affective outcomes. Students in a conductive psychosocial environment had better emotional outcomes than those in a nonconductive environment, according to the findings. There were no significant interactions between the variables. In terms of affective performance, there was no discernible difference between high and low cognitive performers.

Panigrahi and Tandel (2014) tried to test the development of metacognitive knowledge and regulation in science pupil-teacher of Gujarat through implementing 5E learning model of Constructivist Approach. Mixed method and convergent parallel mixed method was used. The researcher chose 10 B.Ed. students from Palanpul tehsil, Banaskantha district, from both urban and rural colleges. The study employed observation, interview, reflection essay, and a self-developed metacognitive skill checklist. Although the results suggested that laboratory experiences provide a better setting for metacognitive skills than classroom learning, the researcher recommended that the study be replicated due to the wide range in the

results.

Mehar and Singh (2014) conducted a study entitled 'Effect of ConceptMapping Strategy on Achievement in Biology in Relation to Attitude towardsBiology' and found that students who were taught using the concept mapping approach performed much better in biology than those who were taught using the traditional teaching strategy.

Mishra(2014) in his article 'Teaching Social Science throughConstructive Approach at Secondary Level', Mishraemphasizes that constructivism is the methodology used by the NCERT's national curriculum framework (NCF)-2005. It is an important instructional document that serves as the foundation for all contemporary educational operations. As a result, while developing and implementing the social science curriculum via the use of constructivist techniques and suitable instructional materials, the emphasis should be on the essence of constructivism as described in the NCF-2005.

Kalpana (2014) conducted a study entitled 'A Constructivist Perspective on Teachingand Learning: A Conceptual Framework'where she sought to examine constructivist teaching and learning by investigating constructivist theory and its two manifestations, psychological and social, as well as the construction of a constructivist classroom. The paper underlines the significance of constructivism theory in the present information explosion brought about by technology advances.

Rout (2014) in their article 'Constructivist Approach inTeacher Professional Development: An Overview' shed light on professionaldevelopment as a critical component in the implementation of the NCFTE-2009.He claimed that outcome-oriented environments benefit a lot more when teachers are trained on constructivism. He recommended a shift in teacher professional development from a mechanistic perspectiveto a holistic perspective.

Mehta (2013) conducted a study on conceptual understanding of constructivistpedagogy highlighting the characteristics of constructivist pedagogy, role ofteacher and suggested that more conceptual clarity is needed for

practicalaspects of adopting constructivism in India classroom.

Sridevi (2013)undertook research to determine if a constructivist approach to scientific instruction may improve eighth-grade students' perceptions of science. The schools for the study were chosen via purposeful sampling. The researcher created the Perception of Nature of Science Test, which was given before and after the treatment. The analysis of covariance test was employed to control the starting variance. Constructivist teaching was shown to be more successful than traditional education in terms of 8th grade students' conceptions of the nature of science. It was also revealed that the constructivist method was equally useful in improving both boys' and girls' achievement and attitude toward science. The findings corroborate studies that supports the positive impact of constructivist learning methods, as well as the idea that a constructivist approach to teaching science is more effective when compared to traditional methods.

Jena (2012)discovered that cooperative spider idea maps were more successful than individual modes of spider concept maps in his study on the application of constructivist method using concept map to create meaningful learning in science.

Dangel,J.R (2013)in his analysis of research on constructivist teacher education, discovered that the relevance of constructivism in educational theory and research cannot be overstated, and its impact on educational practice is debatable.

Gundogdu (2010)published an article where he used a quasi-experimental pretest-posttest control group design to discover that constructivist methods and materials were particularly effective in changing teachers' attitudes about human rights education.

Khalid (2010)led elementary kids outside of the classroom to solve a real-world problem. They required the students to employ the Cognitive Research Trust (CoRT) thinking technique in order to determine the origins, consequences, and potential solutions to the problem.

Bose(2010)conducted a

studytitled‘LearningCollaborativelywithWeb2.0Technologies:Puttinginto Action Social Constructivism’ which involved twenty-four teachers from twelve senior secondary schools. Data was collected usingquestionnaire and interview schedule. The study's conclusions were as follows:

i. The first choice of all the respondents was the internet.Other sources of information used by the respondents included newspapers, reference and course books as well as television.
ii. All the students possessed basicskills in ICT applications such as word processors and presentation applications.Majority of the students preferred using social networking websites.
iii. Only 15% of the assignments were designed to be completed in groups. Even for assignments that were supposed to be done alone, students had regular interactions with their peers.

Neo (2010) conducted a study titled ‘Students’ PerceptionsinDeveloping MultimediaProjectwithin a ConstructivistLearningEnvironment:A MalaysianExperience’.The sample comprised of 53 students in their 2nd year of the degree course.The study revealed that when authentic task was included in the classroom teaching, students became highly motivated and became more active in classroom discussions. It also encouraged the teachers to incorporate multimedia in their teaching. Teamwork and collaboration, motivation for the project, increased and enhanced learning skills, the learning environment, and application of skills obtained were all found to be substantially connected with multimedia development.

Gijbels (2009) conducted a study where two groups of students completed questionnaires measuring their approaches to learning in a pre- test post- test design. The amount of student feedback received from both the groups was vastly different due to the fact that one groups was introduced with constructive teaching practices while the other used traditional methods. The study revealed that a constructivist learning environment shifts learning techniques toward a more in-depth approach with greater feedback.

Demirci (2009)revealed that constructivist learning theory applied to sociology and anthropology revealed a significant difference between the means of achievement and retention in learning scores. Constructivist learning theories produce more positive outcomes than other approaches.

Chan (2009)revealedthatCognitive apprenticeship in teaching, as recommended by social constructivist educators scaffolds upon students' zones of proximal development and applied by teachers of instructional technology, has been found to be particularly effective.

Karaduman and Gultekin (2007) had studied the efficacy of constructivist learningprinciples-based Learning materials to students' attitudes, success and retention in social studies.The findings of this study suggest that teaching content produced using constructivist learning principles improves students' academic success and retention in Social Studies courses. Additionally, pupils regarded the constructivist learning principles-based content to be suitable.

Wessa (2009)studied the implementation of a new e-learning environment that supports non-rote learning of exploratory and inductive statistics within the pedagogical paradigm of social constructivism. His study revealed that courses that emphasised constructivist learning lead to better performance in objective exams that focused on conceptual knowledge The study also showed that when students engaged in constructivist learning they could reproduce results and reuse the results in research.

Gainsburg (2009)conducted a study titled'Creating Effective Video to promote student-CenteredTeaching'. The film enabled teachers to teach in a constructivist manner (as recommended by the investigator) by allowing the PSTs to develop their own knowledge of each subject via the investigation of real classrooms rather than accepting definitions. To conclusion, the investigator believes that the film delivered the benefits of professional video while also overcoming its weaknesses for this

year's PSTs. It was, of course, more difficult to analyse what his PSTs understood as a result of this film than it was to assess how easy it made his job of delivering the course. Because the course has a small enrollment (about 20 students each year), it's difficult to separate the impact of the film from the personal characteristics of the PSTs in each session. Aside from that, the investigator drew information from three sources to imply that the video achieved the desired effect. These were: 1) grades, attendance, and participation records (both formal and informal), 2) a video-analysis assessment, and 3) PST self-report.

Smith (2008)conducted a study titled'Students Experience SMART Board throughConstructivistValues'. Students in this study come from a variety of backgrounds, as do students in most high schools. This study was based on the qualitative interpretive case study paradigm. The classroom observation scale methodology demonstrated that at least 80% of students were actively engaged for the duration of the courses. Throughout the session, students' attentive, on-task, and responsive conduct was assessed every five minutes.Students remained attentive to the teacher and the student at the board during observations. Students in the physics class sat attentively, with the majority of them completely concentrated on the student at the board. "I felt involved, and the lecture was interactive, and I felt apart of the learning," a student said in a focus group interview in Biology class. "You weren't used to it (SMART Board), but it helped you remember it," another student said, implying that novelty played a role in her engagement. Some children mentioned how much they enjoyed the interactive capabilities of the SMART Board. "The class was more interactive," students said. People tend to slack off when using PowerPoint, whereas SMART Board is more dynamic and draws people in." SixmainlearningactivitiesoccurredduringtheSMARTBoardlessons:(1)classdiscussion, (2) student presentation, (3) lecture with discussion, (4) technology – student use, (5)questioningbythe teacher and (6)studentresponse.

Kok (2008)conducted a study titled 'An Online Social Constructivist Tool: A Secondary SchoolExperiencein the DevelopingWorld'. Based on the availability of the teachers, interviews were conducted in groups of three or four. To learn more

about their experiences with Moodle, both formal and unstructured interviews were employed.. The findings of the study was that all of the secondary school teacherswere interested is using virtual classrooms along with their traditional classrooms. Despite the teachers not being trained to use ICT tools, they were eager to make use of it. The researcher recommended that teachers must be provided with adequate facilities and ICT based training so that they can make effective use of ICT teaching tools.

McCray (2007) did a study titled 'Constructivist Approach: Improving Social Studies SkillsAcademic Achievement'. The sample consisted of 25 teachers from Southeastern Michigan's urban and suburban areas. The researcher looked at the degree of resemblance between the theories-in-action of many social studies teachers in urban and suburban schools, as well as the impact of any differences on constructivism. The study's findings showed diverse applications of constructivism on enhancing social studies skills. The teachers also agreed that when their students can relate to the subject, they learn better. The majority of instructors agree that constructivism is currently being used in their classroom. When asked if the teacher's role is to promote students' learning by questioning their realities through active encounters and the formation of new concepts, 100% of the teachers agreed.

Kang (2007) conducted a study titled 'Constructivist Research in Educational Technology: ARetrospective View and Future Prospects'. The sample comprised of articles from international journalspublished in the years from 1996 to 2006. The findings of the study were learning sciences arebasically rooted in the traditions, beliefs, philosophy, epistemology, and strategies of 'socialconstructivism' (Kolodner, 2004; Smith, 2004). The study concluded that constructivism has undergone and continues to undergo a wide and active evolution, and so comes to terms with the name "learning sciences." In this setting, constructivism's future was just as active and extensive as its past and present. The final word to define the future of constructivism is 'post constructivism,' which advocates the development of constructivism to the 'learning sciences,' rather than 'beyond constructivism,' which emphasises the shortcomings or limitations of constructivism. According to Stevens

(2006), there are several characteristics that distinguish constructivist learning contexts. Student autonomy, classroom engagement, and cognitive exploration that leads to higher order thinking skills are the three factors.

Fardanesh (2006)conducted a study titled‘A Classification of Constructivist Instructional DesignModels based on Learning and Teaching Approaches’. The sample consisted of 10 instructional models chosen from a total of 25 constructivist instructional design models found after a thorough search of resources and databases.The ten models selected wereParticipatoryDesign,ProjectMethod, AnchoredCognitive, GenerativeLearning,CognitiveApprenticeship, DiscoveryLearning, Computer Supported, IntentionalLearning Environments, MindTools. Problem-BasedLearning(PBL) and InterpretationConstruction(ICON)Design. In terms of teaching-learning techniques, the majority of the ten constructivist instruction models fall into the "individual" category, with only a few models falling into the "group" category..

Kim (2006)conducted a study titled‘The Effects of a Constructivist Teaching Approach onStudent Academic Achievement, Self-concept and Learning Strategies’. The findings showed that the when experimental group’s academic performance was compared to that of the control group, experimental group had an average pretest score of 64.60 and a post-test score of 75.65 for an 11.05 gain, while the control group had an average pretest score of 69.73 and a post-test score of 64.65 for a 5.08 loss. The findings though ANCOVA showed a significant difference in academic achievement between the constructivist teaching group and the traditional teaching group at p.001 with F=89.11.As a result, it was proven that the group that used constructivist methods performed better than the group using traditional methods.

Bolliger (2004)had investigated student learning in a multimedia-rich constructivist learning environment. The study’s key conclusions were: The recommended activities were thought to be beneficial.

All participants indicated that the following course activities aided their learning: (a) in-class discussions in small and large groups, (b) displaying and

inspecting completed assignments, (c) finishing a draught of a research paper, (d) creating a personal Web site, (e) collaborating on all aspects of the customer project, (f) giving and receiving comments during a formative assessment, (g) presenting the class with the final group project.. Reading prescribed chapters in the Dreamweaver textbook was the activity that the majority of students (more than 50%) did not find useful. A considerable percentage of students (44.4%) did not find the threaded conversations helpful, and 33.3 percent did not find the image alteration project with Fireworks, the final assessment, or the "our" course attitude to be beneficial in their learning.

Linn and Hiss (2004)emphasized the importance of knowledge integration for successful involvement in educated discourse communities. They coined the phrase "knowledge integration" to describe the process of comparing ideas, recognizing situations, establishing connections between concepts, gathering evidence, and separating interconnections.

Helland (2004)conducted a study on ‘ Constructivist learning environment scorecard: A tool for defining online learning’. The goal of the study was to see how well the CLE scorecard was designed and developed. The use of an identifier instead of a scorecard has the advantage of keeping track of the data from each individual component. As a result, if the goal is to change an existing course, this tool might be used to compare elements across many courses or to establish a baseline. In order to determine the effective course components, the researcher created an identifier based on the information accessible in the class curriculum and course instructions prior to the commencement of the course.The evidence acquired from the transcripts of the chat sessions and threaded conversation, as well as the student questionnaires, should have created a second identity once the course was completed. Despite the fact that the researcher did not create a pre- and post-identifier for the class in his study, the CLE scorecard was found to be beneficial in identifying potential linkages between the categories.

Brooks and Brooks (2003)conducted a study where the ’Traditional’ classroom and

the 'Constructivist' classroom were compared. In contrast to traditional learning methods, they discovered that in the constructivist approach, pupils are encouraged to develop meta-cognitive skills.

DuitandConfrey(2002)found that in a constructivist classroom, the teacher's duty is to acknowledge the deeply held beliefs that children bring to class and to provide experiences that will help them expand on their present understanding of the world.

Prawar (2001)pointed out that students can identify and explain their own perspectives, exchange ideas and reflect on other students' views, critically reflect on their own views when needed, acknowledge their own views, and negotiate shared meanings, according to the study.

Jonassen(1991)foundoutthatstudents can identify and explain their own perspectives, exchange ideas and reflect on other students' views, critically reflect on their own views when needed, acknowledge their own views, and negotiate shared meanings.

Novak (2000) in his model of 'Human Constructivism' stated that the cognitive processes involved in a scientist's creative or research work are fundamentally the same as those involved in generating new information for a new learner. The majority of the learning is slow and assimilative.

Table-2.1 Summary of studies related to constructivist teaching and learning

Sl No	Researcher	Year	Findings
1.	Dolgun Aslan, Seyfettin Arslan &Hasan Aydin	2021	The scale was compatible on both the item and at the factor level, and that it was capable of serving the intended functions. It was concluded that the scale had construct validity.

2.	Jemberie,L.W.	2021	Instructors who participated in pedagogical workshops perceived and implemented constructivist learning more positively than instructors who did not engage in pedagogical workshops
3.	Roy,S.&Saha,B.	2021	In comparison to the conventional approach, the constructivist approach represents a new paradigm in teaching and learning. It assists pupils in constructing new knowledge and comprehension from processed facts and information.
4.	Vera Idaresit Akpan, et al	2020	Students can learn new things and add to existing knowledge more effectively in a collaborated group effort.Collaboration makes students more interactive, and reduces the monotony of teaching.
5.	Umar A. Ginga & Yusuf F. Zakariya	2020	Gender influences student success in the social constructivist instructional strategy.
6.	Harjali, H.	2019	Most students' engagement in learning was impacted by elements such as instructors' support, task-oriented learning, deliberating cooperative activities, and learning that was cohesively and directly tied to their lives utilising relevant, critical, and negotiable learning.
7.	Mercy, O.	2019	The performance of constructivist and non-constructivist pupils differs significantly. The constructivist method has been shown to be more successful in increasing pupils'

			academic achievement.
8.	Sarkar, C.	2019	Constructivist teaching methods helps studentachieve better scores than when they are not.
9.	Prajapati,R.	2019	The results showed that constructivist-based training resulted in students learning scientific concepts much better than the students who were not. The use of constructivist approach in science leads to better outcome for both teaching and learning
10.	Fernando, Sithara Y. J. N.; Marikar, Faiz M. M. T.	2017	1) Learning is a dynamic process. 2) The pre-existing ideas of students have a huge impact on their learning experience 3) Education is a social and cultural endeavor.
11.	Sandhu, B. K. and Rani, S.	. 2017	Students taught using the Constructivist teaching style was shown to have greater achievement than that of students taught using the Traditional way of teaching.
12.	Samaresh, A.	2017	Students who were taught utilising the Constructivist 7E Model outperformed those who were taught in the traditional manner.
13.	Chowdhury, S.	2016	Both boys and girls benefit equally from the constructivist 5 E learning approach. When compared to knowledge and skill skills, students who were exposed to a constructivist learning environment experienced an increased improvement in comprehension and application of ideas.

14.	Toraman,C.& Demir,E.	2016	Students of science and technology had more favourable attitude towards constructivist learning approach than mathematics and other curriculum areas. The study's findings can be attributed to the fact that the nature of science and technology as a subject makes it very much compatible with constructivist practices.
15.	Siddiqui, U.	2016	When compared to traditionally structured Chemistry training, the scientific idea of 'Colloids' was greatly improved by instruction based on the 5E learning Cycle Model.
16.	Bhattacharjee, J.	2015	Discussed thevarious aspects of constructivist learning, including concepts, salient features, its differentiating factors from traditional learning methods, role of teacher and students and the implication f this learning practice in various areas.
17.	Richard,.C.K..	2015	The result of the study revealed that constructivist teaching approach helps in improving the academic achievement of student in chemistry subject.
18.	Thomas	2014	The study showed that the use of the constructivist strategies improves affective outcomes. The results also revealed conducive environment has a positive impact on affective outcomes as compared to non-conducive ones... Interactional effects among the variables were not significant. There was no significant difference found between high

			and low cognitive achievers regarding affective achievement.
19.	Panigrahi & Tandel	2014	Laboratory experiences make the environment to metacognitive skills comparing with classroom learning, but the researcher recommended the need for replication of the study because of the variation in the results.
20.	Mehar & Singh	2014	The experiment conducted on biology students in the study showed that idea mapping approach was more effective in delivering positive learning outcome when compared to traditional methods.
21.	Mishra, R. K.	2014	Social science curriculum should incorporate constructivist methodologies with the help of relevant instructional resources as recommended by NCF 2005
22.	Kalpana, T.	(2014)	In-depth investigation of constructivist theory revealed that it has two forms, psychological and social and expressed the importance of a constructivist classroom. The study emphasizesthe relevance of constructivist teaching learning practices in today's schools.
23.	Rout, S. & Behera, S. K.	2014	Professional development for teachers under a constructivist paradigm may be more appropriate in outcomes-based environments. They advocated shifting from a mechanistic to a holistic approach of teacher professional

			development.
24.	Mehta,D	2013	Undertook a study on constructivist pedagogy conceptual understanding emphasized the qualities of constructivist pedagogy, role of teacher and indicated that greater conceptual clarity is needed for practical elements of integrating constructivism in India classroom
25.	Sridevi, K.V.	2013	The constructivist approach proved equally beneficial in boosting achievement and attitude toward science in both boys and girls. Students preferred a Constructivist setting over a regular classroom. The findings corroborate studies that support the positive impact of constructivist teaching and support the concept that a constructivist approach to teaching science is a viable alternative to traditional forms of instruction.
26.	Jena, A Kumar	2012	Based on the findings, it was found that the cooperative spider concept map was more superior in development of meaningful learning in science when compared to solo spider concept map modes.
27.	Dangel,J.R	2013	The study discovered that constructivism is extremely important in educational theory and more importance needs to be given on its research and its influence on educational practice is unclear.
28.	Gundogdu, Kerim	2010	Constructivist approaches and materials have a significant impact on teachers' attitudes

			toward human rights education.
29.	Khalid,T	2010	Conducted a study on students where he administered cognitive research trust thinking strategy to help students understand the impact and solutions to problems.
30.	Bose,S.	2010	None of participants had used constructivist approach for development and modification of content. Students used discussion methods not just for group assignments but also for group assignments as well..
31.	Neo, Mai & Neo, Ken	2010	Adoption of multimedia technology in a constructivist classroom was highly motivational for students and it allowed teachers to use certain constructivist teaching practices as well.
32.	Gijbels,D., Coertjens,L., Vanthournout,G., Struyf,E. & Petegem,P.V.	2009	Constructivist learning assessment environments shift students' perspectives toward a more in-depth approach.
33.	Demirai Cavide	2009	Constructivist learning bears more achievement and more retention
34.	Chan, P., Miller, R.; Monrie, E.	2009	Use of ZPD is effective through application of cognitive apprenticeship.
35.	Wessa,P.	2009	It was found that reproducible research allows students to engage in group activities and reduced the reliance on rote-learning by students..
36.	Gainsburg	2009	Constructive teaching techniques allowed teachers to explain major course topics with concrete examples.

			From the sources such as class records, video- analysis assessment and PST self-report suggested the impact of video to promote students-centered teaching.
37.	Smith and Pecore	2008	Students' learning is enhanced by making use of SMART Board as it enabled engagement, learning activities, learning direction and cognitive activity.
38.	Kok,A.	2008	Teachers were willing to make use of ICTs in their classroom teaching practices despite them never using ICTs before.
39.	McCray,K.	2007	It is important for a teacher to engage students learning through questions that encourage the creation of new ideas.
40.	Kang, I& Choi, J. & Chang, K.	2007	1. Constructivism, which encompassed many specialist domains pertinent to the theme of learning, had undergone and was now undergoing a broad and dynamic evolution. 2. The last word to characterize the future of constructivism is post-constructivism, not beyond constructivism.
41.	Karaduman,H. and Galtekin ,M.	2007	Constructivist learning ideas are used to create teaching materials that improve academic sciences and student retention in social studies classes.
42.	Stevens	2006	The three factors that characterize the constructivist learning situations are students' autonomy, classroom interaction and cognitive exploration
43.	Fardanesh	2006	In terms of teaching-learning techniques, the

			majority of the ten constructivist instruction models fall into the "individual" category, with only a few models coming under the "group" category.
44.	Kim	2006	Conducted a study to find the positive effects on constructivist teaching approaches on student academic achievement, learning strategies and self-concept
45.	Bolliger,D.	2004	The activities that were helpful in learning are a. Displaying and reviewing assignments b. Finishing a draught of a research article c. Creating a personal website b. Participating in all aspects of the customer project f. Giving and receiving comments during a formative assessment g. Making a presentation to the class about the final group project. Reading prescribed chapters and threaded conversations were deemed unhelpful by the majority of students.
46.	Linn and His	2004	Knowledge integration is essential for successful participation in evaluated communities of discourse
47.	Brooks and Brooks	2003	Students are motivated to develop meta-cognitive skills in a classroom where constructivist practices are employed.
48.	Duit and Confrey	2002	The teacher's duty is to acknowledge the deeply held beliefs that students bring and to give experiences that will help them expand

			on their present knowledge..
49.	Prawar	2001	Students may recognize and explain their own points of view, discuss ideas, and reflect on the points of view of other students.
50.	Jonassen	1991	In constructivism, we learn by constantly creating, interpreting, and altering our own representations of reality.
51.	Novak	2000	Human constructivism suggested that the cognitive processes resulting in creative or research works of a scientist are in parallel to a fresher to construct knowledge

From the above review of literature, it is evident that there is a positive contribution of constructivist approach to teaching and learningtowards the academic achievement of students. In most of the study they are stick to particular subject in respect to constructivist approach and more over the investigator observed that the contribution of teachers regarding this approach was not done. There was no such research was conducted on the secondary schools of Mizoram, and hence the investigator has been taken up the particular study related to constructivist approach in teaching learning in the secondary schools of Mizoram.

CHAPTER – III
METHOD AND PROCEDURE

A research design is not chosen solely on the researcher's whims, but rather on the objective of the inquiry, the variables in the equation, and the circumstances and conditions under which the study will be done. The goal of any study design is to deliver as much knowledge as possible on the topic at hand for the least amount of money. In essence, research design serves two purposes. First, it provides objective, accurate, and cost-effective solutions to the research questions. Hypotheses are frequently used to describe research challenges. In the words of Kerlinger (1986):

"Research design is a plan, structure and strategy of investigations so conceived as to obtained answers and to research questions or problem".

The purpose of a research design is to provide a plan of study that permits accurate assessment of cause and effect relationships between independent and dependent variables.

The study's methodology is explained in order to highlight the numerous processes that a researcher often takes in order to solve a research topic, as well as the thinking behind them. As a result, this chapter provides the general framework of the research process, which is followed by the study. The methodology of this study explains why this research study was conducted, how the research topic was recognised, what data was gathered, what method was employed, and why a certain style of data analysis was used.

3.1 Research Approach

The research was done using a mixed mode approach, which included both quantitative and qualitative methods. In education, the descriptive technique has been the most extensively utilized research method. For data collection and the execution of the study, appropriate samples and corresponding research toolswere used.

According to the aims and assumptions of the study, researchers collected the data from relevant sources, which may be primary, secondary, or both. The primary and secondary sources listed below were considered for data gathering in order to meet the study's goals.

Primary Sources: Secondary school teachers as well as students who were participants of this research study were identified as relevant primary sources for this study.

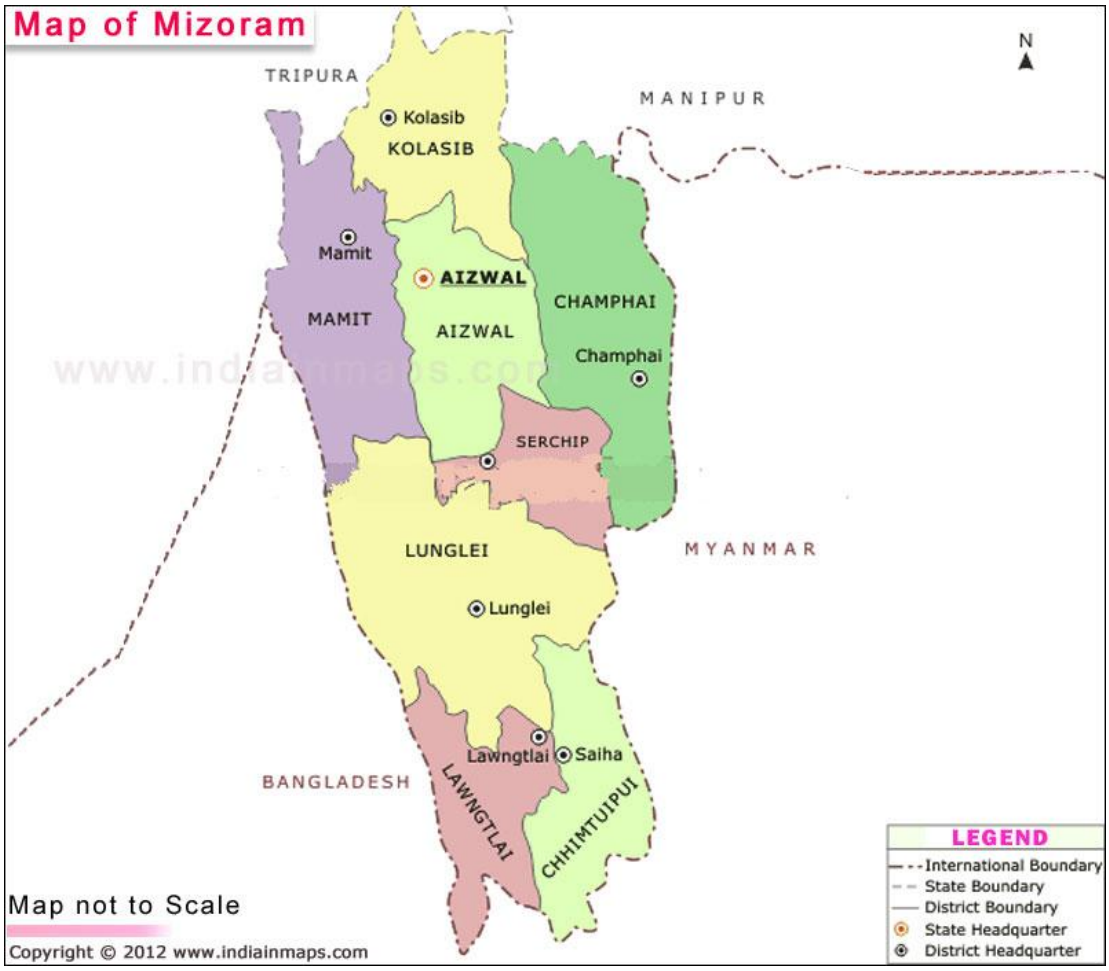
Secondary Sources: Dissertation abstracts reports, survey reports at the international level, state level, and national level. For reference, books, journals, government records, the internet, published and unpublished papers are all important sources for any research.

3.2 Population of the Study

Mizoram is a state in India's north-eastern region and the country's southernmost landlocked state. It is bordered by Tripura, Assam, and Manipur. It also borders Bangladesh and Myanmar on the international level. Mizoram was formed in 1987, and its state capital is Aizawl. Mizoram has 8 districts with 22 towns and 817 villages. The formal education sector of Mizoram ranges from elementary to university education, training to technical courses. The state has third highest literacy rate in the country i.e., 92%.

Figure: 2

Political Map of Mizoram



Secondary education in Mizoram is divided into High Schools (Classes IX and X) and Higher Secondary Schools (Class XI and XII). Higher Secondary Schools were established only in 1996, when the Pre-University class, corresponding to Class XI and XII, was transferred from Colleges to Schools.

Table 3.2: Number of schools in Mizoram (2019-20)

School Category	All types of management	Govt.	Govt. Aided	Pvt. Unaided	Others

Secondary(1-10)	8	2	0	6	0
Secondary (6-10)	3	2	0	1	0
Secondary (9-10)	686	290	138	225	33
Higher Secondary (1-12)	3	3	0	0	0
Higher Secondary (6-12)	6	6	0	0	0
Higher Secondary (9-12)	1	0	0	1	0
Higher Secondary (11-12)	187	22	19	130	16
Total	3924	2552	231	1046	95

Source: Unified District Information System for Education Plus (UDISE+).

Based on the latest available data, Mizoram has a total number of 3924 schools. Majority of the schools are Primary schools and majority of the schools are under the management of the government. For this study, only govt. schools were considered for the sample.

Table: 3.3 Number of teachers in Mizoram (2019-20)

School Category	All types of management	Govt.	Govt. Aided	Pvt. Unaided	Others
Secondary(1-10)	108	29	0	79	0
Secondary (6-10)	20	13	0	7	0
Secondary (9-10)	4183	1837	971	1206	169
Higher Secondary (1-12)	103	103	0	0	0
Higher Secondary (6-12)	84	84	0	0	0
Higher Secondary (9-12)	11	0	0	11	0
Higher Secondary (11-	1795	495	337	874	89

12)					
Total	23147	12823	1824	7906	594

Source: *Unified District Information System for Education Plus (UDISE+).*

Table3.4. Pupil teacher Ratio (PTR) by level of school education (2019-2020)

State	Primary (1-5)	Upper Primary (6-8)	Secondary (9-10)	Higher Secondary (11-12)
National	26.5	18.5	18.5	26.1
Mizoram	16.1	7.5	10.0	18.1

Source: Unified District Information System for Education Plus (UDISE+). Govt. of India, Ministry of Education, Department of School Education and Literacy

The table shows a favorable picture of Mizoram schools at first glance. It conceals the fact that various govt. schools have very few students and crowded staff rooms. Much effort needs to be made to equalize this ratio. The high number of teachers allows for more flexibility and accessibility towards adoption of constructive pedagogy. This study also took into consideration how well a teacher manages to give individualized and personalized instruction to students in classes that are over populated or under-populated.

Table 3.5: Student Enrollment by Gender (2019-2020)

School Category	Gender	All types of management	Govt.	Govt. Aided	Pvt. Unaided	Others
Secondary (9-10)	Male	20474	8238	4537	7080	619
	Female	21125	8605	5116	6829	575
Higher Secondary (11-12)	Male	12106	3771	2311	5661	363
	Female	12852	4295	2627	5596	334
Total	Male	156497	65441	10316	77243	3498
	Female	151797	62068	11475	74894	3360

Source: Unified District Information System for Education Plus (UDISE+).

Mizoram has been in the fore front of women freedom and empowerment and has very favorable balance of male and female students. In the secondary level, female students outnumber male students. This study will compare the learning practices of male and female students and examine the difference in their learning styles and the environment they study in.

Mizoram is still dominated by State Board (MBSE) as CBSE schools account to only 19 out of the 3924 schools (0.48%).

Table.3.6 Number of Teachers and Students of the study area.

Sl.No	Name of District	No. of Secondary Schools including State Govt, RMSA, Deficit, Adhoc Aided, Lumpsump Aided	No. of Teachers			No. of Students		
			M	F	total	Boys	Girls	total
1	Aizawl	127	653	373	1026	4172	5076	9248
2	Kolasib	39	169	81	250	1145	1222	2367
3	Mamit	36	159	55	214	935	844	1779
4	Lunglei	88	375	162	537	2083	2112	4195

Source: Statistical Cell, Directorate of School Education, Annual Publication, 2017-2018

3.3 Sample and Sample Design

A sample is a portion of people drawn from a large population. "A sample is a part of the population which is studied in order to make inferences about the whole population" (Manheim, 1977). Due to time and financial constraints, the scope of the sample size was severely limited. For drawing a representative sample, multi staged random cluster sampling technique was followed. Out of eight districts of Mizoram, 4 districts namely Aizawl, Lunglei, Kolasib and Mamit were selected randomly.

The list of secondary schools of each district was collected from the Director School Education, Mizoram. 15 secondary schools from each district were selected randomly making it a total of 60 schools visited. From each school 8 teachers (English, Mathematics, Science, and Social Science) were included in the sample. Thus, a total number of 480 teachers (120x4) was taken as sample of the study initially. The questionnaire was sent to 480 teachers, but responses were collected from 275 Secondary School teachers. Ten students from class IX (4 boys and 4 girls) of each school were randomly selected in order to reveal and compare the learning practices of secondary school students of Mizoram in the context of constructivist approach with respect to their gender. Thus, the sample of students was 400 out of which 200 boys and 200 girls. The following table shows the total sample taken for the study.

Table- 3.7 Sample distribution of the study

Subjects	No of teachers			No of Students		
	Male	Female	Total	Boys	Girls	Total
English	32	34	66	200	200	400
Social Science	45	42	87			
Mathematics	30	32	62			
Science	32	28	60			
All Subject	139	136	275			

3.4: Tools and Techniques Used

For the present study, no premade instrument was identified to be suitable for the current investigation. Keeping the features of the sources and the research's aims in mind, it was chosen to employ questionnaires as instruments for collecting appropriate data for the study.

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

1) Questionnaire to determinethe awareness of secondary school teachers of Mizoram relating to constructivist approach to teaching

2) Questionnaire to reveal the practices of secondary school teachers of Mizoram and their adoption of constructivist pedagogy with reference to their teaching subjects (English, Math, Science, Social Science).
3) Questionnaire to find out the students' perceptions on constructivist teaching approach in classroom.
4) Questionnaire to find out the perceptions of teachers about constructivist approach of teaching
5) Questionnaire to reveal the learning practices of secondary school students of Mizoram in the context of constructivist approach.
6) Questionnaire to determine the constraints faced by teachers in adopting constructivist approach.

While constructing the tools, components of the school such as concept of constructivist, classroom climate, teaching learning process and the end product were given attention,while making sure the questionnaires were easy to understand and the items were within the scope of the teacher's and student's understanding. Initially 40 items for each questionnaire was prepared on these components and reviewed by the investigator and the supervisor.After the supervisor gave his approval,the questionnaires were sent to a panel of experts that included senior professors in the field of educationand experts with prior experience with the concept of constructivism with the following purpose:

1. If feasible, recommend any additional items for inclusion in the questionnaire and schedules.
2. To include any other relevant location.
3. To remove any region or areas, item or things that were irrelevant to the current investigation.
4. To eliminate inconsistencies, biases, inappropriate language, and wrong terminology, among other things.
5. To investigate the relationship between the questionnaire and schedules and the study's objectives.

It goes without saying that practically all of the experts gave their full cooperation by sharing their perspectives and excellent comments.

Following their helpful recommendations, the drafts were corrected as needed. All of the questionnaires were created with the valuable insights of these recognised specialists in mind, and they have a sufficient level of content validity.

After preparation of the final draft all the questionnaires administered within a small group of secondary school teachers (20) and students (20) in Aizawl district only. The same questionnaires were also administered after 3 months to the same respondents. The data was collected twice.

The responders were required to read the statements and alternatives and indicate the response of their choice with a check mark. The surveys were the same for the four groups of teachers who taught different courses, including math, English, science, and social science. The surveys were given to twenty secondary school teachers and students twice, separated by two to three weeks, to determine the test-retest reliability of the questionnaire.The second time around, the responses from both students and teachers were represented numerically, and two sets of scores were obtained for the examination of student and teacher responses for each questionnaire.Product moment methods was applied to determine the correlation between the two sets of scores and was found to be reliable. Next, the investigator used product moment method to correlate the two sets of scores. The statistical formula used was as follows.

$$r_{xy} = \frac{\sum x^1 y^1}{N} - C^1 x C^1 y \Big/ x^1 y^1$$

Where x', y' are the deviations from the assumed mean. N is the size of the sample, C's, c'$_y$ are co-relation factors.

Reliability

$$Cy = \frac{\sum fy^1}{N} = -\frac{-44}{51} = -0.86 \quad Cy^2 = 0.7396 \quad Cx = \frac{\sum fx^1}{N} = \frac{-44}{51} = -0.86 \quad Cx^2 = 0.7396$$

$$\sigma x = \sqrt{\frac{\sum fx^{12}}{N} - cx^2} = \sqrt{\frac{398}{51} - 0.7396} = \sqrt{7.8039 - 0.7396} = \sqrt{7.0643} = 2.65$$

$$Cy = \frac{\sum x^1 y^1 - Cx - Cy}{\sigma x . \sigma y} = \frac{\frac{402}{51} - (-0.860)(-0.86)}{2.83 \, x \, 2.65} = \frac{7.88 - 0.7396}{7.4995} = \frac{7.1404}{7.4995} =$$

$$= 0.958 \; (HighlySign \quad icant)$$

The value of rwasfound to be 0.958, 0.63,0 78,0.73,0.64, and 0.69 for questionnaire no-1,2,3,4,5and 6 respectively which were very high, and therefore the questionnaires were deemed to be reliable for research study.Duplicates of the questionnaires are attached in the Appendix,

3.5 Procedure of Data collection

Before the data collection process was started, a route chart was plotted to cover all district and block head quarter, as well as required information such as phone numbers of headmasters/principals were collected. On arrival at the schjool, questionnaires were distributed to students and teachers for collection of data with the help of headmaster. In the first stage researcher visited two schools. Further, school visits could not be possible due to the Covid-19 pandemic outbreak.

Then the investigator prepared the questionnaire in Google Forms and posted it in different secondary school teachers and students WhatsApp groups through the principals/headmasters. A proper explanation was also given in every group.All doubts and confusions were cleared by the investigator. Finally, the study was conducted in threephases as shown below

Phase of Study	**Dates**	**Tools used**	**Procedure of data collection**
Phase 1:Pilot testing	Oct 2019	Questionnaire	Offline method
Phase 2: School Visit	March 2020	Questionnaire	Offline method
Phase 3: Collection of Data Online	March 2021	Questionnaire	Online method (Google Forms)

In Phase One, pilot testing of the research tools was done to get a clearer picture towards the research and to identify the need of modification in the research tools and validity as well as reliability checked with the help of experts and statistical techniques.

In Phase two, after undertaking all modification main research was conducted which was mainly through school visit. Due to pandemic period the school visit was stopped during march 2020.

In Phase three, the researcher converted the questionnaire in to the google doc format and posted in different WhatsApp group of teachers and students and collected the information through Google Forms. The researcher also observed the online class taken by the secondary school teachers in different subject during pandemic period. After collecting the data comparison was done on subject wise of awareness practices and perceptions of secondary school teachers.

3.6: Organization of Data

Data gathered from various sources was categorised into three categories: awareness, practices, and perceptions. The outcomes of the instructors' practices in the four disciplines were similarly arranged subject by subject.

3.7: Analysis of Data

Both qualitative and quantitative method of data analysis was used. Descriptive statistics such as mean, standard deviation, frequency and percentage were employed for quantitative analysis. Aside from that, product moment correlation was used to calculate the relationship between various groups. Furthermore, the t-test was employed to compare various groups of teachers and pupils.

CHAPTER-IV

ANALYSIS AND INTERPRETATION OF DATA

"Data Analysis is a method of putting facts and figures to solve the research problem. It is vital to finding the answers to the research question. Another significant part of the research is the interpretation of the data, which is taken from the analysis of the data, making inferences, and drawing conclusions. Often times it becomes difficult to deduce the raw data, in which case the data must be analysed to deduce the result of the analysis". –Ram Ahuja.

"Process of interpretation is essentially one of stating what results findings show, what do they mean? What is their significance? What is the answer to the original problem?" - C.V. Good.

Analysis involves classifying, requesting, controlling, and outlining raw scores to obtain answers to research questions. The purpose of the data analysis is to reduce data to a logical and understandable structure so that the topic of investigation may be explored and tested effectively.

The main purpose of this chapter is to analysis of data acquired from various sources as detailed in the previous chapter, as well as their interpretation in light of the study's objectives. This chapter is organized into five sections that correspond to the first eight objectives for analysis and interpretation.

Section 4.1 deals with assessment of the awareness of secondary school teachers of Mizoram relating to constructivist approach to teaching and learning with reference to their teaching subjects (English, Math, Science and Social Science).

Section 4.2 deals with the practices of secondary school teachers of Mizoram in adopting constructivist pedagogy and comparison of their practices with reference to their teaching subjects. (English, Math, Science, Social Science).

S**ection4.3** deals with the learning practices of secondary school students of Mizoram in the context of constructivist approach and compare the learning practices

of secondary school students of Mizoram in the context of constructivist approach with reference to their gender.

Section 4.4 and 4.5 reveal the nature and breadth of the relationship between secondary school teachers' understanding and practices regarding constructivist pedagogy, as well as the restrictions that secondary school teachers in Mizoram face in adopting constructivist pedagogy.

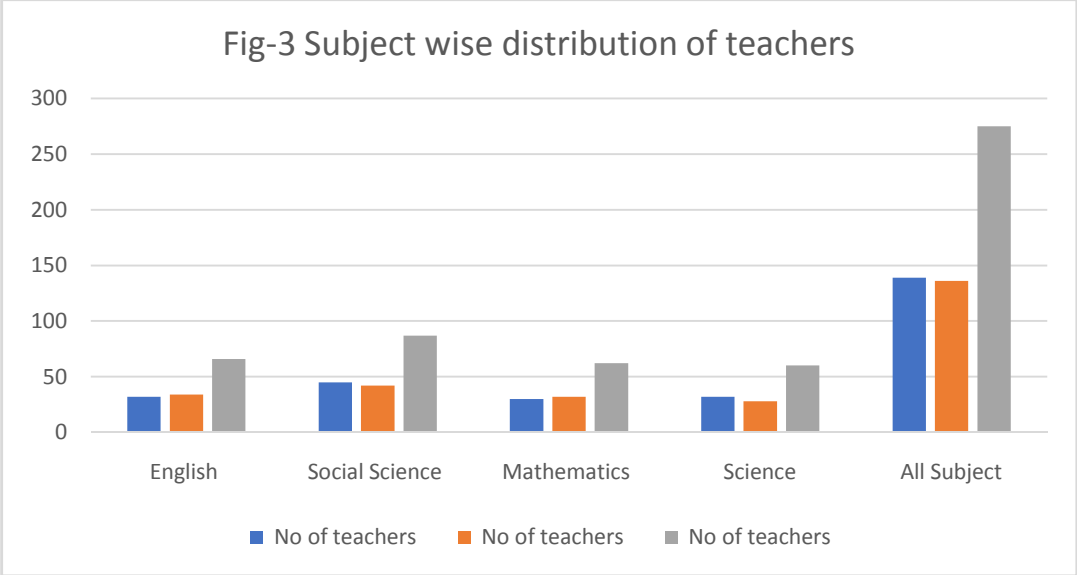
4.1 The General Profile of the Teachers

The general profile of the teachers is given in the table

Table-4.1-General profile of the secondary school teachers

Subjects	No of teachers			Training		
	Male	Female	Total	Trained	Untrained	Total
English	32	34	66	243	32	275
Social Science	45	42	87			
Mathematics	30	32	62			
Science	32	28	60			
All Subject	139	136	275			

From the above table, it is seen that 139 teachers are male and 136 are female out of which 66 are english teachers with 32 male and 34 female, 87 are social science teachers with with male female brake up 45 and 42 respectvely, 62 are mathematics teachers with 30 male and 32 female,60 are english teachers with 32 male and 28 female secondary school teachers are respondents in this study. Out of 275 teachers,243 were trained and 32 were untrained.The data regarding teachers on the basis of subject taught and training received are shown in the following figure 3 and 4 respectively.



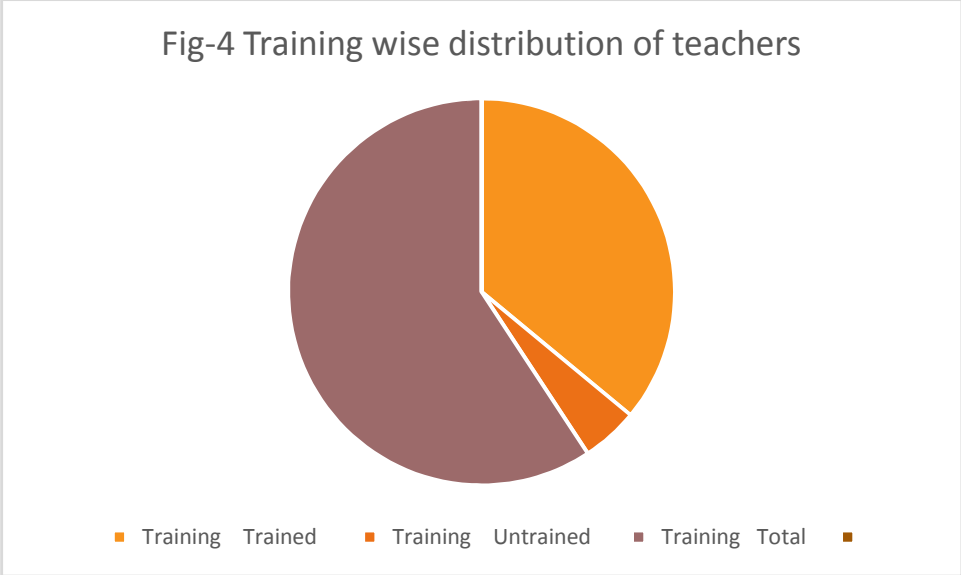
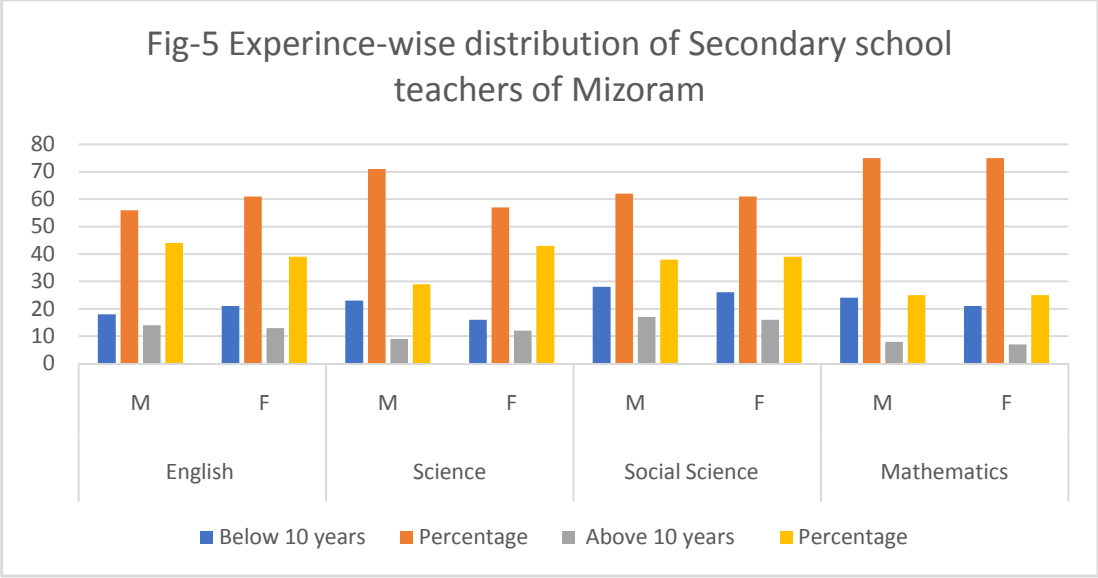


Table-4.2 Experience-wise Distribution of Secondary School Teachers of Mizoram(Respondents)

Stream	Sex	Below 10 years	Percentage	Above 10 years	Percentage
English	**M**	18	56	14	44
	F	21	61	13	39
Science	**M**	23	71	09	29

	F	16	57	12	43
Social Science	**M**	28	62	17	38
	F	26	61	16	39
Mathematics	**M**	24	75	06	25
	F	21	75	11	25
Total		177	64	98	36

According to the data above, 177 (64%) of the 275 secondary school teachers have less than ten years of teaching experience, while 98 (36%) have more than ten years of teaching experience.Out of 177teachers with less than 10 years of teaching experience 39 were English teachers,39 were science teachers,54 were social science teachers and 45 were mathematics teachers Out of 98 teachers having more than 10 years of training,27 were english teachers, 21 were science teachers, 33 were social science teachers and 17 were mathematics teachers.The experience wise graphical representation of the teachers is given in figure no -5



4.2: Awareness of Secondary School Teachers of Mizoram Relating to Constructivist Approach to Teaching and Learning

(Objectiveno-1 To assess the awareness of secondary school teachers of Mizoram relating to constructivist approach to teaching and learning)

The study's first objective is to examine secondary school teachers' awareness of constructivist approaches to teaching and learning in relation to the subjects they teach. The questionnaire designed to test instructors' awareness had twenty-five multiple-choice questions with four choices. The highest and lowest possible scores were 25 and 0, respectively.

The mean and standard deviation (SD) for different groups of teachers on their awareness were computed and displayed in table 4.3 to explain the findings. The teachers were classified based on their knowledge of constructivism as a teaching-learning technique, following the criteria outlined below. Table 4.4 displays the results of teacher classification in several areas, along with interpretations..

Criteria for interpreting the level of awareness

Level of Awareness	Range	Range of Scores
High	Above Mean +1 SD	21.8-25.0
Moderate	Mean-1SD to Mean+1SD	13.1-21.8
Low	Below Mean-1SD	00-13.1

Table 4.3 Mean and SD of Different Groups of Teachers on Awareness

S.N	Subject	Gender	N	Mean	SD
1	English	Male	32	17.25	4.13
		Female	34	16.62	3.96
		Total	66	16.80	4.30
2	Social Science	Male	45	15.85	4.28
		Female	42	16.44	3.93
		Total	87	16.10	4.20

3	Mathematics	Male	30	17.10	3.84
		Female	32	16.51	3.79
		Total	62	16.70	4.00
4	Science	Male	32	16.65	4.32
		Female	28	15.34	4.42
		Total	60	16.10	4.50
5	All Subjects	Male	139	16.71	4.14
		Female	136	16.23	4.03
		Total	**275**	16.39	4.18

Table 4. 4 Gender and Teaching Subject Wise Levels of Awareness of teachers on Constructivist Teaching - Learning Approach

S.N	Subject	Level of Awareness	Male	Female	Total
1	English	Low	9 (17.7)	8 (18.3)	17 (19.2)
		Moderate	18 (68.3)	20 (60.0)	38 (64.2)
		High	05 (14.0)	06 (21.7)	11 (16.6)
2	Social Science	Low	5 (16.7)	10 (21.7)	15 (19.2)
		Moderate	32 (58.3)	24 (61.7)	56 (60.0)
		High	8 (25.0)	08 (16.6)	16 (20.8)
3	Mathematics	Low	02(03.3)	03 (16.7)	05 (08.08)
		Moderate	20 (78.3)	21 (70.0)	41 (79.2)
		High	08 (18.4)	8 (13.3)	16 (12.0)
4	Science	Low	8 (16.6)	4 (14.2)	12 (20.0)
		Moderate	20 (75.1)	21 (65.6)	41 (68.3)
		High	04 (8.3)	3 (9.4)	07 (11.7)

5	Total	Low	24 (18.7)	25 (18.4)	49 (19.2)
		Moderate	90 (61.1)	86 (63.2)	176 (60.2)
		High	25(20.2)	25 (18.4)	50 (20.6)
		Total	139 (100)	136 (100)	**275(100)**

Numbers in parenthesis are in percentages

English

It is seen from **Table 4.3** that the mean scores of English teachers vary from 17.25(Male) to 16.51 (Female) with the total mean of 16.80. The S.D. of various groups vary from 4.13(Male) to 3.96 (Female) and the S.D. of the whole group is 4.30. Since the highest and minimum available scores is25 and 00 (zero), the mean scores of all groups show that English teachers, regardless of gender, have modest knowledge (Awareness) of constructivism as a teaching-learning strategy. The standard deviations demonstrate that the variances in the scores of various groups are likewise not large.

According to Table 4.4, 17.7% of male teachers and 18.3% of female English teachers are unaware of constructivism as a teaching-learning technique. A higher percentage of teachers, 68.3% of male teachers and 60% of female teachers, have a moderate level of awareness about constructivism as a teaching-learning approach, whereas 16.7% of male teachers and 21.7% of female teachers teaching mathematics have a high level of awareness about constructivism as a teaching-learning approach. Overall, 19.2%, 64.2%, and 16.6% of English teachers have low, moderate, and high levels of knowledge of constructivism as a teaching-learning approach, respectively.

Social Science

Table 4.3 shows that the mean scores of Social Science teachers range from 15.65 (male) to 16.44 (female), with a total mean of 16.10. The standard deviation of various groups ranges from 4.28 (male) to 3.93 (female), with a total S.D. of 4.20. Because the highest and lowest possible scores were 25 and 00 (zero), the mean scores of all groups reveal that social science teachers, regardless of gender, have just a basic understanding (awareness) of constructivism as a teaching-learning strategy.

The standard deviations show that the variability in the scores of different groups are also not large.

According to table 4.4, 16.7% of male teachers and 21.7% of female teachers have low level of awareness regarding constructivism as a teaching-learning technique. Similarly, 58.3% of male teachers and 61.7% of female teachers show a moderate degree of understanding of constructivism as a teaching-learning strategy. Only 25% of male instructors and 16.6% of female teachers are found to be well-versed in the constructivist approach to teaching and learning. In all, 19.2 percent and 20.8 percent of social science instructors, respectively, have low and high levels of expertise about constructivism as a teaching-learning technique. Constructivism is known as a teaching-learning strategy by the majority of social science professors (60 percent).

Mathematics

Table 4.3 shows that the mean scores of Math teachers differ by gender, ranging from 17.1 (Male) to 17.93 (Female), with a total mean of 16.70. The standard deviation of various groups ranges from 3.84 (Male) to 3.79 (Female), with a total S.D. of 4.00. Given that the highest and lowest available scores were 25 and 00 (zero), the mean scores of all groups indicate that mathematics teachers, regardless of gender or location, have just a basic understanding (awareness) of constructivism as a teaching-learning strategy. The standard deviations show that the variability in the scores of different groups are also not significant..

According to table 4.4, 3.3% of male teachers and 16.7% of female teachers have low awareness of constructivism as a teaching-learning technique. Similarly, 78.3% of male teachers and 70% of female teachers are familiar with constructivism as a teaching-learning technique. Only 18.4% of male teachers and 13.3% of female teachers are well-versed in the constructivist approach to teaching and learning. Overall, constructivism is known to 15 percent and 21 percent of math educators, respectively, as a teaching-learning approach. The majority of math teachers (64.2%) have a moderate level of awareness..

Science

Table 4.3 shows that the mean scores of Science teachers range from 16.65 (Male) to 15.34 (Female), with a total mean of 16.10. The standard deviation of distinct groups ranges from 4.32 (Male) to 4.42 (Female), with a total S.D. of 4.50. Since the highest and lowest possible scores were 25 and 00 (zero), the mean scores of all groups reveal that mathematics instructors, regardless of gender, have just a basic understanding (Awareness) of constructivism as a teaching-learning strategy. The standard deviations show that the variability in the scores of different groups are also not high.

According to Table 4.4, 16.6% of male teacherss and 14.2% of female teachers have low level of awareness regarding constructivism as a teaching-learning approach. However, 75.1% of male instructors and 65.6% of female teachers show moderate level of awarenss regarding constructivism as a teaching-learning technique. It is seen that 8.3% of male teachers and 9.4% of female instructors are found to be well-versed in the constructivist approach to teaching and learning. Overall, science instructors have a moderate (68.3%) degree of awareness of constructivism as a teaching-learning strategy.

4.3: Practices of Secondary School Teachers Teaching Different Subjects in Mizoram Adopting Constructivist Teaching-Learning Approach

(Objective no-3 To reveal the practices of secondary school teachers of Mizoram in adopting constructivist pedagogy and role)

The third objective of this research is to learn about the practices of secondary school teachers in Mizoram who use a constructivist teaching-learning technique to teach a variety of subjects. The questionnaire consisted of twenty-five multiple-choice questions meant to assess teachers' use of a constructivist teaching-learning technique. The maximum and minimum possible scores were 30 and 0 (zero), respectively.

Table 4.5 shows the mean and standard deviation for various groups of teachers on their practices in order to interpret the data. For meaningful interpretation, it was determined to categorise the teachers based on their score on embracing constructivism as a teaching-learning approach, using the criteria listed below. The findings of teacher categorization in various disciplines are shown in Table 4.6.practices.

Criteria for interpreting the level of practices

Level of Practice	Range	Range of Scores
High	Above Mean +1 SD	23.90-30.0
Moderate	Mean-1SD to Mean+1SD	16.50-23.90
Low	Below Mean-1SD	00-16.50

Table 4.5Mean andSDofDifferentGroupsofTeacherson Practices of Constructivist Teaching Approach.

S.N	Subject	Gender	N	Mean	SD
1	English	Male	32	21.87	3.31
		Female	34	21.60	3.11
		Total	**66**	**21.64**	**3.36**
2	Social Science	Male	45	22.56	3.32
		Female	42	20.65	3.43
		Total	**87**	**21.64**	**3.32**
3	Mathematics	Male	30	20.85	3.31
		Female	32	25.41	3.51
		Total	**62**	**21.16**	**3.52**
4	Science	Male	32	23.22	3.41
		Female	28	21.12	3.73

		Total	**60**	**22.62**	**3.72**
5	All Subjects	Male	139	23.64	3.34
		Female	136	23.21	3.46
		Total	**275**	**23.48**	**3.45**

Table 4.6 GenderandTeachingSubjectWiseLevelsofPractice of ConstructivistTeachingApproach

S.N	Subject	Level of Practice	Male	Female	Total
1	English	Low	2 (6.25)	2 (5.88)	4 (6.06)
		Moderate	26 (81.25)	19 (55.88)	45 (68.18)
		High	4 (12.5)	13 (38.23)	17 (25.75)
	Total		**32 (100)**	**34 (100)**	**66 (100)**
2	Social Science	Low	2 (4.44)	2 (3.3)	4 (4.6)
		Moderate	32 (71.11)	28 (66.66)	60 (69)
		High	11 (24.44)	12 (28.57)	23 (26.5)
	Total		**45**	**42**	**87**
3	Mathematics	Low	5 (16.6)	3 (9.37)	8 (11.7)
		Moderate	19 (65.0)	23 (71.87)	42 (68.3)
		High	6 (20.0)	6 (18.75)	12 (20.0)
	Total		**30**	**32**	**62**
4	Science	Low	4 (12.5)	2 (7.14)	6 (10)
		Moderate	20 (62.5)	17 (60.7)	37 (61.66)
		High	8 (25)	9 (32.1)	17 (28.33)
	Total		**32**	**28**	**60**
5	Total	Low	13 (9.35)	9 (6.61)	22 (8)
		Moderate	97 (54.19)	92 (67.64)	189 (68.72)
		High	29 (37.4)	35 (25.73)	64 (23.27)
		Total	**139**	**136**	**275**

Numbers in parenthesis are in percentages

English

According to Table 4.5, the mean scores of English teachers range from 23.88 (Male) to 23.66 (Female), with a total mean of 23.74. The standard deviation of various groups ranges from 3.33 (Male) to 3.14 (Female), with a total S.D. of 3.34. Since the highest possible score is 25, the mean scores of all groups indicate that English teachers, regardless of gender, employed constructivism as a teaching-learning technique in a moderately effective manner.

According to Table 4. 6, 8.3% of male teachers and 2% of female teachers seldom used a constructivist approach to teaching-learning. A constructivist approach to teaching-learning was used by 80 percent of male teachers and 56.7% of female teachers. It was shown that 7% of male teachers and 24% of female teachers used a constructivist approach to teaching and learning. Similarly, out of all secondary school teachers, 5.8%, 68.3%, and 25.8% of English teachers used constructivist teaching-learning approaches in their classrooms mildly, moderately, and frequently, respectively.

Social Science

According to table 4.5, the mean scores of English teachers range from 23.67 (Male) to 23.65 (Female), with a grand mean of 23.66. The S.D. of various groups ranges from 3.38 (Male) to 3.44 (Female), with the overall S.D. of 3.37. Since the highest possible score is 25, the mean scores of all groups demonstrate that English instructors, regardless of gender, employed constructivism as a teaching-learning technique in a moderately effective manner.

According to Table 4.6, 5% of male instructors and 2% of female teachers rarely used a constructivist approach to teaching-learning. Similarly, 75% of male instructors and 68% of female teachers used a constructivist approach to teaching-learning in a moderately effective manner. It was discovered that 23% of male teachers and 28.4% of female teachers used the constructivist approach to teaching-learning on a regular basis, whereas 5.8%, 68.3%, and 25.8% of teachers teaching Social Science used the constructivist approach to teaching-learning minimally, moderately, and heavily in their classrooms, respectively.

Mathematics

According to table 4.5, the mean scores of Mathematics teachers range from 22.87 (Male) to 23.47 (Female), with a grand mean of 23.17. The standard deviation of various groups ranges from 3.39 (Male) to 3.54 (Female), with a total S.D. of 3.59. Since the highest possible score is 25, the mean scores of all groups reveal that Mathematics instructors, regardless of gender, employed constructivism as a teaching-learning technique in a moderately effective manner.

According to Table 4.6, 15% of male teachers and 8.3% of female teachers rarely used a constructivist approach to teaching-learning, whereas 65% of male teachers and 71.7% of female teachers used a somewhat constructivist approach to teaching-learning. It was shown that 20% of male teachers and 20% of female teachers used a constructivist approach to teaching and learning. Similarly, out of all secondary school teachers, 11.7%, 68.3%, and 20% of instructors teaching mathematics used constructivist teaching-learning approaches in their classrooms slightly, moderately, and frequently, respectively.

Science

According to table 4.5, the mean scores of Science teachers range from 22.87 (Male) to 23.47 (Female), with a grand mean of 23.17. The standard deviation of various groups ranges from 3.39 (Male) to 3.54 (Female), with a total S.D. of 3.59. Because the highest possible score is 25, the mean scores of all groups reveal that Science instructors, regardless of gender, employed constructivism as a teaching-learning technique in a fairly effective manner.

According to Table 4.6, 10% of male instructors and 5% of female teachers infrequently used a constructivist approach to teaching-learning, whereas 61.7% of male teachers and 63.3% of female teachers used constructivist approach to teaching-learningmoderately. It was shown that 28.3% of male teachers and 31.7% of female teachers used a constructivist approach to teaching and learning. It was discovered that 7.5%, 62.5%, and 30% of secondary school instructors teaching science used the constructivist teaching-learning technique minimally, moderately, and extensively in their classes, respectively.

Table 4.7Classroom Practices of English Teachers

Criteria	Males (N=32)	Females (N=34)	Total (N=66)
AskingQuestions	32 (100)	33 (97)	65(98.4)
Brainstorming	3(10.0)	00(00)	3(4.5)
Collaborative Learning	00(00)	00(00)	00(00)
Discussion	5(15.6)	7(20.5)	12 (18.1)
Explanation	27 (84.3)	29 (85.2)	56 (84.8)
Evaluation	4 (12.5)	4 (11.7)	8(12.1)
Inquiryapproach	00(00)	00(00)	00(00)
OralTranslation	27(84.3)	34(100)	61 (92.4)
Recitation	2(6.4)	5(14.7)	7 (10.6)
Use of Hardware/ Software	00(00)	00(00)	00(00)

Numbers in parenthesis are in percentages

Based on the aspects of classroom teaching practiced by English teachers as presented in Table 4.7. From the above table it is found that majority of the teachers practiced oral translation, explanation and asking questions to the students. The proportion of female teachers who engage in discussion and recitation is higher than that of male teachers, even though less than half of the teacher practiced this method. Neither male nor female teachers were making use of hardware and software tools for teaching English. Only a few male teacher engage in brainstorming. None of the female teacher practiced brainstorming. None of the teachers allowed for collaborative learning in their classroom. Very few teachers evaluated the student's learning at the end of the class.

Table 4. 8Classroom Practices of Social Science Teachers

Criteria	Males (N=45)	Females (N=42)	Total (N=87)
Asking Questions	45 (100)	42(100)	87(100)
Collaborative learning	00(00)	00(00)	00(00)
Concept mapping	00(00)	4(9.5)	4(4.5)
Discussion	9(20)	10(23)	19(21.8)
Explanation	45(100)	42(100)	87(100)
Elaboration	13(28.8)	18(42.8)	31(35.6)
Evaluation	7(15.5)	11(26.2)	18 (20.6)
Inquiry approach	00 (00)	00 (00)	00 (00)
Text book materials	45(100)	42 (100)	87 (100)
Use of ICT tools	00 (00)	00 (00)	00 (00)
Use of Pictures, Charts and Maps	6(13.3)	12(28.5)	18 (20.6)

Numbers in parenthesis are in percentages

Based on the aspects of classroom teaching practiced by Social Science teachers as presented in Table 4.8, it is revealed that every teacher in the study asked questions during lesson teaching, used explanation method and made full use of the prescribed textbook. None of the teachers engaged in collaborative learning, and an insignificant amount used concept mapping method to explain. When it came to discussion, elaboration and evaluation, female teachers were more proactive when compared to male teachers. However, the total number of teachers engaging in these practices were very low. None of the teachers made use of ICT tools to assist their teaching, however close to a quarter of them made use of other teaching aids such as maps, diagrams, pictures etc.

Table 4.9 Classroom Practices of Math Teachers

Criteria	Males (N=30)	Females (N=32)	Total (N=62)
Askingstudentsto memorizeinformation	30(100)	31 (96.8)	61(98.3)
Askingstudentstosolve questionin front of class	9 (30.0)	5(15.6)	14 (22.5)
Engage	00(00)	00(00)	00(00)
Explore	00(00)	00(00)	00(00)
Explanation	30(100)	32(100)	62(100)
Elaboration	00(00)	00(00)	00(00)
Evaluation	11 (36.6)	10(31.2)	21(33.8)
Brainstorming	2(6.6)	5 (15.6)	7 (11.2)
Usingexamplesoutside thetextbooks	16 (53.3)	13(40.6)	29(46.77)
Using inquiryapproach	00(00)	00(00)	00(00)
Solvingtextbookproblems	30 (100)	32 (100)	62(100)
Usinglocal resources	8 (26.6)	8 (25)	16 (25.8)

Numbers in parenthesis are in percentages

Based on the aspects of classroom teaching practiced by Math teachers as presented in Table 4.9 the following information can be revealed: When it comes to the 5 Es of a Math Lesson plan, every teacher across both the genders engaged in explanation, while very few of them evaluated the performance of students when solving math problems. None of the math teachers employed the other three E's of a typical math lesson plan, which is Engage, Explore and Elaboration. Neither did any of them employ Inquiry approach in their teaching. Only 22% of the teachers asked students to solve math problems on the board, where male teachers were more proactive than female teachers. Nearly half the teachers made use of the illustrations provided in the textbook, where male teachers were more proactive than female teachers did. Every Math teacher in the study solved questions from the textbook, but very few made use of locally available tools to complement their teaching.

Table 4.10 Classroom Practices of Science Teachers

Criteria	Males (N=32)	Females (N=28)	Total (N=60)
Anchored Instruction	00(00)	00(00)	00(00)
Brainstorming	5(15.6)	7(25)	12 (20)
Collaborative learning	00 (00)	00 (00)	00 (00)
Concept mapping	28 (87.5)	26 (92.8)	54 (90)
Demonstration	14 (43.7)	12 (42.8)	26 (43.3)
Discussion	11 (34.3)	16 (57.1)	27 (45)
Elaboration	9 (28.1)	00(00)	9 (15.0)
Encouraging critical thinking	11 (36.7)	40(66.7)	62(51.7)
Experimentation	00(00)	00(00)	00(00)
Evaluation	9(15.0)	10(16.7)	19(15.8)
Inquiry approach	00(00)	00(00)	00(00)
Problem-based learning	7(11.70)	5(8.3)	12(10.0)
Project works	30 (93.7)	26 (92.8)	56 (93)
Scientific models	11 (34)	18 (64.2)	29 (48.3)
Use of ICT Tools	5 (15.6)	5 (17.8)	10(16.6)
Project Work	11 (34.3)	16 (57.1)	27 (45)

Numbers in parenthesis are in percentages

Based on the aspects of classroom teaching practiced by Social Science teachers as presented in Table 410, the following information can be revealed. Majority of the teachers practiced concept mapping while teaching new scientific concepts, as well as assigning project work to students. None of the teachers made use of collaborative learning, anchored instructions, adopted inquiry approach and real-life experiments. Nearly half of them used scientific models to aid instruction and used demonstration

techniques. Very few teachers made use of problem-based learning, brainstorming or made use of ICT tools.

4.4 Student's Perceptions about Teacher'sConstructivist Role in Teaching.

To find out the student's perception of teachers in terms of their practices in facilitating role, scaffolding role and reflection role. As a result, the investigator developed a questionnaire for students with yes, no and undecided options. The students were required to read the statements attentively and mark their choice of response, i.e. 'Yes' 'No'. or 'Undecided' The questionnaire items were identical for both male and female students. The role of the teacher divided into four categories which are facilitating role,relationship building role,scaffolding role and reflection role. The role wise descriptions are given in the table 4.11,4,12,4.13 and 4.14

Table 4.11: Teachers' facilitating role as perceived by students

Sl No	Facilitating role descriptor	Yes	No	Undecided
1.	Teachers negotiate with their students	258(64.5)	83(20.7)	59(14.8)
2.	Teachers encourage and accept students' autonomy and initiatives	53(13)	281(70)	66 (16.5)
3.	Teachers ask thought-provoking open-ended questions	302(75.5)	79(19.7)	19(5.8)
4.	Teachers have an internalized flexible knowledge of learning sequence	103(25.7)	247(61.8)	50(12.5)
5.	Teachers make the classroom set up conducive to facilitate collaborative learning	289(72)	103(25.7)	08(2.3)
6.	As a whole facilitating role	201(50)	158(39.5)	41(10.5)

Numbers in parenthesis are in percentages

From the above table it is found that 64.5% of students said that teachers negotiate with their students in the classroom where as 20.7% students said no and 14.8% students have no response about this question. Thirteen percentage students said that teachers encourage and accept students' autonomy and initiatives, whereas 281(70%) students said that teachers are not encouraging students' autonomy. In response to the question regarding teachers ask thought-provoking open-ended questions 75.5% have positive response and 19.7% have negative response where as only 5.8% have undecided to it. Two hundred forty-seven students said that there is nointernalized flexible knowledge of learning sequence among the secondary school teachers of Mizoram. Seventy-two percentage of students said that teachers make the classroom setup conducive to facilitate collaborative learning. As a whole 50% students said that teachers played facilitating role in classroom teaching where as 39.5% students are negative response to it.

Table 4.12: Teachers' relationship building role as perceived by students

Sl No	**Relationship building role descriptor**	**Yes**	**No**	**Undecided**
1.	Teachers positively value all learners andwhat they are doing.	321(80)	18(04)	61(16)
2.	Teachers encourage democratic relationship in the class room.	347(87)	29(07)	24(06)
3.	Teachers encourage students to work in cooperation.	365(91)	23(05)	12(04)
4.	Teachers engage students in dialogue both with him/her and with other.	258 (64.5)	122 (30.5)	20 (05)
5.	Teachers develop shared understanding with students.	79 (19.7)	238 (60)	83 (20.3)

6.	Teachers are familiar with the interest, like and dislike of the learners.	167(41.7)	138(34.5)	95 (23.8)
7.	Relationship building role as whole	256(64)	95(24)	49(12)

Numbers in parenthesis are in percentages

From the above table it is found that 80% of students said that teachers positively valued all learners in the classroom where as 04% students said no and 16% students have undecided about this question. Eighty-seven percentage students said that teachers encourage democratic relationship in the class room, whereas only 07% students said that teachers are not encouraging democratic relationship. In response to the question teachers encourage students to work in cooperation 91% have positive response and 05% have negative response whereas only 4% have undecided to it. Two hundred fifty-eight students said that teachers engage students in dialogue both with him/her and with other there. Sixty percentage of students said negatively thatteachers develop shared understanding with students. Only 41.7% of students said that teachers are familiar with the interest, like and dislike of the learners. As a whole 64% students said that teachers played relationship building role in classroom teaching where as 24% students are negative response to it.

Table 4.13: Teachers' scaffolding roleas perceived by students

Sl No.	Scaffolding Role descriptor	Yes	No	Undecided
1.	Teachers taught the new lesson by joining with previous experiences.	354(88)	12(03)	34(09)
2.	Teachers continuously reassure students learning progress through authentic assessment.	332(83)	53(13)	15(04)
3.	Teachers provide enough time for activities.	259(64)	127(32)	14(04)

4.	Teachers relate the class room activities with real experience.	264(66)	93(23)	43(11)
5.	Teachers structure learning from mistakes	303(76)	13(03)	84(21)
6.	Teachers provide instructional support for learners to accomplish their task effectively.	93(23)	251(62)	56(15)
7.	Teachers scaffolding role as a whole	267(67)	91(23)	42(10)

Numbers in parenthesis are in percentages

From the above table it is found that 88% of students said that teachers taught the new lesson by joining with previous experience where as 03% students said no and 09% students have undecided about this statement. With respect to teachers continuously reassure students learning progress through authentic assessment 83% students said positive response and 13% responds negatively. In response to the question teachers provide enough time for activities.64% have positive response and 32% have negative response whereas only 4% have undecided to it. Two hundred sixty-four students said that teachers relate the class room activities with real experience. Similarly, 66% of students saidteachers structure learning from mistakes. Only 23% of students said that teachers provide instructional support for learners to accomplish their task effectively. As a whole 67% students said that follow scaffolding role.

Table 4.14: Teachers' reflection role as perceived by students

Sl No	**Statements**	**Yes**	**No**	**Undecide**
1.	Teachers encourage students to reflect on teaching and learning process.	362(90)	13(03)	25(07)
2.	Teachers are open minded, wholehearted and responsible for students learning.	232(58)	153(38)	15(04)

3.	Teachers monitor evaluate and revise their teaching practice continuously.	359(89)	28(08)	13(03)
4.	Teachers allow students to play with ideas and explore issues.	264(66)	93(23)	43(11)
5.	Teachers make students to present their ideas first before sharing his/her ideas	13(03)	303(76)	84(21)
6.	Teachers make students to reflect on other ideas.	92(23)	252(62)	56(15)
7.	Teacher's reflection role as a whole	220(55)	140(35)	40(10)

Numbers in parenthesis are in percentages

From the above table-4.14 it is found that 90% of students said that teachers encourage students to reflect on teaching and learning process. Whereas 03% students said no and 09% students have undecided about this statement. In response to the statement teachers are open minded, wholehearted and responsible for students learning58% students said positive response and 38% responds negatively. In response to the question teachers monitor evaluate and revise their teaching practice continuously.89% have positive response and 08% have negative response whereas only 3% have undecided to it. Two hundred sixty-four students said that teachers allow students to play with ideas and explore issues. Similarly, 76% of students denied that teachers make students to present their ideas first before sharing his/her ideas. Only 23% of students said that teachersmake students to reflect on other ideas. As a whole55% students said that teachers followedreflection role.

Table–4.15Teachers'utilizationofdimensionsofconstructivistteachingaswholeperceived bystudents (N=400)

Teachers'role	**Obs.mean**	**Exp.mean**	**Std**	**T**
Facilitatingrole	13.901	16.95	3.049	-6.184
Relationbuildingrole	16.589	19.408	2.819	9.682

Scaffoldingrole	16.69	19.94	3.250	-5.686
Reflectionrole	13.91	17.236	3.326	-5.617
Teachers'roleaswhole	61.09	69.065	7.975	-3.522

p<0.05

The table above shows that the status of teachers in Mizoram secondary schools in terms of assisting students' learning is investigated using a one sample t-test. The students' results revealed a statistically significant difference between the observed mean (13.901) and predicted mean (16.95) on the instructors' enabling role (t=-6.184, p<0.05). The findings imply that teachers were not facilitating pupils' learning. This suggests that Mizoram secondary school teachers perform the facilitating role well below what is expected of them.

Students' responses revealed a statistically significant difference between the observed mean (16.589) and predicted mean (19.408) for the teacher's connection building role (t=9.684; p<0.05). This demonstrates that instructors were doing their relationship-building duties well. This indicates that Mizoram secondary school teachers go above and beyond what is asked of them in terms of connection building role descriptors.

According to the data above, there is a statistically significant discrepancy between the observed mean (16.69) and predicted mean (19.4) on teachers' scaffolding role (t=-5.686; p 0.05). The t-test results received from students indicate that teachers were not adequately scaffolding students' learning capability. This means that instructors will practice these scaffolding role descriptions below the level expected of them. However, as perceived by students, the descriptor, instructors' framework learning from mistakes, ispracticed above the average score.

The data collected from students about teachers' reflection roles were analysed using a one-sample t-test. According to the students' t-test results in the table above, there is a statistically significant difference between the observed mean (13.91) and expected mean (17.236) on the teacher's reflection role (t=-5.617; p< 0.05). The t-test results from students revealed that teachers

were not performing their reflection role in classroom learning effectively. Teachers perform all reflection role descriptions below the mean score, as seen in the table above.

According to the table above, there is a statistically significant difference between the observed mean (61.09) and expected mean (69.065) on the dimension of constructivist teaching ($t=-3.532$; $p <0.05$) between the role-played teachers to carry out dimension of constructivist teaching (facilitating, relationship building, reflection, and scaffolding roles). According to the Table students t-test results, the level of constructivist teaching practice of the teacheris lower than expected. Despite the fact that teachers' overall involvement is judged to be low, the effort taken to develop successful relationships between them and students, as well as among students themselves, is high (above from the average).

4.5: Practices of Secondary School Students Adopting Constructivist Learning Approach

The third objective of the research is to determine how much secondary school students apply constructivist learning approaches in the classroom and at home. Thirty multiple-choice questions were included in the questionnaire designed to reveal students' activities in adopting a constructivist approach. The highest and lowest possible scores were 25 and 0 (zero), respectively. Table 4.16 presents the mean and standard deviation for students' practices in order to describe the data. It was decided to categorise the students based on their results on adopting constructivism as a learning approach, using the criteria stated below. Table 4.16 displays the results of the classification of pupils based on their gender.

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

Table 4.16Mean andSD of studentsbased on adoption of Constructivist Learning Approach

S.N	Grade	Gender	N	Mean	SD
1	Class IX	Male	210	16.65	4.32
		Female	190	15.34	4.42
		Total	400	16.20	4.30

Table 4.17 GenderWiseLevelsofPractice of ConstructivistLearning

S.N	Grade	Level of Practice	Male (N=210)	Female (N=190)	Total (N=400)
1	Class IX	Low	72 (34.2)	83 (43.6)	155(38.7)
		Moderate	107 (50.9)	78(41)	185(46.2)
		High	31(14.7)	29 (15.2)	60 (14.5)

Numbers in parenthesis are in percentages

According to table 4.17, the mean scores of secondary school students differ by gender, ranging from 16.65 (Male) to 15.34 (Female), with a grand mean of 16.20. The standard deviation of various groups ranges from 4.32 (Male) to 4.42 (Female), with a total S.D. of 4.30. Since the maximum possible score is 25, the mean scores of all student groups, regardless of gender, modestly applied constructivism as a learning strategy.

Table 4.17 reveals the following critical observations. Only 34.2% of male students and 43.6% of female students seldom used the constructivist method to learning, whereas 50.9% of male students and 41% of female students used it regularly. Similarly, 14.7% of male students and 15.2% of female students used a constructivist learning approach. Overall, 38.7%, 46.2%, and 14.5% of secondary school students utilised constructivist learning approaches minimally, moderately, and substantially in their classrooms and at home, respectively.

The objective no-6 of the study is to Compare the learning practices of Secondary School students of Mizoram based on constructivist approach in learning with respect to gender

Table-4.18Gender-wise Comparison of practices on constructivist approach of learning of Secondary School students of Mizoram

Gender	N	Mean	SD	t-Value	p-value
Male	210	16.65	4.32	-.087	.953
Female	190	15.34	4.42		

The obtained p-value for mean scores of practices of constructivist approach of learning of male and female secondary school students of Mizoram is actually (p>.05) larger compared to the.05 level of significance. Which, means there's no substantial distinction between the practices of constructivist approach on learning between male and female students of Mizoram at.05 level of significance, t =.078, p =.843. Hence, practices of constructivist approach on learning among secondary school students of Mizoram has no significant difference among male and female students.

4.6: Perception of Secondary School Teachers Teaching Different Subjects in Mizoram on Constructivist Teaching-Learning Approach

The fourth objective is to find the perception of Secondary School Teachers across four different subjects (English, Social Science, Math, and Science). In this section, the perceptions of secondary school teachers on four characteristics of constructivism (authentic leaning task, metacognition, cooperative learning and Awareness construction) are presented.

Criteria for interpreting the level of perceptions

Level of Awareness	Range	Range of Scores
High	Above Mean +1 SD	22.8-25.0

Moderate	Mean-1SD to Mean+1SD	12.1-22.8
Low	Below Mean-1SD	00-12.1

Table 4.19 Mean and SD of Different Groups of Teachers on perceptions

S.N	Subject	N	Mean	SD
1.	English	66	13.80	4.29
2.	Social Science	87	15.10	4.17
3.	Mathematics	62	13.65	4.21
4.	Science	60	15.20	4.49
5.	All Subjects	**275**	16.38	4.16

Table 4.19 shows the mean scores of several groups of teachers, with a grand mean of 16.38. The standard deviation for all subjects is 4.16. The mean scores of all groups suggest that instructors of diverse courses such as English, Social science, Mathematics, and Science had moderate perspectives of constructivism as a teaching-learning strategy, since the highest and least possible scores were 25 and 00 (zero), respectively. The standard deviations demonstrate that the variances in the scores of various groups are likewise not large.

Authentic learning task

Table 4.20: Relationship of task with a student's real –life

Sl No	Options	**Individual**	**Group**
		Number	**Number**
1.	The task should have close relationship with real-life	123(44.7)	79 (28.7)
2.	The task may or may not have relationship with real-life	68(24.7)	60 (21.8)
3.	The task should be from the book and irrespective of its relationship with real-life	82(29.8)	134 (48.5)
4.	Total	275(100)	275(100)

Numbers in parenthesis are in percentages

Table 4.20 reveals that most of the teachers (44.7%) feel that task should have close relationship with real life when it comes to individual task, although when it comes to group task, it should be from textbook (48.72%). Very few teachers (10.9%) felt that task should be from the book and irrespective of its relationship with real-life when it comes to individual task, while 28.7% of the teachers felt the task should have close relationship with real-life when it comes to group tasks.

Metacognition and cooperative learning

Table 4.21: Self-regulation of student task

Sl No	How should a student perform his individual task?	
	Options	**Number**
	Students should collaboratively work with fellow students and complete the task together	102(39)
	Students should individually complete their work without any interaction with others.	45(16.7)
	Student should personally regulate the way they perform the task; however, they may interact with fellow students to complete their individual task	123((44.3)
	Total	275((100)

Numbers in parenthesis are in percentages

Table 4.21 reveals the following information. Considering self-regulation of the task, nearly half (46.18%) of all the teachers answered felt that students should personally regulate the way they perform the task and may interact with fellow students to complete his individual task. Only a small minority of teachers (16.7%) felt that students should individually complete his work without any interaction with others, while 39% of the teachers felt that students should collaboratively work with fellow students and together complete the task.

Awareness construction

Table 4.22. Teachers' view about knowledge construction

By performing an individual and group work activities students construct new knowledge.				
Options	**Individual**		**Group**	
	Number	**%**	**Number**	**%**
Strongly Disagree	0	0	0	0
Disagree	0	0	0	0
Cannot say	38	13.8	12	4.3
Agree	137	49.8	107	38.9
Strongly Agree	100	36.4	156	56.8
Total	275	100	275	100

From Table 4.21 it is revealed that every teacher agreed that performing a task as an individual or in a group helps in constructing knowledge, with 49.8% agreeing when it is an individual task and 56.7% strongly agreeing when it is a group task. Very few teachers were unsure (13.8%) of a task's benefits in individual tasks as well as group tasks (4.3%). Teachers have more faith in group activities as the enabler of knowledge construction compared to individual tasks.

Relationship between new and prior knowledge

Table 4.23Relationship between new and prior knowledge in learning

Should there be any relationship between new and prior knowledge?		
Options	**Individual**	**Group**
New knowledge should be totally new and not have any relationship with prior Awareness	61 (12.7)	91(29)
New knowledge should alter students' prior Knowledge	214(87.3)	184(71)
Total	275(100)	275(100)

Numbers in parenthesis are in percentages

Table 4.23 shows that majority of the teachers (87.3%) seem to perceive that when students perform tasks individually, their prior-knowledge should have close relationship with new knowledge. This goes down to 71% for group activities. In the case of individual work methods, the majority of teachers place a high value on the link between past and new knowledge. However, the number of teachers in the group

work technique is lower than in the individual work method when this connection is taken into account.

Students' reflection on learning, how student can express what they learnt

Table 4.24 Students' reflection on learning in both individual and group work methods

After your student performed individual and group work on a task he/she will reflect as:				
Options	**Individual**		**Group**	
	Number	**%**	**Number**	**%**
Students should be able to explain what he has learnt.	83	30.3	123	44.7
Students may or may not be able to explain what he they learnt	45	16.3	54	19.6
Students will not be able to explain what they learnt immediately	147	53.4	98	35.7
Total	275	100	275	100

Table 4.24 shows that when teachers were asked about students' reflection on their learning, nearly half (44.7%) of them replied that, after performing group-work activity students must be able to express what they have learnt in group work. When it came to individual activities only 30.2% of all the teachers agreed to this. Nearly half (53.4%) of the teachers felt that students will not be able to express what they have learnt while doing individual work. Whereas, 35.6% of all the teachers perceived that, by performing group work activities students will not be able to express what they have learnt.

Application of individual and group working methods by teachers.

Table 4.25. How do teachers apply individual and group working methods?

How do you implement individual and group working methods		
Options	**Individual Task**	**Group Task**
He should collaborate with other students to complete	71(25.8)	

tasks		
He should complete his tasks alone	60(21.8)	
Students personally regulates the way he does his tasks, still he may seek help from others to complete his task	143(52)	
Total	275(100)	
Group as a whole should achieve the result, no matter who achieved it		160(58)
Every member in the group is accountable and should contribute		115(42)
Total		275(100)

Numbers in parenthesis are in percentages

Table 4.25 reveals that more than half (58%) of the teachers have the perception that when it comes to group work activities, the group as a whole should achieve the result. Conversely, 42% of the teachers feel that every member should be accountable and contribute to group work activity for achieving the result. It is also revealed that 52% of all the teachers feel that students have to regulate the work when they perform their individual work. Only a small group of teachers (21.8) feel that students should complete their individual task alone while 36.6% of the teachers feel students should collaborate with other students to complete individual tasks.

Topics and result for question-answer method

Table 4.26. Topics and result in question-answer session

Questions	**Yes%**	**No%**
Topic for the question-and-answer session should be relevant to students' everyday lives.	74	26
Students should be able to express what they have learned in question-answer sessions as a result of using the question-answer technique	70	30
Question-and-answer sessions should be demanding and relevant to students' past knowledge	66	34

From the information given in table 4.26, we can see that majority of teachers (74%) felt that the topic for the question-and-answer session should be relevant to students' everyday lives. Similar percentage of teachers (70%) felt that students should be able to express what they have learned in question-answer sessions because of using the question-answer technique. However, 34% of the teachers disagree with the idea that question-and-answer sessions should be demanding and relevant to students' past knowledge. In addition, most of the teachers (66%) say that they ask questions that are tough for pupils and connected to their past knowledge

Question-and-answer outcomes for students and instructors

Table 4.27Outcomes of question-answer for students and teachers

Main reason teacher implements question-answer method		
Options	**Yes %**	**No %**
To help students recall what they have learnt	93	07
To evaluate pupils' past knowledge	87	13
To control the classroom	67	33

As we can see from table 4.28, 93% of teachers said that teacher implement questionnaire method because it will help students to recall what they have learnt. Similarly,87% teachers said that it will evaluate students' past knowledge. Only 67% teachers said that it will help to control the class room

4.7: Comparison of Awareness, Perception and Practices of Secondary School Teachers Teaching Different SubjectsinMizoram RelatingtoConstructivist Approach to Teaching and Learning

The study's second, fourth and eighthobjectives were to determine if there were any differences in the awareness, perception, and practices of secondary school teachers in Mizoram across various subjects using a constructivist teaching-learning method. Based on the four teaching subjects, the significance of differences in means of awareness, perception, and practices is compared using a t-test, and the findings are presented in table 4.29 interpreted using components.

Table 4.28: t-Values for Teachers Teaching Different Subjects Compared on three Components of Constructivist Approach to Teaching-Learning

Sl. no.	Groups Compared	Components		
		Awareness	Perception	Practices
1.	Mathematics Vs English teachers	0.13	1.21	00
2.	Mathematics Vs Science teachers	1.21	2.64**	1.35
3.	Mathematics Vs Social Science teachers	1.54	1.20	0.37
4.	English Vs Science teachers	0.99	1.74	1.59
5.	English Vs Social Science teachers	1.07	2.78**	0.26
6	Science Vs Social Science Teachers	1.05	1.39	0.27

** Significant at 0.01 level

The differences among the secondary school teachers of various subjects in their awareness on constructivist teaching-learning approach is tested through t- value. According to the table above, all five t-values for Mizoram secondary school teachers based on their teaching subjects compared to the awareness component of the constructivist method to teaching-learning are not significant.

As a result, it can be established that all secondary school teachers in Mizoram teaching various subjects are more or less aware of the constructivist approach to teaching-learning.

Similarly, in order to assess the differences in views of constructivist teaching-learning approaches across the six groups, the following table shows that four of the six t-values are not significant, while two are at the 0.01 level. There is a significant difference between mathematics and science teachers, as well as between English and social science teachers.

As a result, mathematics and social science teachers in Mizoram secondary schools had a more favourable perception toward constructivist teaching-learning approaches than science and English instructors.

The table shows that none of the six t-values for the four groups of teachers depending on their teaching subjects were significant when compared to the practice component of the constructivist method to teaching-learning.

As a result, it may be deduced that all secondary teachers teaching different subjects have more or less identical constructivist teaching-learning practices in their classrooms.

Table-4.29Post hoc test for Multiple Compressions of subject-wise difference in constructivist teaching between Secondary school Teachers of Mizoram

(I) Subject	(J) Subject	Mean Difference (I-J)	Std. Error	Sig.
Mathematics	Science	2.1567	1.3068	.226
	English	2.6933	1.6530	.235
	Social Science	2.6821	1.2530	.221
Science	Mathematics	2.1567	1.3068	.226
	English	2.1432	1.7533	.017
	Social Science	2.1765	1.546	.012
Social Science	Mathematics	2.6933	1.6530	.235
	Science	2.043	1.241	.241
	English	2.413	1.7533	.017
English	Mathematics	2.1367	1.2068	.216
	Science	2.5933	1.5530	.215
	Social Science	2.5721	1.1530	.231

From the above table it could be concluded that there's no great difference occurs in the mean scores of constructivist teaching of mathematics, science, social science and English.

4.8: NatureandExtent ofRelationshipamongAwareness, Perceptions and PracticesofSecondarySchoolTeachersinMizoram RelatingtoConstructivism asaTeaching-LearningApproach

The objective no-9 of the study is to find out thenature and extent of relationship among awareness, perceptions and practices of secondary school teachers in Mizoram relating to constructivism as a teaching-learning approach

To determine the nature and extent of the relationship between awareness, perceptions, and practices of secondary school teachers in Mizoram relating to constructivism as a teaching-learning approach, the co-relation coefficients for the three components were computed on the scores of the entire sample, regardless of gender or teaching subjects. The findings are summarized in Table 4.31.

Table 4.30:CorrelationCoefficients amongAwareness, Perceptions and Practices of secondary School Teachers onConstructivistTeaching-LearningApproach

(N=275)

Components	Awareness	Perceptions	Practices
Awareness	1.200	0.292**	0.324**
Perceptions	0.292**	1.20	0.243**
Practices	0.324**	0.243**	1.200

**significantat 0.01 level

Table 4.31 reveals that there is positive and significant relationship between awareness and perceptions, awareness and practices, and perceptions and practices of secondary school teachers in Mizoram on constructivist teaching learning approach.

4.9 Constraints of SecondarySchool Teachers in Mizoramin Adopting ConstructivistTeaching-Learning Approach

The study's 10thgoalis to uncover the barriers that secondary school teachers in Mizoram experience in adopting a constructivist teaching-learning strategy. As a result, the investigator developed a checklist for teachers that comprised eleven (11) questions with alternate response options. The respondents were required to read the statements attentively and mark their choice of response, i.e. 'Yes' or 'No.' The checklist items were the identical for all four groups of teachers, regardless of the disciplines they taught: mathematics, English, science, and social science. The percentages of all four groups of teachers' responses were calculated after they were collated into frequency distributions. Table 4.32 summarizes the findings, with question-by-question interpretations.

Table4.31: ResponsesofTeachersonConstraintsofadoptingConstructivist Teaching-Learning Approach

Statements	Teaching Subjects									
	Mathematics (n=62)		English (n=66)		Science (n=60)		Social Science (n=87		Total (N=275)	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Freedom provided by the headmaster	62 (100)	00 (00)	66 (100)	00 (00)	60 (100)	00 (00)	87 (100)	00 (100)	275 (100)	00 (00)
Use TLM to supplement teaching	48 (77)	14 (23)	50 (75)	16 (25)	60 (100)	00 (00)	64 (73)	23 (27)	222 (80)	53 (20)
Funds for buying necessary teaching aids instructional tools	62 (100)	00 (00)	66 (100)	00 (00)	60 (100)	00 (00)	87 (100)	00 (00)	275 (100)	00 (00)
Liberty to take the students for excursions	50 (80)	12 (20)	48 (72)	18 (28)	50 (83)	10 (17)	63 (72)	24 (28)	211 (77)	64 (23)
Social distance between students and teachers	32 (51.7)	30 (48.3)	42 (63)	24 (37)	30 (50)	30 (50)	48 (55)	39 (45)	152 (55)	123 (45)
Difficulty in covering the syllabus on time	58 (90)	04 (10)	53 (80)	13 (20)	60 (100)	00 (00)	84 (96)	03 (04)	255 (91.5)	20 (8.5)
Colleagues are less interest in this method	38 (61)	24 (39)	42 (63)	22 (37)	38 (63)	22 (37)	53 (60)	34 (40)	171 (62)	104 (38)
Classroom management is difficult	58 (93.3)	4 (6.7)	50 (95)	16 (5)	50 (95.8)	10 (4.2)	70 (97.5)	17 (2.5)	228 (83)	47 (17)
Large class size	15 (14.2)	47 (85.8)	20 (16.7)	46 (83.3)	48 (10.8)	12 (89.2)	5 (4.2)	82 (95.8)	88 (11.5)	187 (88.5)
Scarcity of learning resources	62 (100)	00 (00)	66 (100)	00 (00)	60 (100)	00 (00)	87 (100)	00 (00)	275 (100)	00 (00)

Teachers lack of knowledge and skill of constructivist approach to teaching	48 (60)	12 (40)	51 (77)	15 (23)	42 (70)	18 (30)	58 (66)	29 (34)	201 (73)	74 (27)

Figures inparentheses indicatepercentages

According to table 4.32, all teachers (100%) teaching the four subjects of Math, English, Science, and social science said the headmaster gave them full freedom to adopt constructivist teaching practices in class, as well as being provided with all the teaching learning aids and necessary instructional tools whenever asked.However, the same number of teachers (100%) said that despite all this, there still existed scarcity of learning resources, mainly due to geographical and financial constraints present within the institution itself.

The second question asked if they used TLM to supplement their teaching. From the above table it is observed that 77 percent, 75 percent, 100 percent, and 73 percent of Math, English, Science, and social science teachers respectively made use of TLM in their teaching.Overall, the majority of teachers (80%) said that they used TLM in their teaching. In total 20 percent of teachers didn't use TLM for teaching

The fourth question asked whether they were given the liberty to take their students out on excursions as part of the teaching-learning process. Table 4.32 reveals that 80 percent, 72 percent, 90 percent, and 87.5 percent of Math, English, Science, and Social science teachers respectively said they were given the liberty to take their students out on excursions as part of the teaching-learning process. Overall, 84.4 percent of all teachers teaching various subjects said they were allowed to take their students out on excursions as part of the teaching-learning process. In total 15.6 percent of teachers said they were not given the liberty to take their students out on excursions.

The fifth question asked whether social distance between students and teachers was a constraint in implementing constructivist methods. According to table 4.32, 51.7 percent, 63 percent, 50 percent, and 55 percent of Math, English, Science, and social science teachers respectively said they faced problems covering the syllabus on time.Overall, 55 percent of all teachers teaching various subjects said social distance between students and teachers was a constraint in implementing constructivist methods. In total 8.5 percent of teachers said they faced no problems in this regard.

The sixth question asked whether they faced problem covering the syllabus on time hindered the ability to implement constructivist methods. According to table 4.32, 90 percent, 80 percent, 100 percent, and 96 percent of Math, English, Science, and Social science teachers respectively said they faced problems covering the syllabus on time.Overall, 91.5 percent of all teachers teaching various subjects said they faced problem covering the syllabus on time. In total 8.5 percent of teachers said they faced no such problems regarding the covering of the syllabus on time.

The seventh question asked whether their fellow teachers showed less interest in constructivist teaching method. According to table 4.32, 61 percent, 63 percent, 63 percent, and 60 percent of Math, English, Science, and social science teachers respectively said their fellow teachers showed low interest in this method.Overall, 62 percent of all teachers teaching various subjects said their fellow teachers showed less interest in constructivist teaching method. In total 38 percent of teachers said their fellow teachers did show interest in constructivist teaching method.

The eighth question asked whether they faced problems managing the classroom. According to table 4.32, 93.3 percent, 95 percent, 95.8 percent, and 97.5 percent of Math, English, Science, and Social science teachers respectively said faced problems managing the classroom. Overall, 83 percent of all teachers teaching various subjects said that faced problems managing the classroom. In total 17 percent of teachers said they faced no problems managing the classroom.

The ninth question asked whether the large size of their classroom was a constraint to their constructivist teaching methods. Table 4.32 shows that 14.2 percent, 16.7 percent, 10.8 percent, and 4.2 percent of Math, English, Science, and Social science teachers respectively said the large size of their classroom was a constraint to their constructivist teaching methods. Overall, 11.5 percent of all teachers teaching various subjects said that the large size of their classroom was a constraint to their constructivist teaching methods. In total 88.5 percent of teachers said the large size of their classroom was not a constraint to their constructivist teaching methods

The final question asked the teachers whether their own lack of knowledge and skill of constructivist approach to learning was a constrain to their abilities. Table 4.32 shows that 60 percent, 77 percent, 70 percent, and 66 percent of Math, English, Science, and Social science teachers respectively said their own lack of knowledge and skill of constructivist approach to learning was a constrain to their abilities

Overall, 73 percent of all teachers teaching various subjects said their own lack of knowledge and skill of constructivist approach to learning was a constrain to their abilities. In total 27 percent of teachers said their own lack of knowledge and skill of constructivist approach to learning was a constrain to their abilities.

CHAPTER-V
FINDINGS AND DISCUSSIONS

This chapter deals about the findings and discussions of this study. Findings of the study is followed by discussions and conclusion. In this chapter Section 5.1 has been presented as findings of the study, Section 5.2 is about discussion and Section 5.3 is about conclusion of the study.

5.1: Findings

The following are the important findings of the study:

A. Objective #1: To assess the awareness of secondary school teachers of Mizoram relating to constructivist approach to teaching and learning.

B. Objective #2:To compare the awareness of secondary school teachers of Mizoram relating to constructivist approach to teaching and learning with reference to their teaching subjects (English, Math, Science and Social Science).

1. With regard to awareness on constructivist teaching and learning approach, all the groups of teachers of various subjects (English, Social science, Mathematics and Science) have moderate level of awareness.
2. About 19.2% of secondary school teacher of Mizoram have low level of awareness on constructivist methods of teaching and learning with a male and female breakup of 18.75 and 18.45 respectively.
3. Majority (60.2%) of the teachers in all subjects (English, Social Science, Math and Science) have moderate level of awareness regarding constructivist approach to teaching and learning with a male and female breakup of 61.1% and 63.2% respectively
4. About 20.6% of secondary school teacher of Mizoram have high level of awareness on constructivist methods of teaching and learning with a male and female breakup of 20.2% and 18.5% respectively

C. Objective #3:To reveal the practices of secondary school teachers of Mizoram in adopting constructivist pedagogy and role.

D. Objective#4: To compare the practices of secondary school teachers of

Mizoram in adopting constructivist pedagogy with reference to their teaching subjects. (English, Math, Science, Social Science).

5. About 8% of secondary school teacher (with a male and female breakup of 9.35% and 6.61% respectively) of Mizoram have low level of practice on constructivist methods of teaching and learning in classroom situation,
6. A majority (68.72%) of secondary school teachers of Mizoram weremoderately practicing constructivist approach in their teaching and learning in classroom situation.
7. About 23.27% of secondary school teachers of Mizoram have high level of practice of constructivist approach in their teaching.
8. About 28.33% of secondary school science teachers of Mizoram have high level of practice of constructivist approach in their teaching in comparison to english (25.75%) social Science (26.5%) and mathematics (20%)
9. Similarly, About 4.6% of secondary school social science teachers of Mizoram have low level of practice of constructivist approach in their teaching in comparison to English (6.06%) , Science (10%) and Mathematics (11.7%)

E. Objective #5:To compare the learning practices of secondary school students of Mizoram in the context of constructivist approach with reference to their gender.

10. With respect to practices of secondary school students on constructivist learning, only 46.2% (with male, 50.9% and female, 41%) of students respondents have moderate level of practices; whereas 38.7% of secondary school students have low level of practice and 14.5% of students having high constructivist learning practices.
11. There is no significant difference between male and female students of secondary schools of Mizoram with regard to constructivist approach on learning practices.

F. Objective #6: To determine the students' perception about teachers' constructivist role in teaching.

12. With respect to teacher's facilitating role as perceived by students 64.5% of secondary school teachers negotiate with their students.

13. About 13% secondary school teachers encourage and accept student's autonomy and initiatives.
14. About 75.55% of secondary school teachers ask thought-provoking open-ended questions to the students in the classroom.
15. A majority of the secondary school teachers (72%) make the classroom conducive and facilitating for collaborative learning.
16. With regard to teachers' relationship building role as perceived by students, a majority of the secondary school teachers of Mizoram (80%) positively value all the learners in the classroom and 87% of teachers encourage democratic relationship in the classroom.
17. A majority of the students of secondary school (91%) say that their teachers encourage students to work in cooperation with them.
18. About 64.5% of secondary school students of Mizoram say that teachers engage students in dialogue both with students and among themselves.
19. A very few students (19.7%) opined that teachers are familiar with the interest of students and their likes and dislikes.
20. With regard to scaffolding role of teacher, 88% of students say that teachers taught the new lesson by joining with previous experiences.
21. A majority of students (83%) say that teachers continuously reassure students' learning progress through authentic assessment.
22. About 64% of secondary school students of Mizoram say that teachers provide them enough time for activities.
23. About 66% of student of secondary school students of Mizoram say that teachers relate the classroom activities with real experience.
24. About 76% of secondary school students say that teachers structure learning from mistake.
25. In total, 67% of the student respondents say that their teachers play the scaffolding role properly.
26. With regard to teachers' reflection role as perceived by students, 90% say that teachers encourage students to reflect on teaching and learning process.
27. A majority of the students (89%) say that teachers monitor, evaluate and revise their teaching practice continuously.

28. A small percentage of students (3%) say that teachers make students present their ideas first before sharing his/her ideas.
29. The level of constructivist teaching practice and teacher's overall involvement on constructivist teaching practice in the classroom is low. ($t=-3.532$; $p<0.05$)

G. Objective #7: To find out the perception of secondary school teachers teaching different subjects in Mizoram adopting Constructivist Teaching-Learning Approach

H. Objective # 8. To compare the perceptions of secondary school teachers of Mizoram relating to constructivist approach to teaching and learning with reference to their teaching subjects (English, Math, Science and Social Science).

30. With regard to perception of secondary school teachers teaching different subjects in Mizoram, majority of the teachers have moderate perception of constructivism as a teaching – learning approach.
31. With regard to relationship task with student's real-life, 44.7% of the secondary school teachers of Mizoram think that the task should have close relationship with real life when it comes to individual tasks. However, 48.5% of the teachers think that group tasks should be from the book and irrespective of its relationship with real-life.
32. In terms of self-regulation of student tasks, majority of the secondary school teachers of Mizoram (44.3%) think student should personally regulate the way they perform the task; however, they may interact with fellow students to complete their individual task.
33. Majority of the secondary school teachers of Mizoram (49.8%) agree and a considerable number of teacher (36.4%) strongly agree that idea construction can happen in individual activities. When it comes to group activities, majority (56.8%) of teachers strongly agree and a considerable amount of teachers (38.9%) agree.
34. A majority of secondary school teachers of Mizoram (87.3%) believe that in an individual setting new knowledge should alter student's prior knowledge**.** In group setting, the proportion of teachers supporting this idea drops a bit (71%).

35. In the context of individual setting, majority of the teachers (53.4%) believe that it is not possible for students to immediately explain their ideas while 30.3% of the teachers believe students should be able to explain their ideas. In a group setting, majority of the teachers (44.7%) believe students should be able to explain their ideas.
36. Majority of the teachers (74%, 70% & 66%) believed that when it comes to question answer session (that usually occurs after a topic is covered) the questions should be relevant to student's everyday lives, previous knowledge and enable students to express their ideas.
37. Majority of the teachers (93%) implement question-answer method to help students recall what they have learnt in class. Most of the teachers (87%) do so to find out the students past knowledge. However, 67% of the teachers use this strategy to control the classroom.

I. Objective #9. To find out the relationship between awareness, practices and perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy.
J. Objective #10. To compare the relationship between awareness, practices and perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy.

38. In comparison of awareness and perception of secondary school teachers of Mizoram teaching different subjects in relation to constructivist approach of teaching and learning it is found that there is no significant difference between them.
39. In comparison of practices of secondary school teachers of Mizoram teaching different subjects in relation to constructivist approach of teaching and learning it is found that there is a significant difference between mathematics and science teachers, as well as between English and social science teachers.
40. There is no significant difference among awareness, perception and practices of secondary school teachers of Mizoram teaching various subjects.

41. There is positive and significant relationship between awareness and perceptions, awareness and practices, and perceptions and practices of secondary school teachers in Mizoram on constructivist teaching learning approach.

K. Objective # 11: To reveal the constraints of secondary school teachers of Mizoram in adopting constructivist pedagogy.

42. With regard to the constraints faced by the teachers of secondary schools of Mizoram every teachers, irrespective of their subjects, say they faced the problem of scarcity of learning resources.
43. A majority (80%) of secondary school teachers made use of the teaching learning materials available to them for teaching, which shows that teachers in Mizoram are more than willing to make use of all the available resources and accommodate these aids in their day-to-day teaching activities.
44. Majority of teachers (77%) enjoy the liberty to conduct co-curricular and extra-curricular activities.
45. Majority (55%) of secondary school teachers of Mizoram feel the lack of social distance between students and teachers.
46. A majority (91.5%) of secondary school teachers face difficulty in covering the syllabus in due course of time with constructivist approach of teaching.
47. Many teachers (171) said that their colleagues show lack of interest in teaching using constructivist approach.
48. Eighty three percentage of teachers face difficulties to manage the class while teaching in constructivist approach.
49. All teachers opined that they face scarcity of learning resources for using constructivist approach in teaching.
50. Majority of the teachers (73%) admitted that they lack adequate knowledge and skill for using constructivist approach in teaching and learning process effectively.

5.2 Discussions

5.2.1 Discussion on Awareness of Secondary school teachers on constructivist approach of teaching and Learning

The study reveals that secondary school teachers of Mizoram irrespective of teaching subject have moderate awareness on constructivist teaching and learning approach. The findings are similar to the findings of the study conducted by Grace (2016) and Lasker, A. H., & Bhattacharjee, S. (2022).Government Secondary Schools teachers and students of hail Khandi district of Assam are less aware about Constructivist Approach in the teaching learning process. A few percentages of the secondary school teachers irrespective of their training reported that they have low level of awareness on constructivism. Teacher awareness impact instruction (Song & Looi, 2012; Snider & Roehl, 2007) and can help form the basis for decisions teachers make regarding how subject is taught (Feyzioğlu, 2012; Song & Looi, 2011). Teacher awareness on constructivism not only impact instruction, but also how teachersmay accept and implement changes and reforms (Snider & Roehl, 2007; Harwood, Hansen, &Lotter, 2006; Errington, 2004). This finding is relevant as secondary school teachers of Mizoramwhat teachers think should be taught, how it should be taught, how studentslearn, and what the appropriate teacher and student roles are in the classroom (Snider & Roehl,2007; Harwood, Hansen, & Lotter, 2006; Errington, 2004).

Teachers having low awareness could be due to being out of touch with this concept and not actually practicing constructivist teaching methods in day-to-day class activities. Moderate level of understanding is a poor show in light of the importance constructivist pedagogy has in the modern education system. The result of the study shows that either these teachers are not benefitting from training programs they participate in (e.g. Refresher course), the teaching training courses they attend do not cover constructivist pedagogy, or are not given the opportunity to participate in any training programs. More training programs should be organized by institutions such as Mizoram University, DIET and IASE to keep teachers up to date and well aware of developments regarding constructivist pedagogy. Though some professional development programs are conducted by Mizoram University to train the secondary school teachers on constructivism, due to lack of participation it is

difficult for the secondary school teachers of Mizoram to adopt constructivist approach in teaching

5.2.2 Discussion on Practices of Secondary school teachers on constructivist approach of teaching and Learning.

It is found that majority of secondary school teachers of Mizoram were moderately practicing constructivist approach in their teaching and learning in classroom situation. The findings of this study are very similar to the findings of the study conducted by Grace (2018) which showed 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." There are several key elements of constructivist pedagogy that was completely missing in these teacher's classroom activities.

None of the English teachers made use of collaborative learning, inquiry approach and computer aided teaching tools. In lessons relating to poetry and prose, collaborative learning and inquiry approach is essential. These were omitted since these activities require skillful teaching. In Mizoram, English classes usually involve recitation and explanation by the teacher with very moderate levels of constructivist teaching.

The same issue was seen among Social Science teachers who avoided collaborative learning and inquiry approach. Social Science teachers didn't use ICT tools too but this can be attributed to the lack of ICT infrastructure in the school. Like English teachers, Social Science teachers were very prompt to using teaching methods like asking questions and explanation.

Math teachers relied heavily on solving and explaining questions from the textbook. None of the Math teachers engaged, explored and elaborated the theorems, formulas and equations, which are essential elements of constructivist math pedagogy.Science teachers didn't indulge in inquiry and collaborative learning like their peers from English and Social Science. They also skipped on essential constructivist science pedagogy like experimentation.

Students were asked as to how they see their teachers in the roles of facilitator, relationship builder, role of reflector and role of scaffolder which are essential roles played by teachers engaging in constructivist teaching.

When students were asked how they perceived their teacher as facilitator for learning, majority of the students felt they lack freedom to express their thoughts and opinions in the class. To these students, classroom teaching is very rigid and strictly follows a pattern set my teachers, and students have no say in changing the way teaching is imparted. Despite the rigidity, the teachers seem to lack coherence in their teaching pattern. This can occur when teachers jump from one topic to another without a smooth transition, which can confuse students. On the bright side, teachers were often willing to negotiate with students. Teachers in Mizoram are known for their leniency when compared to the rest of India. Extending the deadline for assignment submissions, postponing test dates, accommodating student's preoccupation with social activities are common traits among Mizo teachers and that is reflected in the response of the students. It was also good to see that teachers didn't shy from asking thought-provoking open-ended questions which is a very much needed to broaden a student's mind. Dewey (1993) acknowledges as the initiator of the concept of reflective and he identified attitudes as pre requisites for reflective teaching. The role of teachers in constructivist teaching was to involve themselves and students in continually reflecting on the teaching learning process. However, in fact, the findings suggested that second cycle primary school teachers in Dangila district were not adequately performing their reflection function. According to Elliot et al., a substantial majority of teachers do not teach in a reflective manner. As a consequence, we may infer that teachers were not accountable for engaging themselves and students in the process of reflection in order to develop students' learning ability.

When playing the role of relationship builder, students felt their teachers were doing well in teaching positive values such as democratic relationship, cooperation and building good teacher-student relationship as a whole. Due to the close knit nature of the Mizo society, it is not uncommon to see teachers and students extending their interaction outside the confines of the school. However, a slight majority (60%) of the students felt disconnected with the teachers when it comes to having common

understanding on concepts. This could be due to lack of adequate communication skills of either of the two parties.

Scaffolding is a vital tool in constructivist pedagogy as it lets teacher provide the needed support for students to create their own ideas. Majority of the students felt their teachers were doing a good job in providing the needed support to create and generate ideas on their own. Their teachers were prompt with their feedback and assessment and helped students learn from their mistake quiet often. This is finding is similar to the findings of Harjali (2019) whose study showed that students felt they were performing better with good support from their instructors.

Majority of the students felt their teachers played an active reflection role in their teaching practice. However very few teachers let the students present their own ideas before delving into the topic. This is can be attributed on the teaching method used by the teachers as some teachers prefer giving a broad overview of the topic before seeking opinions and ideas from students. Most teacher seem to be satisfied with one idea as majority of the students felt that teachers did not stray away from an idea that is being currently discussed. This can be attributed to the pressure of covering the topic in one class and not deviating from the lesson plan. Reflection in constructivist pedagogy is not complete if the teacher does not explore other ideas, even if it seems distant from the topic under discussion which is similar to the findings of Dagnew, A (2017)

Majority of the student fall at the low to moderate spectrum of constructivist learning practices. Constructivist learning methods can be taught in schools. Students can adopt the methods employed by teachers in their teaching task to help them in learning at school or at home. If the teachers use the internet during classes, the students are highly likely to use internet for learning at home too. Self-study and learning at home is often ignored by teachers, some may even consider it the responsibility of the guardians (to guide and monitor their ward). If students can't take home the constructivist ideas back home and put it into practice then a considerably large essence of constructivist teaching and learning is being missed out. As a whole, secondary students of Mizoram need to be taught and familiarized with constructivist learning methods either implicitly or through example.Based on the findings, we may infer that teachers play a prominent role in the instructional

process, which favour information transfer over the production of meaning and comprehension by students themselves. If students are not actively involved in studying, schools may not produce the required number of creative, imaginative problem solvers and competent citizens.

5.2.3 Discussions on Perceptions of Secondary School Teachers of Mizoram on Constructivist teaching and learning

Teachers are trained across various aspects of teacher training skills and knowledge. Many of these teachers implement what they learned in their classroom teaching. However, many of what they learned may not be what they approve of. Some may engage in constructivist teaching methods purely for the sake of it and not because they believe in its efficacy. This findings are very similar to the findings of NSTA, (2006)and Richardson, (2003) that teachers should receive transformative long term research based professionaldevelopment throughout the school year to increase collaboration, content knowledge, andinstructional practice to provide high quality instruction. Professionaldevelopment should challenge teacher beliefs and knowledge about learners and instruction(NSTA, 2006;). School administration should have supportive effectivetraining can include professional learning communities, lesson study, teacher leadership anddemonstration lessons (NSTA, 2006).

Authentic Learning task: One of the biggest challenges faced by a teacher is relating curriculum material to real life experiences and phenomenon. Explaining a concept can be challenging, more so if it's a foreign concept that needs to be made relatable to students. Constructivist pedagogy weighs heavily on correlating real life with curricular material. When it comes to individual task most teachers feel there needs to be a connection with real life. However, when it comes to group tasks, most teachers feel it's unnecessary. This sentiment can be attributed to the diverse nature of the students (cultural background, opinion, values) in a group. It is very difficult relating a task to every student's real life unless they are closely homogeneous, which is unrealistic, especially in highly populated secondary schools of Mizoram. According to other research, when pupils are unable to study a subject or topic, it is

because they are unable to apply the concepts to their real-life circumstances. Second, over half of the teachers said that students must manage their own learning and that teamwork is essential for students to achieve the assignment. This shows that half of the teachers offer students more responsibility for their learning. According to their responses, they believe that actively involving students in the learning process is important. When students actively engage in their learning, they learn better and constructively (Naeem& Basheer,2014).

Metacognition and cooperative learning: Collaborative learning is paramount to constructivist learning. However, several teachers have varying opinion when it comes to individual student tasks. While a small minority believes that individual activities should be completed completely by students, the majority believes that individuals should independently manage how they do the assignment; nonetheless, they may interact with fellow students to achieve their individual task. In short, do as much as you can on your own, but collaborate with others to enhance your result. A fewnumbers of teachers however had the strict opinion that all individual tasks are better done in collaboration with other students. This finding is very similar to the findings of,Naeemand Basheer (2014) that it should be noted that even within a constructivistclassroom, there can be direct instruction from the teacher

Awareness Construction: In what situation does student construct ideas the best, in an individual setting or in a group setting? - is a vital question asked in various studies concerning constructivist teaching and learning. Majority of the teachers agree and a considerable number of teachers strongly agree that idea construction can happen in individual activities. When it comes to group activities, majority of teachers strongly agree and a considerable number of teachers agree that constructing ideas can develop in group activities. It is known that constructivist ideas can be developed in both individual and group setting, but the important question is which of the two setting should we priorities. Based on the teacher's feedback, teaching in group setting is more ideal for idea construction.

Relationship between new and prior knowledge: A vast majority of teachers believe that in an individual setting new knowledge should alter student's prior knowledge**.** In group setting, the proportion of teachers supporting this idea drops a bit It can be concluded that teachers find more difficulty in connecting new knowledge to prior knowledge in a group setting.

Students' reflection on learning, how student can express what they learnt: A big learning outcome of constructivist pedagogy is enabling students to be able to immediately express the ideas they have developed. The degree to which they can do so depends on the individual or group setting in which they developed this idea. In the context of individual setting, majority of the teachers believe that it is not possible for students to immediately explain their ideas while of the teachers believe students should be able to explain their ideas. In a group setting, majority of the teachers believe students should be able to explain their ideas. This difference could be attributed to the fact that most teachers believe group discussion is a better enabler of constructing ideas.

Application of individual and group working methods by teachers: Constructivist pedagogy relies heavily on making students do their own tasks with teachers waiting to provide help when necessary. This approach can vary depending on the nature of the task. Some teachers may expect the students to do an individual task as much as possible on their own, while some teachers may expect discussion even in individual tasks. When it comes to individual tasks, most of the teachers feel students should seek help from other students only to supplement his or her work. When it came to group tasks, the teachers were almost equally divided in their opinion as to how much accountability and effort should be rested on students. Still, majority of the teachers believed that a group task needs to be judged as a group effort, and all students participating in the group should be evaluated on common lines.

Topics and result for question-answer method: Ideally students should feel related to the topic they are learning and should be able to form a link between the various topics they learned. This enabled better understanding that leads to the construction

of personalized and unique ideas. In Constructivist pedagogy, the questions asked by a teacher should check mark all these essential aspects. Majority of the teachers believed that when it comes to question answer session (that usually occurs after a topic is covered) the questions should be relevant to student's everyday lives, should be relevant to previous knowledge and enable students to express their ideas. The fact that those proportions are not 100% is a matter of concern from a constructivist pedagogical point of view. This could be attributed to the fact that in Mizoram's secondary school classrooms, question answer sessions are usually done in a group setting i.e. the teacher asks the entire class a question and the students raise their hands when they want to express their ideas. Teachers should make the effort to ask question individually, but in a large classroom it can be a challenge due to it being very time consuming.

Question-and-answer outcomes for students and instructors: Question-answer is a very strong reinforcement strategy in constructivist pedagogy. Different teachers have different reasons why they implement this. Majority of the teachers implement question-answer method to help students recall what they have learnt in class. Most of the teachers do so to find out the student's past knowledge. Majority of the teachers do use this strategy as intended. However, most of the teachers use this strategy to control the classroom. It is very important to maintain a foothold on the student's attention, as with time, the attention span of students dwindle. Teacher who use question-answer method to control the classroom do so in short intervals, to keep the student's mind active and alert. This goes a long way in enabling a student to develop their ideas. Unfortunately, a considerable number of teachers did not see the need for this. As a consequence, it is feasible to infer that the current state of social interaction between teachers and students is encouraged, which provided an excellent chance for students to study in an independent learning environment.

The result of the study is very similar to the study conducted by Hartle, Baviskar, & Smith (2012) provided four criteriathat should be present in constructivist teaching and learning. The first criterion is the teacher'stask of triggering learners' prior knowledge (Hartle, Baviskar, & Smith, 2012). This can occur bymethods such as presenting class demonstrations or engaging in discussions. The secondcomponent

was what Hartle, Baviskar, and Smith (2012) called creating cognitive dissonance.Students experience tension or disequilibrium due to being confronted with seeminglyconflicting or more challenging information or situations that do not fit within the confines oftheir existing mental models. Students must resolve this dissonance to progress. The thirdcomponent was the application of new knowledge and feedback, which was intended to assurethat learning occurred and that concepts were being reinforced and transferred to other situations(Hartle, Baviskar, & Smith, 2012). The final component was reflection on learning ormetacognition (Hartle, Baviskar, & Smith, 2012). When students engage in metacognition, theyreflect on their own thinking and learning and demonstrate or explain their new mental models orconstructions of knowledge focused around the lesson (Hartle, Baviskar, & Smith, 2012).

All in all, majority of the teachers covered in this study had perceptions that are in line with the philosophy of constructivism and the various constructivist approaches to teaching and learning. Most of the causes for disagreement and deviation from popular opinion can be attributed to logistical issues, environmental issues and individual problems characteristic to their schools. The result is similar to the findings of Jemberie (2021) who conducted a study titled Teachers' perception and implementation of constructivist learning approaches: Focus on Ethiopian Institute of textile and fashion technology, Bahir Dar. There is a strong correlation between teachers undergoing training and their positive perception of constructivism.

5.2.4 Discussion on Comparison of Awareness, Perception and Practices of Secondary School Teachers teaching different subjects in Mizoram relating to Constructivist Approach to Teaching and Learning

There is a very similar pattern between the teacher of English, Social Science, Math and English. They all seem to be on the same page when it comes to awareness and perception in relation to constructivist teaching and learning. This can be attributed to the kind of collective training they receive, as most teaching training programs involve teacher participation from various subjects. When it comes to practice, there is a significant difference between Mathematics and Science teachers, as well as between English and Social Science teachers. As a result, mathematics and social

science teachers in Mizoram secondary schools had a more favorable perception toward constructivist teaching-learning approaches than Science and English instructors. This result is different from the study conducted by Toraman and Demir (2016) titled 'The Effect of Constructivism learning approach than the Math teachers'.

5.2.5 Discussions on Nature and Extent of Relationship among Awareness, Perceptions and Practices of secondary School Teachers in Mizoram relating to Constructivism as a Teaching-Learning Approach

There is a strong correlation between awareness and perceptions, awareness and practices, and perceptions and practices of secondary school teachers in Mizoram on constructivist teaching learning approach. It is predictably evident that the higher the awareness regarding a particular idea, the more one exercises it. If the teachers had higher level of awareness and knowledge of constructivist pedagogy (and how it would benefit their classroom) they would definitely have more positive perception and practice constructivist teaching methods more often and more effectively.

5.2.6 Discussions on Constraints of Secondary School Teachers in Mizoram in adopting Constructivist Teaching-Learning Approach

Every teacher, irrespective of their subjects, received assistance in the form of teaching and learning aids needed for imparting constructivist teaching. One thing to note is that the study covered only government schools, which are the most well-funded schools in the state. Centrally sponsored schemes like Samagra Shiksha has ensured the well funding and well equipment of necessary teaching resources, and teachers of secondary school teachers of Mizoram. However, every teacher said they faced the problem of scarcity of learning resources. There is no point having the funds when there is nothing to spend on. Due to the geographical and economic nature of the state, it is very difficult to acquire the learning resource required for teaching constructivist. While readymade teaching tools can be purchased and implemented in the classroom, it cannot be as effective as locally made teaching tools that are catered to the local students.

Teachers also enjoyed full liberty in their classroom teaching activities. is very characteristic of the state, where the school administration and the parents/guardians leave the fate of the students' education in the hands of the teachers with full faith. A majority made use of the teaching learning materials available to them for teaching, which shows that teachers in Mizoram are more than willing to make use of all the available resources and accommodate these aids in their day-to-day teaching activities.

The liberty provided to teachers also extends to co-curricular and extra-curricular activities. It is very common to see schools organizing study tours and excursions whenever possible, usually overseen and organized by the younger teachers. Majority of teachers enjoyed this liberty however; some did not have such liberty. This can be attributed to the lack of transport infrastructure and the unavailability of places to visit in lesser-developed districts.

With so many benefits and liberties present to teachers, one might assume the implementation of constructivist teaching is learning is without barriers. However, there are several roadblocks faced by teachers, which to some extent nullifies the benefits and liberties they enjoy. The main constraint faced by the teachers in this study were difficulty in covering the syllabus on time.Some teachers also faced the problem of being unable to make use of the teaching learning materials due to the poor condition of those materials. Some teachers even said they didn't know how to use certain teaching materials.

CHAPTER- VI

SUMMARY, SUGGESTIONS&EDUCATIONALIMPLICATIONS

6.1 Summary

In this digital era the teachersarefacilitatorsofstudents'learningandcreatorsofconducive classroom environments for developing students' skills. Teaching involves the process of development and changed the present scenario and adoptedtheconstructivistapproach.It is said that constructivist means learning through producing (Jonassen,1991).Thistermisassociatedwithconstructivismandconstructivistparadigm whichmeansknowledgeconstruction.Thelearnersconstruct,findordevelopmeaning in their subjective experiments and their result becomes knowledge for them(Murphy,1997).Naylon and Keogh (1999) suggested that, the key concepts of this method are that learners can only make sense of new situations in terms of their prior understanding, and that learning is an active process in which learners generate meaning by connecting new ideas with prior knowledge

Thestudentsconstructknowledge through exploration, interpretation, and interaction with the environmentandlearn the content concurrently(BrooksandBrooks, 1993). Traditional classrooms provide sufficient opportunities to students for activeparticipationinlearningprocessincontrasttoconstructivistclassroomwhereample opportunities has been present for learner to observe, explore, execute, interact, raisequestion and discuss views (Kumar and Gupta, 2009). Nowadays, teacher education curricula are reinforced with constructivist teaching approaches such as learning theories, programmed instructions, mastery learning methods, and teaching models. Currently, instructional techniques for successful teaching, such as the 5Es approach, are being created.

The 5 E's learning model is a popular constructivist learning model in scienceandother practical

basedsubjects.Thisenablesthelearnerstobemorecuriousandgetfamiliar with the real world and transfer the information (Biyikli and Yagci, 2015).The engage step of 5 E model provides opportunity to the teachers to understand thelevel of students and grab attention by story, video, experimentation (Newby 2004). Buntod, Suksringam, and Singseevo (2010) investigated the impact of the 5E learning model assisted by cognitive strategies on academic achievement. There are two groups in the study: experimental and control. The study's results indicate that the success of the experimental group utilising the 5E learning model is greater than the success of the control group using the standard teaching technique. Polat and Baş (2012) investigated the impact of applying the 5E learning paradigm in Social Studies on students' academic progress. The study's findings show that the 5E learning paradigm has a beneficial impact on students' academic progress.

Another study with comparable findings was undertaken by Biyikli and Yagci, (2015)who investigated the influence of education circumstances of the 4th grade Science and Technology lesson organised according to the 5E learning model on the students' level of learning. The control group pretest-posttest experimental design was employed in the investigation. Lessons in the control group were taught in accordance with the present curriculum, whereas lessons in the experimental group are taught using the 5E model. According to the study's findings, the experimental group outperforms the control group in terms of academic success.

Ilter and Unal (2014) investigated the impact of using the 5E learning paradigm in social studies lessons on student motivation. According to the findings of the study, 5E learning model applications improve students' motivation and modify their sentiments and views about the course.

Considering the content of Social Studies, verbal learning is predominant. Direct transfer of the content by the teacher to the student can prevent the experience ofthe student. In 5E learning modeland the activities done in this scope, students conduct studies to reach information and theteacher guidesthe students. Considering thisfeature of 5E learning model, it can besaid that the constructivist learning theory expected to have a command in the education system will serve its purpose.When the studies regarding 5E learning model are considered, it can be

stated that it is especially used in teaching Science. However, Social Studies is also one of the lessons in which it will be useful to apply this learning model

The function of the teacher, according to Akinoglu and Tandogan (2007, in Ongowo, 2013, 2), is to begin and lead the learning process. Teachers must create learning environments in which students may actively participate in their own learning and obtain information via inquiry and questioning. The teacher's responsibility, rather than controlling the learning environment, is to allow students to become explorers and experiment architects, testing ideas and comparing their results with others. As a result, constructivist teaching promotes critical thinking and the development of engaged and motivated learners. Yager (1991) concentrated on specific constructivist teaching techniques, which he said were based on Piaget's principles.

Secondary education serves as a foundation for further education, research, and contributions to the growth and progress of humanity and the nation. If secondary school students can grasp concepts properly, they will be able to quickly progress to higher education and contribute significantly to the nation's development. Constructivism is a learning theory that is widely employed in the West and is gaining popularity in our nation due to its efficacy in the teaching-learning process. As mentioned in the preceding section, students at all levels of education in Mizoram commonly practice cramming to attain excellent scores and marks on examinations.

There is a shortage of secondary school teachers in Mizoram, as a result of which children are often found to be behind in their studies. To teach these two crucial disciplines, teachers must use a constructivist approach. Secondary school teachers and teacher educators working in teacher education institutions such as DIETs and IASE must be adequately oriented and trained to execute their tasks. As a result, awareness is a requirement for practice. If we want our teachers to use a constructivist approach to teaching, we must ensure that they have the necessary knowledge and awareness. Only then will they be able to put it into practice. Therefore, thepresent study has been focused on the awareness practices and perceptions of secondary school teachers of Mizoram on constructivist approach of teaching and Learning.

6.1.1 Research Questions

1. Are the secondary school teachers of Mizoram well aware about constructivist approach to teaching?
2. Is there any difference in the awareness among the secondary school teachers of Mizoram on constructivist approach to teaching and learning with respect to their teaching subject?
3. How do secondary school teachers of Mizoram practice constructivist teaching approach?
4. Is there any difference in the practices among the secondary school teachers of Mizoram on constructivist approach to teaching and learning with respect to their teaching subject?
5. Are the secondary school students of Mizoram aware about constructivist approach of learning?
6. What are the perceptions of secondary school teachers of Mizoram towards constructivist teaching?
7. Is there any relationship between awareness, practice and perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy?
8. What are the constraints secondary school teachers of Mizoram face in adopting constructivist pedagogy?

6.1.2 Statement of the Problem:

While there have been studies on constructivist teaching learning approaches and practices, none have focused on secondary school instructors and students in Mizoram. It is critical to understand the present degree of understanding of constructivist teaching and learning techniques in Mizoram secondary schools so that relevant agencies may implement new policies and changes to enhance the education system.

Although constructivism and constructivist teaching learning theories is no longer a novel concept in our present day world, the fact that it is still out of the reach for many students shows how much we falter behind when it comes to educational development. In Mizoram, like the rest of the country, traditional teaching practices that is dominated by lectures and rote memorisation is still

prevalent. Schools as well as the guardians of the students are still fixated on high scores in exams which has encouraged detrimental learning practices among students. Teachers lack the training and expertise to educate students using a constructivist method due to ignorance, lack of training, lack of sincerity, and various other factors. Support for research is required to uncover the causes and address the issues that plague the current education system. Despite the fact that various literatures have been produced in this regard, very few imperial investigations that highlight grass root problems are available

To reveal the answers to the questions posed in the preceding sections, the following problem was adopted as the topic of this study. In order to get satisfactory answer to the above questions empirically, the following research problem is proposed to be undertaken:

"Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study".

6.1.3 Delimitation of the Study

The study is delimited to only four (4) districts of Mizoram namely Aizawl, Mamit, Lunglei and Kolasib. Further, it was delimited to the government schools affiliated to Mizoram Board of Secondary Education

6.1.4 Objectives of the Study:

1. To assess the awareness of secondary school teachers of Mizoram relating to constructivist approach to teaching and learning.
2. To compare the awareness of Secondary school teachers of Mizoram relating to constructivist approach to teaching and learning with reference to their teaching subjects (English, Math, Science, Social Science).
3. To reveal the practices of secondary school teachers of Mizoram in adopting constructivist pedagogy and role.
4. To compare the practices of secondary school teachers of Mizoram in adopting constructivist pedagogy with reference to their teaching subjects. (English, Math, Science, Social Science).
5. To reveal the learning practices of secondary school students of Mizoram in

the context of constructivist approach.

6. To compare the learning practices of secondary school students of Mizoram in the context of constructivist approach with reference to their gender.
7. To find out the perception of Secondary School Teachers teaching different subjects in Mizoram adopting Constructivist Teaching-Learning Approach
8. To compare the perceptions of Secondary school teachers of Mizoram relating to constructivist approach to teaching and learning with reference to their teaching subjects (English, Math, Science, Social Science).
9. To find out the relationship between awareness, practices and perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy.
10. To compare the relationship between awareness, practices and perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy.
11. To reveal the constraints of secondary school teachers of Mizoram in adopting constructivist pedagogy.
12. To suggest measures for successful implementation of constructivist pedagogy in teaching and learning of different subjects in secondary schools of Mizoram.

6.1.5 Hypothesis of the Study

1. Secondary school teachers of Mizoram are aware of constructivist approach to teaching and learning.
2. Secondary school teachers of Mizoram teaching different subjects adopt constructivist pedagogy in teaching.
3. There is no significant difference in the awareness of secondary school teachers of Mizoram teaching different subjects relating to constructivist pedagogy in teaching.
4. There is no significant difference in the practices of secondary school teachers of Mizoram teaching different subjects adopting constructivist pedagogy.
5. There is no significant difference in the perception of secondary school teachers of Mizoram teaching different subjects adopting constructivist pedagogy.
6. The secondary school students of Mizoram practice constructivist approach in their learning practices.

7. There is no significant difference among secondary school students of Mizoram adopting constructivist approach in their learning practices with reference to gender.
8. There are no constraints faced by secondary school teachers in Mizoram in adopting constructivist pedagogy.

6.1.6 Operational Definitions of Key Terms:

Various words have different implications depending on where they are used. The terms used in the topic title in this study have the operational definitions listed below.

5. **Constructivist approach**: The phrase 'constructivist approach' in this study refers to learner-centered education in which learners utilize their prior experiences to construct information, rather than knowledge supplied to them in fully structured form.
1. **Teaching-Learning process**: In the present study, 'teaching-learning process' implies the process of:
    a) delivery of information/knowledge to the learners by the teachers
    b) receiving of information/ knowledge by the learners and
    c) organizing or carrying out activities through which the learners construct knowledge
2. **Secondary schools:** In the proposed study. Secondary schools mean those schools comprising of classes IX and X.
3. **Critical study:** The term 'critical study' in the title of the proposed study refers to a study that analyses, examines and criticizes different aspects of the area of the constructivist teaching and learning.

6.1.7 Research Approach

The research was done using a mixed mode approach, which included both quantitative and qualitative methods. In education, the descriptive technique has been the most extensively utilized research method. For data collection and the execution

of the study, appropriate samples and corresponding research toolswere used.

According to the aims and assumptions of the study, researchers collected the data from relevant sources, which may be primary, secondary, or both. The primary and secondary sources listed below were considered for data gathering in order to meet the study's goals.

Primary Sources: Secondary school teachers who teach the four main disciplines of Mathematics, English, Science, and Social Science were identified as relevant primary sources for this study.

Secondary Sources: Dissertation Abstracts reports, International, National, and State Survey Reports, books, journals, government records, the internet, published and unpublished papers are all important sources for any research.

6.1.8 ToolsUsed

For the present study, no premade instrument was identified to be suitable for the current investigation. Keeping the features of the sources and the research's aims in mind, it was chosen to employ a questionnaire as instruments for collecting appropriate data for the study.

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

1) Questionnaire to determine the awareness of secondary school teachers of Mizoram relating to constructivist approach to teaching
2) Questionnaire to reveal the practices of secondary school teachers of Mizoram and their adoption of constructivist pedagogy with reference to their teaching subjects (English, Math, Science, Social Science).
3) Questionnaire to find out the students' perceptions on constructivist teaching approach in classroom.
4) Questionnaire to find out the perceptions of teachers about constructivist approach of teaching
5) Questionnaire to reveal the learning practices of secondary school students of Mizoram in the context of constructivist approach.

6) Questionnaire to determine the constraints faced by teachers in adopting constructivist approach.

While constructing the tools, components of the school such as concept of constructivist, classroom climate, teaching learning process and the end product were given attention,while making sure the questionnaires were easy to understand and the items were within the scope of the teacher's and student's understanding. Initially 40 items for each questionnaire were prepared on these components and reviewed by the investigator and the supervisor.After the questionnaires were draftedand analysed by the research guide, the questionnaires were sent to a various experts consisting of senior educationists, veteran professors, and experts with prior experience with the concept of constructivism with the following purpose:

1. If feasible, recommend any additional items for inclusion in the questionnaire and schedules.
2. To include any other relevant location.
3. To remove any region or areas, item or things that were irrelevant to the current investigation.
4. To eliminate inconsistencies, biases, inappropriate language, and wrong terminology, among other things.
5. To investigate the relationship between the questionnaire and schedules and the study's objectives.

6.1.9 Procedure of Data collection

Before the data collection process was started, a route chart was plotted to cover all district and block head quarter, as well as required information such as phone numbers of headmasters/principals were collected. After reaching the school, questionnaires were distributed to students and teachers for collection of data with the help of headmaster. In the first stage researcher visited two schools. Further, school visits could not be possible due to the Covid-19 pandemic outbreak.

Then the investigator prepared the questionnaire in Google Forms and posted it in different secondary school teachers and students WhatsApp groups and requested them to answer the questions. The investigator explained how to answer the questions through online communication. Every doubt and confusions were cleared by the investigator. Finally, the study was conducted in threephases as shown below

Phase of Study	**Dates**	**Tools used**	**Procedure of data collection**
Phase 1:Pilot testing	Oct 2019	Questionnaire	Offline method
Phase 2: School Visit	March 2020	Questionnaire	Offline method
Phase 3: Collection of Data Online	March 2021	Questionnaire	Online method (Google Forms)

In Phase One, pilot testing of the research tools was done to get a clearer picture towards the research and to identify the need of modification in the research tools and validity as well as reliability checked with the help of experts and statistical techniques.

In Phase two, after undertaking all modification main research was conducted which was mainly through school visit. Due to pandemic period the school visit was stopped during march 2020.

In Phase three, the researcher converted the questionnaire in to the google doc format and posted in different WhatsApp group of teachers and students and collected the information through Google Forms. The researcher also observed the online class taken by the secondary school teachers in different subject during pandemic period. After collecting the data comparison was done on subject wise of awareness practices and perceptions of secondary school teachers.

6.1.10 StatisticalTechniques Used

The investigator used the following statistical techniques for analyzing of thedatain the present study:

1. Descriptive statistics such as mean, median, standard deviation, were computed on the total sample to determine the nature of thedistributionofthe scores.
2. The t-test and p-value was used in order to find out Gender-wise Comparison of practices on constructivist approach of learning of Secondary School students of Mizoram
3. Post hoc test for Multiple Compressions of subject-wise difference in constructivist teaching between Secondary school Teachers of Mizoram
4. Graphical techniques were used for descriptive analysis and visual perceptionof thedata.

6.2 Suggestions

Thefollowing suggestions weredrawn on thebasisof results of the study and review of related literature:

1. Initiative should be taken to create awareness among the secondary school teachers of Mizoram about constructivist approach of teaching and learning by governmental and non-governmental organisation irrespective of different school subjects.
2. Hands on experiences should be given to the secondary school teachers of Mizoram for practicing constructivist approach in teaching and learning process irrespective of the different school subject.
3. Secondary school teachers of Mizoram should fully adopt the different roles (Facilitating role, relationship building role, scaffolding role, reflection role) as per constructivist approach of teaching irrespective of all the teaching subject.
4. Secondary school teachers of Mizoram should focus on collaborative learning, brainstorming, discussion, inquiry approach, oral translation, use of software and ICT tools, experimentation, anchored instruction, critical thinking, scientific models, project work while teaching the subject in the class.
5. Secondary school teachers of Mizoram should give taskswhich have close relationship with real life situation while teaching, irrespective of all subjects.
6. Government of Mizoram should give training to in-service teachers on

constructivist approach to teaching-learning through Samgra Sikhya.

7. Department of Education, Mizoram University should organize teacher training programmes onConstructivist approach to teaching-learning through internship programme of Pre-service secondary teachers
8. During internship period emphasis should be given to use instructionalstrategies/tactics like collaborative learning, discussion techniques,inquiry approach, problem-solving, assessment etc so that teacherswitness for themselves how these strategies/tactics serve as importantvehicles for teaching different subjects.
9. Institutions imparting in-service training for teachers should try to change the traditional perspective of teaching that is present in the minds of teachers.
10. Teacher student relationship should be enhanced by organizing different co-curricular activities in which both the teacher and students will be involved.
11. Scheme of the subjects should be prepared in accordance with constructivist approach of teaching to cover the syllabus in time.
12. Principal/Headmaster of secondary schools of Mizoram should give incentives (monetary, award, recognition) to teachers for adopting constructivist teaching methods.
13. Classroom management training should be given to in-service secondary school teachers of Mizoram.
14. Adequate learning resources may be provided to the teachers for following constructivist approach of teaching.
15. Secondary school teachers of Mizoram should use teaching learning material frequently while teaching irrespective of all subjects.
16. When imparting training to pre-service teachers, focus should be made on participatory teaching and learning, communication skill, linking previous knowledge to new topic, making and use of appropriate teaching learning materials, encouraging comprehension rather than memorization.
17. Similarly, pre service teachers should be encouraged to develop lesson plans based on constructivist approach of teaching.

6.3 Educational Implications of the Study.

The current study discovered that constructivist theories of teaching and learning are not new to the teachers of Mizoram. However, the current level of integration and implementation of constructivist ideas in the education system is unsatisfactory. This study has wide implications upon the various interest groups of Mizoram education system.

For Students:

The biggest beneficiary of constructivist pedagogy is the student. Although the students felt the teachers were implementing constructivist teaching methods to a certain extent, the data showed that teachers' actual practice of constructivist teaching overall is low. Teachers need to realise that students not only benefit from constructivist style of teaching, but are also more eager and positive than traditional style of teaching. The methods applied by teachers can be applied by students during self-study so constructivist pedagogy has more benefits than it may seem. This study will show the students what they are missing out, and introduce them to concepts that are beneficial to them such as collaborative learning and inquiry approach to learning. It will also make students aware of what to expect in a constructivist classroom. Students can take the initiative to let their teachers know what style of teaching they prefer and ask the teacher to conduct activities such as collaborative learning.

For Teachers:

Every trained teacher is, or is expected to be, aware about constructivist approach to teaching and learning to the extent that they can practice it in their classroom. However, this study shows that their level of awareness and level of actual classroom practices was unsatisfactory. Data on student's perception on teachers practices and their own practice at home shines a light on the harsh reality that our teachers are not up to mark. Constructivist pedagogy is not an optional method; it is in fact essential for the optimal development of a student's educational growth, as proved by several studies. Teachers need to reflect on themselves, on how much they know, how much

they practice and their overall perception of constructivist approach to teaching and learning.

The finding shows teacher all the essential elements of constructivist pedagogy that they skipped over or ignored. No matter how much practical skills and knowledge one attained during their teacher training course regarding constructivist pedagogy, it can easily fade away when they are not put into practice. Effort must be made on their part to try their best to integrate constructivist teaching and learning theories and ideas into their classroom practice. Based on the findings on the awareness level of the teachers, teachers will develop the mindset to try their best to take advantage of every opportunity that gives them training on modern teaching methods and practices (such as seminars, workshops etc.). Lesson plans should be strictly made and maintained by teachers so as to keep lessons organised and well-adjusted to fit the limited time frame of a class period.

For Administrators

Administrators may not have the training received by teachers, especially on modern ideas such as constructivism. However, their main interest lies in improving the educational practices of the institution and bringing out the best learning outcomes. This study will let the administrators develop awareness about the present condition of not just their school but every other school in the State. This study will encourage them to take action on various regards, such as:-

i. Ensuring the teachers are given the freedom, as well as encouragement to forego traditional teaching methods and adopt modern teaching methods inspired by constructivist theories.

ii. Providing teachers with ample opportunities to undergo training, workshops and seminars that aims to improve the teaching-learning practices in schools

iii. Re-designing the school's academic framework and its programs so that it can promote constructivist teaching and learning.

iv. Make school programs flexible so that teachers can experiment and try out new teaching methods without being under the pressure of the tight schedules

set bytheschool's academic calendar.

v. Make classrooms more accommodating to non-traditional teaching methods.

For Curriculum Planners

This study will be an eye opener for curricular planners because whatever the teacher or the school administrator does, is within the confines of the curriculum and a lot rests upon the curriculum planners' shoulders to create a conducive platform that allows constructivist teaching and learning. MBSE, which is the State Board responsible for the school curriculum should design text materials as per state board and center level regulations while being based on the constructivist approach. Curriculum planners should give clear and practical instructions for selecting and using topic material that is appropriate for this method in order to improve the efficacy of teaching. The moderate level of perception and awareness shown in this study will help curriculum planners realise that there is a discrepancy between what the teachers are told to do and what they actually do in the classroom. Curriculum at the teacher educational level as well as the secondary school level needs to be designed hand in hand so that the teachers are trained to deliver constructivist teaching in under a constructivist friendly curricular plan.

6.4 Suggestions for Further Study

Based on the findings and experience of the present study, the following suggestions are made for the further research in the area of constructivist approach to teaching and learning

1. A study on other modern models of teaching, such as flipped classroom, ICT based learning, Visual, Auditory, and Kinesthetic (VAC) Teaching; Gamification etc. should be conducted, so as to see its feasibility and applicability in the context of secondary education in Mizoram.
2. A study on constructivist approach to teaching and learning should be taken with a wider scope or on a different population, such as private schools or schools in remote regions.

3. Similar studies should be taken in other states of India to compare and contrast the different successes and challenges faced across the country regarding the implementation of constructivist approach of teaching and learning.
4. Similar studies may be conducted on multi-disciplinary subjects at higher level.
5. Effect of 5 E Models can be studied on different subjects at secondary level of Mizoram
6. Other variables like retention, critical thinking, interest; problem solvingmay be explored to check the effectiveness of constructivist approach in secondary schools of Mizoram.

Appendix A

Questionnaire to Assess the Awareness of Secondary School Teachers on Constructivist Approach to Teaching-Learning

Dear Sir/Madam,

A research study entitled "*Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study"* is undertaken by me in the Department of Education under the supervision of Prof. Lokanath Mishra. For the above purpose I need your cooperation by answering the questions given below. Please rest assured that your responses will be kept strictly confidential and will be used for research purpose only. There are four (4) alternatives in each questions. You should answer each questions by putting a tick mark (✓) in the appropriate bracket. Please fill up the following information about yourself given on Part-A before going to Part-B

Part -A

Name of the respondent:

Name of the school:

Gender:

Teaching experience

Major Subject

Age:

Qualification:

Part-B

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

a) Constructive criticism of students ( )

b) Construction of new knowledge by the students ( )

c) Constructive discussion with students ( )

d) Constructive debate among students ( )

2) Constructivism is

a) same as behaviourism ( )

b) the opposite of behaviourism ( )

c) Not as important as behaviourism ( )

d) Complimentary to behaviourism ( )

3) Constructivism is a theory of

a) Knowledge ( )

b) Motivation ( )

c) Intelligence ( )

d) Personality ( )

4)Constructivism tries to explain how people

a) Remember experiences ( )

d) Forget past experiences ( )

b) Know what they know ( )

c) Interact with each other ( )

5) According to Constructive philosophy, teachers should provide students with

a) Guidance only ( )

b) Study materials only ( )

c) Scope of thinking ( )

d) Moral support ( )

6) In a constructivist classroom students and teachers are

a) Indifferent to one another ( )

b) Independent of each other ( )

c) Interactive ( )

d) Competitive ( )

7) The classroom climate that facilitate constructive learning is

a) Competitive ( )

b) Autocratic ( )

c) Democratic ( )

d) Laissez Faire ( )

8) In a constructive classroom, ideas initiated by students are

a) Discouraged ( )

b) Neglected ( )

c) Ignored ( )

d) Accepted ( )

9) In a constructive classroom

a) Students opinion is least important ( )

b) teacher's opinion is least important ( )

c) Students opinion is most important ( )

d) Teacher's opinion is most important ( )

10) The most important character of a constructive classroom is

a) Play ( )

b) Activity ( )

c) Discussion ( )

d) Dictation ( )

11) Constructivism is based on

a) Observation and scientific study ( )

b) Observation and reinforcement ( )

c) Rote memorization and reinforcement ( )

d) Observation and rote memorization ( )

12) People can better understand and construct their own understanding and knowledge of the world through

a) Experiencing things ( )

b) Reading ( )

c) hearsay ( )

d) Adaptation ( )

13) Constructive Approach is

a) Teacher centered ( )

b) Learner centered ( )

c) Subject centered ( )

d) Discipline centered ( )

14) The most important feature of constructivist learning is that it is

a) Static and organised ( )

b) Transferable and organised ( )

c) Static but unorganized ( )

d) Transferable and unorganised ( )

15)Constructivist teachers are

a) partners in the process of meaning-making ( )

b) Carefree ( )

c) Reinforcers of behaviour ( )

d) Strict disciplinarians ( )

16) A constructivist learning is

a) Memory based ( )

b) Lecture based ( )

c) Activity Based ( )

d) Demonstration based ( )

17) Constructivist learning focuses on

a) Prescribed Textbooks ( )

b) Reference books ( )

c) Online media ( )

d) Real -world context ( )

18) In a constructivist approach, recognition of students' prior knowledge is essential for

a) Progress ( )

b) Motivation ( )

c) Drill ( )

d) Reinforcement ( )

19) In constructivist approach, students learn from

a) Simple to complex and whole to parts ( )

b) Simple to complex and parts to whole ( )

c) Complex to simple and whole to parts ( )

d) Complex to simple and parts to whole ( )

20) Constructivist philosophy encourages activities like

a) Brainstorming and project works ( )

b) Project works and Memorisation ( )

c) Memorisation and demonstration ( )

d) memorization and brainstorming ( )

21) Constructivism is a theory which promotes

a) Listening skills ( )

b) Demonstration skills ( )

c) Debating skills ( )

d) Problem solving skills ( )

22) Learning is enhanced when learners work with teachers who are more

a) Commanding and active ( )

b) Commanding and passive ( )

c) Active and skilled ( )

d) Passive and skilled ( )

23) Learning becomes effective through

a) Thinking and predicting ( )

b) Observing and predicting ( )

c) Noting and memorisation ( )

d) Observing and organising. ( )

24) Students in constructive classroom get the scope to

a) Question things ( )

b) Listen ( )

c) Memorise ( )

d) Absorb ( )

25) Constructivist learning gives students ownership of

a) Study-materials ( )

b) What they learn ( )

c) Their identity ( )

d) Their belief ( )

Appendix – B1

Questionnaire to Assess the Practices adopted by Secondary School English Teachers on Constructivist Approach to Teaching-Learning

Dear Sir/Madam,

A research study entitled "*Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study"* is undertaken by me in the Department of Education under the supervision of Prof. Lokanath Mishra. For the above purpose I need your cooperation by answering the questions given below. Please rest assured that your responses will be kept strictly confidential and will be used for research purpose only. There are two (2) alternatives in each question. You should answer each question by putting a tick mark (✓) in the appropriate bracket. Which of the following constructivist teaching practice do you engage in during class

Part -A

Name of the respondent:

Name of the school:

Gender:

Teaching experience

Major Subject

Age:

Qualification:

Part-B

Sl No.	Practices	Yes	No
1.	AskingQuestions	( )	( )
2.	Brainstorming	( )	( )
3.	Collaborative Learning	( )	( )

4.	Discussion	( )	( )
5.	Explanation	( )	( )
6.	Evaluation	( )	( )
7.	Inquiryapproach	( )	( )
8.	OralTranslation	( )	( )
9.	Recitation	( )	( )
10.	Use of Hardware/ Software	( )	( )

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Appendix – B2

Questionnaire to Assess the Practices adopted by Secondary School Social Science Teachers on Constructivist Approach to Teaching-Learning

Dear Sir/Madam,

A research study entitled "*Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study"* is undertaken by me in the Department of Education under the supervision of Prof. Lokanath Mishra. For the above purpose I need your cooperation by answering the questions given below. Please rest assured that your responses will be kept strictly confidential and will be used for research purpose only. There are two (2) alternatives in each question. You should answer each question by putting a tick mark (✓) in the appropriate bracket. Which of the following constructivist teaching practice do you engage in during class

Part -A

Name of the respondent:

Name of the school:

Gender:

Teaching experience

Major Subject

Age:

Qualification:

Part-B

Sl.No.	Criteria	Yes	No
1.	Asking Questions	( )	( )
2.	Collaborative learning	( )	( )
3.	Concept mapping	( )	( )

4.	Discussion	( )	( )
5.	Explanation	( )	( )
6.	Elaboration	( )	( )
7.	Evaluation	( )	( )
8.	Inquiry approach	( )	( )
9.	Text book materials	( )	( )
10.	Use of ICT tools	( )	( )
11.	Use of Pictures, Charts and Maps	( )	( )

Appendix- B3

Questionnaire to Assess the Practices adopted by Secondary School Math Teachers on Constructivist Approach to Teaching-Learning

Dear Sir/Madam,

A research study entitled "*Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study"* is undertaken by me in the Department of Education under the supervision of Prof. Lokanath Mishra. For the above purpose I need your cooperation by answering the questions given below. Please rest assured that your responses will be kept strictly confidential and will be used for research purpose only. There are two (2) alternatives in each question. You should answer each question by putting a tick mark (✓) in the appropriate bracket. Which of the following constructivist teaching practice do you engage in during class

Part -A

Name of the respondent:

Name of the school:

Gender:

Teaching experience

Major Subject

Age:

Qualification:

Part-B

Sl No.	Criteria	Yes	No
1.	Askingstudentsto memorizeinformation	( )	( )
2.	Askingstudentstosolve sumsontheboard	( )	( )
3.	Engage	( )	( )
4.	Explore	( )	( )
5.	Explanation	( )	( )

6.	Elaboration	( )	( )
7.	Evaluation	( )	( )
8.	Brainstorming	( )	( )
9.	Citingexamplesbeyond thetextbooks	( )	( )
10.	Inquiryapproach	( )	( )
11.	Solvingtextbooksums	( )	( )
12.	Usinglocallyavailable resources	( )	( )

Appendix- B4

Questionnaire to Assess the Practices adopted by Secondary School Science Teachers on Constructivist Approach to Teaching-Learning

Dear Sir/Madam,

A research study entitled "*Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study"* is undertaken by me in the Department of Education under the supervision of Prof. Lokanath Mishra. For the above purpose I need your cooperation by answering the questions given below. Please rest assured that your responses will be kept strictly confidential and will be used for research purpose only. There are two (2) alternatives in each question. You should answer each question by putting a tick mark (✓) in the appropriate bracket.

Part -A

Name of the respondent:

Name of the school:

Gender:

Teaching experience

Major Subject

Age:

Qualification:

Part-B

Which of the following constructivist teaching practice do you engage in during class?

Sl No	Criteria	Yes	No
1.	Anchored Instruction	( )	( )
2.	Brainstorming	( )	( )
3.	Collaborative learning	( )	( )
4.	Concept mapping	( )	( )
5.	Demonstration	( )	( )
6.	Discussion	( )	( )
7.	Elaboration	( )	( )
8.	Encouraging critical thinking	( )	( )
9.	Experimentation	( )	( )

10.	Evaluation	( )	( )
11.	Inquiry approach	( )	( )
12.	Problem-based learning	( )	( )
13.	Project works	( )	( )
14.	Scientific models	( )	( )
15.	Use of ICT Tools	( )	( )
16.	Project Work	( )	( )

Appendix - C

Student's Perception about Teacher's Constructivist Role in Teaching

Dear students,

A research study entitled "*Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study"* is undertaken by me in the Department of Education under the supervision of Prof. Lokanath Mishra. For the above purpose I need your cooperation by answering the questions given below. Please rest assured that your responses will be kept strictly confidential and will be used for research purpose only. There are two (2) alternatives in each question. You should answer each question by putting a tick mark (✓) in the appropriate bracket.

Part -A

Name of the respondent:

Name of the school:

Gender:

Age:

Class:

Part-B

Sl No	Facilitating role descriptor	Yes	No
1.	Teachers negotiate with their students	( )	( )
2.	Teachers encourage and accept students' autonomy and initiatives	( )	( )
3.	Teachers ask thought-provoking open-ended questions	( )	( )
4.	Teachers have an internalized flexible knowledge of learning sequence	( )	( )
5.	Teachers make the classroom set up conducive to facilitate collaborative learning	( )	( )
6.	As a whole facilitating role	( )	( )

Sl No	Relationship building role descriptor	Yes	No
7.	Teachers positively value all learners andwhat they are doing.	( )	( )

8.	Teachers encourage democratic relationship in the class room.	( )	( )
9.	Teachers encourage students to work in cooperation.	( )	( )
10.	Teachers engage students in dialogue both with him/her and with other.	( )	( )
11.	Teachers develop shared understanding with students.	( )	( )
12.	Teachers are familiar with the interest, like and dislike of the learners.	( )	( )
13.	Relationship building role as whole	( )	( )

Sl No.	**Scaffolding role descriptor**	**Yes**	**No**
14.	Teachers taught the new lesson by joining with previous experiences.	( )	( )
15.	Teachers continuously reassure students learning progress through authentic assessment.	( )	( )
16.	Teachers provide enough time for activities.	( )	( )
17.	Teachers relate the class room activities with real experience.	( )	( )
18.	Teacher's structure learning from mistakes	( )	( )
19.	Teachers provide instructional support for learners to accomplish their task effectively.	( )	( )
20.	Teachers scaffolding role as a whole	( )	( )

Sl No	**Reflection role descriptor**	**Yes**	**No**
21.	Teachers encourage students to reflect on teaching and learning process.	( )	( )
22.	Teachers are open minded, wholehearted and responsible for students learning.	( )	( )
23.	Teachers monitor evaluate and revise their teaching practice continuously.	( )	( )
24.	Teachers allow students to play with ideas and	( )	( )

	explore issues.		
25.	Teachers make students to present their ideas first before sharing his/her ideas	( )	( )
26.	Teachers make students to reflect on other ideas.	( )	( )
27.	Teacher's reflection role as a whole	( )	( )

Appendix D

Questionnaire to Assess the Perception of Secondary teachers on Constructivist Approach to Teaching-Learning

Dear Sir/Madam,

A research study entitled "*Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study"* is undertaken by me in the Department of Education under the supervision of Prof. Lokanath Mishra. For the above purpose I need your cooperation by answering the questions given below. Please rest assured that your responses will be kept strictly confidential and will be used for research purpose only. There are some alternatives in each question. You should answer each question by putting a tick mark (✓) in the appropriate bracket.

Part -A

Name of the respondent:

Name of the school:

Gender:

Teaching experience

Major Subject

Age:

Qualification:

Part-B

1. What kind of relation should an individual task have with real life?
   a. The task should have close relationship with real-life ( )
   b. The task may or may not have relationship with real-life ( )
   c. The task should be from the book and no matter if it has relationship with real-life or not ( )

2. What kind of relation should a group task have with real life?
   a. The task should have close relationship with real-life ( )
   b. The task may or may not have relationship with real-life ( )
   c. The task should be from the book and no matter if it has relationship with real-life or not ( )

3. How should a student perform his individual task??
   a. He should collaboratively work with fellow students and together complete the task ( )
   b. He should individually complete his work without any interaction with others. ( )
   c. Student's personal experience is important; he personally regulates the way he performs the task; still he may interact with fellow student to complete his individual task ( )

4. By performing an individual activities students construct new knowledge.
   a. Strongly Disagree ( )
   b. Disagree ( )
   c. Cannot Say ( )
   d. Agree ( )
   e. Strongly Agree ( )

5. By performing group activities students construct new knowledge.
   a. Strongly Disagree ( )
   b. Disagree ( )
   c. Cannot Say ( )
   d. Agree ( )
   e. Strongly Agree ( )

6. Should there be any relationship between new and prior knowledge in individual tasks?
   a. New knowledge should be totally new and not have any relationship with prior knowledge ( )
   b. New knowledge should alter students' prior knowledge ( )

7. Should there be any relationship between new and prior knowledge in group tasks?

   a. New knowledge should be totally new and not have any relationship with prior knowledge ( )
   b. New knowledge should alter students' prior knowledge ( )

8. After your student performed individual work on a task he/she will reflect as:?

   a. He should be able to express what he has learnt. ( )
   b. He may or may not be able to express what he has learnt ( )
   c. He will not be able to express what he has learnt immediately ( )

9. After your student performed group work on a task he/she will reflect as:?

   a. He should be able to express what he has learnt. ( )
   b. He may or may not be able to express what he has learnt ( )
   c. He will not be able to express what he has learnt immediately ( )

10. How should individual students complete tasks in group working methods?

   a. He should collaborate with other students to complete tasks ( )
   b. He should complete his tasks alone ( )
   c. Students personally regulates the way he does his tasks, still he may seek help from others to complete his task ( )

11. How should a group of students complete their tasks in group working methods?

   a. Group as a whole should achieve the result,no matter who achieved it ( )
   b. Every member is accountable and should contribute to group work ( )

12. In a question-answer session, topic should be relevant to student's everyday lives.

a. Strongly Disagree ( )
b. Disagree ( )
c. Cannot Say ( )
d. Agree ( )
e. Strongly Agree ( )

13. Students should be able to articulate what they have learned in question-answer sessions as a result of using the question-answer technique.

a. Strongly Disagree ( )
b. Disagree ( )
c. Cannot Say ( )
d. Agree ( )
e. Strongly Agree ( )

14. Question-and-answer sessions should be demanding and relevant to students' past knowledge.

a. Strongly Disagree ( )
b. Disagree ( )
c. Cannot Say ( )
d. Agree ( )
e. Strongly Agree ( )

15. What will be the outcome when students perform tasks individually?

a. Student will learn new knowledge to which he was not familiar before ( )
b. Student will alter his prior knowledge in the context of new knowledge ( )

16. What will be the outcome when students perform tasks in a group?
    a. Student will learn new knowledge to which he was not familiar before ( )
    b. Student will alter his prior knowledge in the context of new knowledge ( )
17. What is the main outcome teachers expect to achieve when implement question-answer method ?
    a. To help students recall what they have learnt ( )
    b. To evaluate pupils' past knowledge ( )
    c. To control the classroom ( )
    d. Other ( )

Appendix E

Questionnaire to Assess the Learning practices of Secondary School Students on Constructivist Approach to Teaching-Learning

Dear students,

A research study entitled "*Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study"* is undertaken by me in the Department of Education under the supervision of Prof. Lokanath Mishra. For the above purpose I need your cooperation by answering the questions given below. Please rest assured that your responses will be kept strictly confidential and will be used for research purpose only. There are two (2) alternatives in each question. You should answer each question by putting a tick mark (✓) in the appropriate bracket.

Part -A

Name of the respondent:

Name of the school:

Gender:

Age:

Class:

Part-B

1. What type of learning practices do you like the most?
    a. Teachers focuses on the course content only ( )
    b. Teachers encouraging students to develop new and original ideas ( )

2. Do you ask your teacher to further elaborate a topic you already understand?
    a. Yes, I like to increase my command over the topic ( )
    b. No, I am satisfied with what I already know ( )

3. Which learning style do you generally use?

a. I learn exactly how the teachers tells me to learn ( )

b. I learn in a manner that suits me the most ( )

4. What does your teacher do when you give your ideas, thoughts and opinion in the classroom?

a. The teacher acknowledges my inputs only when its correct ( )

b. The teacher acknowledges my inputs even if it is incorrect ( )

5. When a teacher tells you to participate in a demonstration, what do you do?

a. I try not to be part of the demonstration ( )

b. I willingly take part in the demonstration ( )

6. What do you do when you are given a group assignment?

a) I do my part of the group assignments on my own ( )

b) I collaborate with my classmates to do the assignment. ( )

7. When you encounter a concept which is extremely difficult, what do you do?

a) I simply memorise the whole topic ( )

b) I try to understand it by breaking the topic into small parts ( )

8. When writing answers that require examples, what do you do?

a) I pick examples given in the textbook ( )

b) I use my own examples based on my own ideas and observations of my immediate surrounding ( )

9. What kind of learning resources do you use when studying at home?

a) I use the recommended books prescribed by the teacher and the school board ( )

b) I use every learning resources available, including the internet, teachers note and prescribed text books. ( )

10. What kind of teaching tools do you use inside the classroom?

a) I use my notebook and textbook only. ( )

b) I use Textbooks, Whiteboards and other available tools like Projector, Charts, Diagrams etc ( )

11. During class.do you discuss with other students while solving a problem

a) I do my class tasks on my own ( )

b) I discuss matters with my classmates while solving a problem. ( )

12. Do you pay attention to other student when they express their ideas?

a) I pay close attention to what my classmates are saying ( )

b) I don't pay attention to what my classmates are saying ( )

13. When a new chapter is started by your teacher, what do you do

a) I try to recall what i learned in the previous chapter. ( )

b) The teacher begins a new chapter after quick revision of previous chapters ( )

14. When a topic is difficult to understand what do you do?

a) I keep reading the same topic over and over till I understand it. ( )

b) I try to find new and different way of understanding the topic. ( )

15. When a new topic is introduced which you are new to what do you do?

a) I try to understand it the way my teachers tells me to ( )

b) I try to create new ideas about the topic ( )

16. When in doubt about a topic, do you ask questions to your teachers or friends?

a) I try to manage on my own ( )

b) I seek assistance from my teachers or friends. ( )

c)

17. When a teacher gives you a solution to a problem, do you think there can be other solutions??

a) I simply follow the solutions given by my teacher. ( )

b) I try to find other solutions to the problem ( )

c)

18. Do you help your fellow classmates in solving problem? (reciprocal learning)?

a) Yes, if there is a topic i can teach my friends, i do it. ( )

b) No, i leave it up to the teacher to help my classmates ( )

19. Do you help your classmate in solving problems to improve your own understanding??

a) Yes ( )

b) No ( )

20. Do you enjoy assignments and projects that requires team work?

a) Yes, i like working in a team ( )

b) No, no i prefer doing my tasks alone. ( )

Appendix- F

Constraints of Adopting Constructivist Teaching-Learning Approach

Dear Sir/Madam,

A research study entitled "*Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study"* is undertaken by me in the Department of Education under the supervision of Prof. Lokanath

Mishra. For the above purpose I need your cooperation by answering the questions given below. Please rest assured that your responses will be kept strictly confidential and will be used for research purpose only. There are two (2) alternatives in each question. You should answer each question by putting a tick mark (✓) in the appropriate bracket. Which of the following constraints do you face while teaching using constructivist teaching methods.

Part -A

Name of the respondent:

Name of the school:

Gender:

Teaching experience

Major Subject

Age:

Qualification:

Part-B

Sl. No	**Constraints faced while practicing constructivist approach to teaching**	**Yes**	**No**
1.	Freedom provided by the headmaster	( )	( )
2	Use TLM to supplement teaching	( )	( )
3	Funds for buying necessary teaching aids instructional tools	( )	( )
4	Liberty to take the students for excursions	( )	( )
5	Social distance between students and teachers	( )	( )
6	Difficulty in covering the syllabus on time	( )	( )
7	Colleagues are less interest in this method	( )	( )
8	Classroom management is difficult	( )	( )
9	Large class size	( )	( )

10	Scarcity of learning resources	( )	( )
11	Teachers lack of knowledge and skill of constructivist approach to teaching	( )	( )

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ANNEXURE – I

Mizoram University (A central university)

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DEPARTMENT:	EDUCATION
TITLE OF THE THESIS:	CONSTRUCTIVIST APPROACH AND TEACHING LEARNING PROCESSES IN SECONDARY SCHOOLS OF MIZORAM: A CRITICAL STUDY
DATE OF ADMISSION:	19-03-2019

APPROVAL OF RESEARCH PROPOSAL

DATE OF DRC MEETING:	15-04- 2019
DATE OF BOS MEETING:	26-04- 2019
DATE OF SCHOOL BOARD MEETING:	08-05-2019

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ABSTRACT

CONSTRUCTIVIST APPROACH AND TEACHING LEARNING PROCESSES IN SECONDARY SCHOOLS OF MIZORAM: A CRITICAL STUDY

AN ABSTRACT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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SEPTEMBER, 2022

ABSTRACT

CONSTRUCTIVIST APPROACH AND TEACHING LEARNING PROCESSES IN SECONDARY SCHOOLS OF MIZORAM: A CRITICAL STUDY

BY

MIKAEL L CHUAUNGO

DEPARTMENT OF EDUCATION

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Submitted

In Partial Fulfilment of the Requirement of the Degree of Doctor of Philosophy in Education of Mizoram University, Aizawl

Abstract

In this digital era the teachersarefacilitatorsofstudents'learningandcreatorsofconducive classroom environments for developing students' skills. Teaching involves the process of development and changed the present scenario and adoptedtheconstructivistapproach.Literally it is said that constructivist means learning through producing (Jonassen,1991).Thistermisassociatedwithconstructivismandconstructivistparadigm whichmeansknowledgeconstruction.Thelearnersconstruct,findordevelopmeaning in their subjective experiments and their result becomes knowledge for them.Naylon and Keogh (1999) suggested that, the key concepts of this method are that learners can only make sense of new situations in terms of their prior understanding, and that learning is an active process in which learners generate meaning by connecting new ideas with prior knowledge

Thestudentsconstructknowledge through exploration, interpretation, and interaction with the environmentandlearn the content concurrently(BrooksandBrooks, 1993). Traditional classrooms provide sufficient opportunities to students for activeparticipationinlearningprocessincontrasttoconstructivistclassroomwhereample opportunities have been present for learner to observe, explore, execute, interact, raisequestion and discuss views (Kumar and Gupta, 2009). Now a days teacher education curriculum is enriched with constructivist approach of teaching likelearningtheories,programmedinstructions,masterylearningstrategiesandmodelsof teaching.Atpresent,instructionalstrategiesarebeingdevelopedforeffectiveteachinglike 5Esmodelsof teaching.

5 E's learning model is a well-known constructivist learning model in scienceandotherschoolsubjects.Thisenablesthelearnerstobemorecuriousandgetfamili ar with the real world and transfer the information. The engage step of 5 E model provides opportunity to the teachers to understand thelevel of students and grab attention by story, video, experimentation. The unanswered questions were resolved

in the explore step wherestudents'activityisthehighest.Thestudentsreachedtosomeinformationusingvarioussourceslikechart,discussion. Explain is the step where teacher helps the students to combine theresults of their own experiences. The elaboration step or deepening stepallows students to apply new definition, explanation and skills. The evaluation is thestep in which students are expected to demonstrate their understanding and reveal thechange in their behavior. Teachers are the firstimportant factor influencing the effect of teaching procedures and students are thesecondfactorinfluencingtheeffectofteachingmethod.Eachstudentrespondsdifferentlytovariousinstructionalstrategies.Learnersconstructknowledgethrough active engagement in the process of learning. In a constructivist classroom, the teacher's goal is to guide students by pressing and asking questions that will allow them to make their own conclusions and build their own judgements on the subject, thereby adding meaning to the obtained information based on their personal experiences. The function of the teacher is to begin and lead the learning process. Teachers must create learning environments in which students may actively participate in their own learning and obtain information via inquiry and questioning. Rather than dominating the learning environment, the teacher's role is to allow students to become explorers and experiment architects, testing ideas 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.

Secondary education serves as a foundation for further education, research, and contributions to the growth and progress of humanity and the nation. If secondary school students can grasp concepts properly, they will be able to quickly progress to higher education and contribute significantly to the nation's development. Constructivism is a learning theory that is extensively used in the west and is gaining traction in our country due to its effectiveness in the teaching-learning process. As noted in the preceding section, cramming is frequently used by students at all levels of education in Mizoram in order to achieve good grades and marks on examinations.

There is a shortage of secondary school teachers in Mizoram, as a result of which children are often found to be behind in their studies. To teach these two crucial disciplines, teachers must use a constructivist approach. Secondary school teachers and teacher educators working in teacher education institutions such as DIETs and IASE must be adequately oriented and trained to execute their tasks. As a result, awareness is a requirement for practice. If we want our teachers to use a constructivist approach to teaching, we must ensure that they have the necessary knowledge and awareness. Only then will they be able to put it into practice. Therefore, thepresent study has been focused on the awareness practices and perceptions of secondary school teachers of Mizoram on constructivist approach of teaching and learning.

Research Questions

1. Are Mizoram's secondary school teachers well familiar with the constructivist method to teaching?
2. Is there a difference in awareness of the constructivist method to teaching and learning among Mizoram secondary school teachers in relation to their teaching subject?
3. Do the secondary school teachers of Mizoram practice constructivist teaching methods in their classroom?
4. Is there a difference in the practices of Mizoram's secondary school teachers when it comes to the constructivist approach in relation to their teaching subject?
5. How often do the secondary school students of Mizoram practice constructivism in their learning practice?
6. How do Mizoram’s secondary school teacher perceive constructivism as a theory of teaching and learning?
7. Is there any relationship between awareness, practice and perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy?
8. What are the difficulties and challenges faced by secondary school teachers of Mizoram with regard to the adoption and practice of

constructivist pedagogy?

Statement of the Problem:

While there has been various research work done on constructivist teaching learning approaches and practices, none have focused on secondary school instructors and students in Mizoram. It is critical to understand the present degree of understanding of constructivist teaching and learning techniques in Mizoram secondary schools so that relevant agencies may implement new policies and changes to enhance the education system.

Although constructivism and constructivist teaching learning theories is no longer a novel concept in our present day world, the fact that it is still out of the reach for many students shows how much we falter behind when it comes to educational development. In Mizoram, like the rest of the country, traditional teaching practices that is dominated by lectures and rote memorisation is still prevalent. Schools as well as the guardians of the students are still fixated on high scores in exams which has encouraged detrimental learning practices among students. Teachers lack the training and expertise to educate students using a constructivist method due to lack of awareness, lack of in-service and pre-service training, lack of sincerity towards their profession, and various other factors. Support for research is required to uncover the root of this problem and deal with the issues that plague the current education system. Despite the fact that various literatures have been produced in this regard, very few imperial investigations that highlight grass root problems are available

To reveal the answers to the research questions stated above and get satisfactory resolution to the underlying issue, the following research problem is proposed to be undertaken:

"Constructivist Approach and Teaching Learning Processes in Secondary Schools of Mizoram: A Critical Study".

Delimitation of the Study

The research is delimited to four (4) districts of Mizoram namely Aizawl, Mamit, Lunglei and Kolasib. Further, it was delimited to the government schools affiliated to Mizoram Board of Secondary Education

Objectives of the Study:

1. To assess the awareness of secondary school teachers of Mizoram relating to constructivist approach to teaching and learning.
2. To compare the awareness of Secondary school teachers of Mizoram relating to constructivist approach to teaching and learning with reference to their teaching subjects (English, Math, Science, Social Science).
3. To reveal the practices of secondary school teachers of Mizoram in adopting constructivist pedagogy and role.
4. To compare the practices of secondary school teachers of Mizoram in adopting constructivist pedagogy with reference to their teaching subjects. (English, Math, Science, Social Science).
5. To reveal the learning practices of secondary school students of Mizoram in the context of constructivist approach.
6. To compare the learning practices of secondary school students of Mizoram in the context of constructivist approach with reference to their gender.
7. To find out the perception of Secondary School Teachers teaching different subjects in Mizoram adopting Constructivist Teaching-Learning Approach
8. To compare the perceptions of Secondary school teachers of Mizoram relating to constructivist approach to teaching and learning with reference to their teaching subjects (English, Math, Science, Social Science).
9. To find out the relationship between awareness, practices and perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy.
10. To reveal the constraints of secondary school teachers of Mizoram in adopting constructivist pedagogy.
11. To suggest measures for successful implementation of constructivist pedagogy in teaching and learning of different subjects in secondary schools of Mizoram.

Hypothesis of the Study

1. Secondary school teachers of Mizoram are aware of constructivist approach to teaching and learning.
2. Secondary school teachers of Mizoram teaching different subjects adopt constructivist pedagogy in teaching.
3. There is no significant difference in the awareness of secondary school teachers of Mizoram teaching different subjects relating to constructivist pedagogy in teaching.
4. There is no significant difference in the practices of secondary school teachers of Mizoram teaching different subjects adopting constructivist pedagogy.
5. There is no significant difference in the perception of secondary school teachers of Mizoram teaching different subjects adopting constructivist pedagogy.
6. The secondary school students of Mizoram practice constructivist approach in their learning practices.
7. There is no significant difference among secondary school students of Mizoram adopting constructivist approach in their learning practices with reference to gender.
8. There are no constraints faced by secondary school teachers in Mizoram in adopting constructivist pedagogy.

Operational Definitions of Key Terms:

Various words have different implications depending on where they are used. The terms used in the topic title in this study have the operational definitions listed below. The Cambridge Advanced Learner's Dictionary is used for dictionary definitions, and the meanings of the terms applicable to the circumstances are cited.

1. **Constructivist approach**: The term 'constructivist approach' in this study refers to learner-centered education in which learners utilize their prior experiences to construct information, rather than knowledge supplied to them in fully structured form.
2. **Teaching-Learning process**: In the present study, ‘teaching-learning process’ implies the process of:

a) delivery of information/knowledge to the learners by the teachers
b) receiving of information/ knowledge by the learners and
c) organizing or carrying out activities through which the learners construct knowledge

3. **Secondary schools:** In the proposed study. Secondary schools mean those schools comprising of classes IX and X.
4. **Critical study:** The term 'critical study' in the title of the proposed study refers to a study that analyses, examines and criticizes different aspects of the area of the constructivist teaching and learning.

Research Approach

The research was done using a mixed mode approach, which included both quantitative and qualitative methods. The population for the present study was all the secondary school students and teachers of Mizoram. The study was delimited to 4 districts only namely Aizawl, Lunglei, Kolasib and Mamit. In the first phase 15 secondary schools from each district were selected randomly making it a total of 60 schools. From each school 8 teachers (English, Mathematics, Science, and Social Science) were included in the sample. Thus, a total number of 480 teachers (120x4) was taken as sample of the study initially. The questionnaire was sent to 480 teachers, but responses were collected from 275 Secondary School teachers of Mizoram. Ten students from class IX (4 boys and 4 girls) of each school were randomly selected in order to reveal and compare the learning practices of secondary school students of Mizoram in the context of constructivist approach with respect to their gender. Thus, the sample of students was 400 out of which 200 boys and 200 girls.

ToolsUsed

For the present study, no premade instrument was identified to be suitable for the current investigation. Keeping the features of the sources and the research's aims in

mind, it was chosen to employ a questionnaires as instruments for collecting appropriate data for the study.

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

1) Questionnaire to determine the awareness of secondary school teachers of Mizoram relating to constructivist approach to teaching
2) Questionnaire to reveal the practices of secondary school teachers of Mizoram and their adoption of constructivist pedagogy with reference to their teaching subjects (English, Math, Science, Social Science).
3) Questionnaire to find out the students' perceptions on constructivist teaching approach in classroom.
4) Questionnaire to find out the perceptions of teachers about constructivist approach of teaching
5) Questionnaire to reveal the learning practices of secondary school students of Mizoram in the context of constructivist approach.
6) Questionnaire to determine the constraints faced by teachers in adopting constructivist approach.

While constructing the tools, components of the school such as concept of constructivist, classroom climate, teaching learning process and the end product were given attention, while making sure the questionnaires were easy to understand and the items were within the scope of the teacher's and student's understanding. Initially 40 items for each questionnaire was prepared on these components and reviewed by the investigator and the supervisor.After the questionnaires were drafted and analysed by the research guide, the questionnaires were sent to a various experts consisting of senior educationists, veteran professors, and experts with prior experience with the concept of constructivism with the following purpose:

1. If feasible, recommend any additional items for inclusion in the questionnaire and schedules.
2. To include any other relevant location.
3. To remove any region or areas, item or things that were irrelevant to the current investigation.
4. To eliminate inconsistencies, biases, inappropriate language, and wrong

terminology, among other things.

5. To investigate the relationship between the questionnaire and schedules and the study's objectives.

Procedure of Data collection

Before the data collection process was started, a route chart was plotted to cover all district and block head quarter, as well as required information such as phone numbers of headmasters/principals were collected. After reaching the school, questionnaires were distributed to students and teachers for collection of data with the help of headmaster. In the first stage researcher visited two schools. Further, school visits could not be possible due to the Covid-19 pandemic outbreak.

Then the investigator prepared the questionnaire in Google Forms and posted it in different secondary school teachers and students WhatsApp groups and requested them to answer the questions. The investigator explained how to answer the questions through online communication. Every doubt and confusions were cleared by the investigator. Finally, the study was conducted in threephases as shown below

Phase of Study	**Dates**	**Tools used**	**Procedure of data collection**
Phase 1: Pilot testing	Oct 2019	Questionnaire	Offline method
Phase 2: School Visit	March 2020	Questionnaire	Offline method
Phase 3: Collection of Data Online	March 2021	Questionnaire	Online method (Google Forms)

In Phase One, pilot testing of the research tools was done to get a clearer picture towards the research and to identify the need of modification in the research tools and validity as well as reliability checked with the help of experts and statistical techniques.

In Phase two, after undertaking all modification main research was conducted which was mainly through school visit. Due to pandemic period the school visit was stopped during march 2020.

In Phase three, the researcher converted the questionnaire in to the google doc format and posted in different Whatsapp group of teachers and students and collected the information through Google Forms. The researcher also observed the online class taken by the secondary school teachers in different subject during pandemic period. After collecting the data comparison was done on subject wise of awareness practices and perceptions of secondary school teachers.

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StatisticalTechniques

The investigator used the following statistical techniques for analyzing of thedatain the present study:

1. Descriptive statistics such as mean, median, standard deviation, were computed on the total sample to determine the nature of thedistributionofthe scores.
2. The t-test and p-value was used in order to find out Gender-wise Comparison of practices on constructivist approach of learning of Secondary School students of Mizoram
3. Post hoc test for Multiple comparison of subject-wise difference in constructivist teaching between Secondary school Teachers of Mizoram
4. Graphical techniques were used for descriptive analysis and visual perceptionof thedata.

5.1: Findings

The following are the important findings of the study:

A. **Objective #1: To assess the awareness of secondary school teachers of Mizoram relating to constructivist approach to teaching and learning.**
B. **Objective #2: To compare the awareness of secondary school teachers of**

Mizoram relating to constructivist approach to teaching and learning with reference to their teaching subjects (English, Math, Science and Social Science).

1. With regard to awareness on constructivist teaching and learning approach, all the groups of teachers of various subjects (English, Social science, Mathematics and Science) have moderate level of awareness.
2. About 19.2% of secondary school teacher of Mizoram have low level of awareness on constructivist methods of teaching and learning with a male and female breakup of 18.75 and 18.45 respectively.
3. Majority (60.2%) of the teachers in all subjects (English, Social Science, Math and Science) have moderate level of awareness regarding constructivist approach to teaching and learning with a male and female breakup of 61.1% and 63.2% respectively
4. About 20.6% of secondary school teacher of Mizoram have high level of awareness on constructivist methods of teaching and learning with a male and female breakup of 20.2% and 18.5% respectively

C. Objective #3:To reveal the practices of secondary school teachers of Mizoram in adopting constructivist pedagogy and role.

D. Objective#4: To compare the practices of secondary school teachers of Mizoram in adopting constructivist pedagogy with reference to their teaching subjects. (English, Math, Science, Social Science).

5. About 8% of secondary school teacher (with a male and female breakup of 9.35% and 6.61% respectively) of Mizoram have low level of practice on constructivist methods of teaching and learning in classroom situation,
6. A majority (68.72%) of secondary school teachers of Mizoram weremoderately practicing constructivist approach in their teaching and learning in classroom situation.
7. About 23.27% of secondary school teachers of Mizoram have high level of practice of constructivist approach in their teaching.

8. About 28.33% of secondary school science teachers of Mizoram have high level of practice of constructivist approach in their teaching in comparison to english (25.75%) social Science (26.5%) and mathematics (20%)
9. Similarly, About 4.6% of secondary school social science teachers of Mizoram have low level of practice of constructivist approach in their teaching in comparison to English (6.06%) , Science (10%) and Mathematics (11.7%)

E. Objective #5:To compare the learning practices of secondary school students of Mizoram in the context of constructivist approach with reference to their gender.

10. With respect to practices of secondary school students on constructivist learning, only 46.2% (with male, 50.9% and female, 41%) of students respondents have moderate level of practices; whereas 38.7% of secondary school students have low level of practice and 14.5% of students having high constructivist learning practices.
11. There is no significant difference between male and female students of secondary schools of Mizoram with regard to constructivist approach on learning practices.

F. Objective #6: To determine the students' perception about teachers' constructivist role in teaching.

12. With respect to teacher's facilitating role as perceived by students 64.5% of secondary school teachers negotiate with their students.
13. About 13% secondary school teachers encourage and accept student's autonomy and initiatives.
14. About 75.55% of secondary school teachers ask thought-provoking open-ended questions to the students in the classroom.
15. A majority of the secondary school teachers (72%) make the classroom conducive and facilitating for collaborative learning.
16. With regard to teachers' relationship building role as perceived by students, a majority of the secondary school teachers of Mizoram (80%) positively value all the learners in the classroom and 87% of teachers encourage democratic relationship in the classroom.

17. A majority of the students of secondary school (91%) say that their teachers encourage students to work in cooperation with them.
18. About 64.5% of secondary school students of Mizoram say that teachers engage students in dialogue both with students and among themselves.
19. A very few students (19.7%) opined that teachers are familiar with the interest of students and their likes and dislikes.
20. With regard to scaffolding role of teacher, 88% of students say that teachers taught the new lesson by joining with previous experiences.
21. A majority of students (83%) say that teachers continuously reassure students' learning progress through authentic assessment.
22. About 64% of secondary school students of Mizoram say that teachers provide them enough time for activities.
23. About 66% of student of secondary school students of Mizoram say that teachers relate the classroom activities with real experience.
24. About 76% of secondary school students say that teachers structure learning from mistake.
25. In total, 67% of the student respondents say that their teachers play the scaffolding role properly.
26. With regard to teachers' reflection role as perceived by students, 90% say that teachers encourage students to reflect on teaching and learning process.
27. A majority of the students (89%) say that teachers monitor, evaluate and revise their teaching practice continuously.
28. A small percentage of students (3%) say that teachers make students present their ideas first before sharing his/her ideas.
29. The level of constructivist teaching practice and teacher's overall involvement on constructivist teaching practice in the classroom is low. ($t=-3.532$; $p < 0.05$)

G. Objective #7: To find out the perception of secondary school teachers teaching different subjects in Mizoram adopting Constructivist Teaching-Learning Approach

H. Objective # 8. To compare the perceptions of secondary school teachers of Mizoram relating to constructivist approach to teaching and learning

with reference to their teaching subjects (English, Math, Science and Social Science).

30. With regard to perception of secondary school teachers teaching different subjects in Mizoram, majority of the teachers have moderate perception of constructivism as a teaching – learning approach.
31. With regard to relationship task with student's real-life, 44.7% of the secondary school teachers of Mizoram think that the task should have close relationship with real life when it comes to individual tasks. However, 48.5% of the teachers think that group tasks should be from the book and irrespective of its relationship with real-life.
32. In terms of self-regulation of student tasks, majority of the secondary school teachers of Mizoram (44.3%) think student should personally regulate the way they perform the task; however, they may interact with fellow students to complete their individual task.
33. Majority of the secondary school teachers of Mizoram (49.8%) agree and a considerable number of teacher (36.4%) strongly agree that idea construction can happen in individual activities. When it comes to group activities, majority (56.8%) of teachers strongly agree and a considerable amount of teachers (38.9%) agree.
34. A majority of secondary school teachers of Mizoram (87.3%) believe that in an individual setting new knowledge should alter student's prior knowledge**.** In group setting, the proportion of teachers supporting this idea drops a bit (71%).
35. In the context of individual setting, majority of the teachers (53.4%) believe that it is not possible for students to immediately explain their ideas while 30.3% of the teachers believe students should be able to explain their ideas. In a group setting, majority of the teachers (44.7%) believe students should be able to explain their ideas.
36. Majority of the teachers (74%, 70% & 66%) believed that when it comes to question answer session (that usually occurs after a topic is covered) the questions should be relevant to student's everyday lives, previous knowledge and enable students to express their ideas.

37. Majority of the teachers (93%) implement question-answer method to help students recall what they have learnt in class. Most of the teachers (87%) do so to find out the students past knowledge. However, 67% of the teachers use this strategy to control the classroom.

I. Objective #9. To find out the relationship between awareness, practices and perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy.

J. Objective #10. To compare the relationship between awareness, practices and perceptions of secondary school teachers of Mizoram relating to constructivist pedagogy.

38. In comparison of awareness and perception of secondary school teachers of Mizoram teaching different subjects in relation to constructivist approach of teaching and learning it is found that there is no significant difference between them.
39. In comparison of practices of secondary school teachers of Mizoram teaching different subjects in relation to constructivist approach of teaching and learning it is found that there is a significant difference between mathematics and science teachers, as well as between English and social science teachers.
40. There is no significant difference among awareness, perception and practices of secondary school teachers of Mizoram teaching various subjects.
41. There is positive and significant relationship between awareness and perceptions, awareness and practices, and perceptions and practices of secondary school teachers in Mizoram on constructivist teaching learning approach.

K. Objective # 11: To reveal the constraints of secondary school teachers of Mizoram in adopting constructivist pedagogy.

42. With regard to the constraints faced by the teachers of secondary schools of Mizoram every teacher, irrespective of their subjects, say they faced the problem of scarcity of learning resources.
43. A majority (80%) of secondary school teachers made use of the teaching learning materials available to them for teaching, which shows that teachers in Mizoram are more than willing to make use of all the available resources and accommodate these aids in their day-to-day teaching activities.

44. Majority of teachers (77%) enjoy the liberty to conduct co-curricular and extra-curricular activities.
45. Majority (55%) of secondary school teachers of Mizoram feel the lack of social distance between students and teachers.
46. A majority (91.5%) of secondary school teachers face difficulty in covering the syllabus in due course of time with constructivist approach of teaching.
47. Many teachers (171) said that their colleagues show lack of interest in teaching using constructivist approach.
48. Eighty-three percentage of teachers face difficulties to manage the class while teaching in constructivist approach.
49. All teachers opined that they face scarcity of learning resources for using constructivist approach in teaching.
50. Majority of the teachers (73%) admitted that they lack adequate knowledge and skill for using constructivist approach in teaching and learning process effectively.

Suggestions

Thefollowing suggestions weredrawn on thebasisof results of the study and review of related literature:

1. Initiative should be taken to create awareness among the secondary school teachers of Mizoram about constructivist approach of teaching and learning by governmental and non-governmental organisation irrespective of different school subjects.
2. Hands on experiences should be given to the secondary school teachers of Mizoram for practicing constructivist approach in teaching and learning process irrespective of the different school subject.
3. Secondary school teachers of Mizoram should fully adopt the different roles (Facilitating role, relationship building role, scaffolding role, reflection role) as per constructivist approach of teaching irrespective of all the teaching subject.
4. Secondary school teachers of Mizoram should focus on collaborative learning, brainstorming, discussion, inquiry approach, oral translation, use of software and ICT tools, experimentation, anchored instruction, critical

thinking, scientific models, project work while teaching the subject in the class.

5. Secondary school teachers of Mizoram should give tasks which have close relationship with real life situation while teaching, irrespective of all subjects.
6. Government of Mizoram should give training to in-service teachers on constructivist approach to teaching-learning through Samagra Shiksha.
7. Department of Education, Mizoram University should organize teacher training programmes on Constructivist approach to teaching-learning through internship programme of Pre-service secondary teachers
8. During internship period 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.
9. Institutions imparting in-service training for teachers should try to change the traditional perspective of teaching that is present in the minds of teachers.
10. Teacher student relationship should be enhanced by organizing different co-curricular activities in which both the teacher and students will be involved.
11. Scheme of the subjects should be prepared in accordance with constructivist approach of teaching to cover the syllabus in time.
12. Principal/Headmaster of secondary schools of Mizoram should give incentives (monetary, award, recognition) to teachers for adopting constructivist teaching methods.
13. Classroom management training should be given to in-service secondary school teachers of Mizoram.
14. Adequate learning resources may be provided to the teachers for following constructivist approach of teaching.
15. Secondary school teachers of Mizoram should use teaching learning material frequently while teaching irrespective of all subjects.
16. When imparting training to pre-service teachers, focus should be made on participatory teaching and learning, communication skill, linking previous knowledge to new topic, making and use of appropriate teaching learning

materials, encouraging comprehension rather than memorization.

17. Similarly, pre service teachers should be encouraged to develop lesson plans based on constructivist approach of teaching.

Educational Implications of the Study.

The current study discovered that constructivist theories of teaching and learning are not new to the teachers of Mizoram. However, the current level of integration and implementation of constructivist ideas in the education system is unsatisfactory. This study has wide implications upon the various interest groups of Mizoram education system.

For Students:

The biggest beneficiary of constructivist pedagogy is the student. Although the students felt the teachers were implementing constructivist teaching methods to a certain extent, the data showed that teachers' actual practice of constructivist teaching overall is low. Teachers need to realise that students not only benefit from constructivist style of teaching, but are also more eager and positive than traditional style of teaching. The methods applied by teachers can be applied by students during self-study so constructivist pedagogy has more benefits than it may seem. This study will show the students what they are missing out, and introduce them to concepts beneficial to them such as collaborative learning and inquiry approach to learning. It will also make students aware of what to expect in a constructivist classroom. Students can take the initiative to let their teachers know what style of teaching they prefer and ask the teacher to conduct activities such as collaborative learning.

For Teachers:

Every trained teacher is, or is expected to be, aware about constructivist approach to teaching and learning to the extent that they can practice it in their classroom. However, this study show that their level of awareness and level of actual classroom practices was unsatisfactory. Data on student's perception on teachers practices and

their own practice at home shines a light on the harsh reality that our teachers are not up to mark. Constructivist pedagogy is not an optional method, it is in fact essential for the optimal development of a student's educational growth, as proved by several studies. Teachers need to reflect on themselves, on how much they know, how much they practice and their overall perception of constructivist approach to teaching and learning.

The finding shows teacher all the essential elements of constructivist pedagogy that they skipped over or ignored. No matter how much practical skills and knowledge one attained during their teacher training course regarding constructivist pedagogy, it can easily fade away when they are not put into practice. Effort must be made on their part to try their best to integrate constructivist teaching and learning theories and ideas into their classroom practice. Based on the findings on the awareness level of the teachers, teachers will develop the mindset to try their best to take advantage of every opportunity that gives them training on modern teaching methods and practices (such as seminars, workshops etc.). Lesson plans should be strictly made and maintained by teachers so as to keep lessons organised and well-adjusted to fit the limited time frame of a class period.

For Administrators

Administrators may not have the training received by teachers, especially on modern ideas such as constructivism. However, their main interest lies in improving the educational practices of the institution and bringing out the best learning outcomes. This study will let the administrators develop awareness about the present condition of not just their school but every other school in the State. This study will encourage them to take action on various regards, such as:-

i. Ensuring the teachers are given the freedom, as well as encouragement to forego traditional teaching methods and adopt modern teaching methods inspired by constructivist theories.

ii. Providing teachers with ample opportunities to undergo training, workshops and seminars that aims to improve the teaching-learning practices in schools

iii. Re-designing the school's academic framework and its programs so that it can promote constructivist teaching and learning.

iv. Make school programs flexible so that teachers can experiment and try out new teaching methods without being under the pressure of the tight schedules set by theschool's academic calendar.

v. Make classrooms more accommodating to non-traditional teaching methods.

For Curriculum Planners

This study will be an eye opener for curricular planners because whatever the teacher or the school administrator does, is within the confines of the curriculum and a lot rests upon the curriculum planners' shoulders to create a conducive platform that allows constructivist teaching and learning. MBSE, which is the State Board responsible for the school curriculum should design text materials as per state board and center level regulations while being based on the constructivist approach. Curriculum planners should give clear and practical instructions for selecting and using topic material that is appropriate for this method in order to improve the efficacy of teaching. The moderate level of perception and awareness shown in this study will help curriculum planners realise that there is a discrepancy between what the teachers are told to do and what they actually do in the classroom. Curriculum at the teacher educational level as well as the secondary school level needs to be designed hand in hand so that the teachers are trained to deliver constructivist teaching in under a constructivist friendly curricular plan.

Suggestions for Further Study

Based on the findings and experience of the present study, the following suggestions are made for the further research in the area of constructivist approach to teaching and learning

1. A study on other modern models of teaching, such as flipped classroom, ICT based learning, Visual, Auditory, and Kinesthetic (VAC) Teaching; Gamification etc. should be conducted, so as to see its feasibility and

applicability in the context of secondary education in Mizoram.

2. A study on constructivist approach to teaching and learning should be taken with a wider scope or on a different population, such as private schools or schools in remote regions.
3. Similar studies should be taken in other states of India to compare and contrast the different successes and challenges faced across the country regarding the implementation of constructivist approach of teaching and learning.
4. Similar studies may be conducted on multi-disciplinary subjects at higher level.
5. Effect of 5 E Models can be studied on different subjects at secondary level of Mizoram
6. Other variables like retention, critical thinking, interest; problem solving may be explored to check the effectiveness of constructivist approach in secondary schools of Mizoram.

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